Chapter 2

A NOTE ON INCOME AND POVERTY OF PERSONS WITH DISABILITIES IN METRO MANILA[1]

Soya Mori and Tatsufumi Yamagata

I. Introduction

This chapter elaborates income and poverty related aspects of the analyses developed in the previous chapter. First, the differences in income level and poverty indices by disability are statistically examined. Second, determinants of income are singled out by estimation of the Mincer equation, which will be described shortly.

Main conclusions are the followings: (1) the incidence of poverty is higher among sample PWDs than that of total population in Metro Manila; (2) the depth of poverty is greater among sample PWDs, too; (3) female PWDs are less privileged than male PWDs with the same level of education, age, marital status and sort of disability; and (4) large variations among PWDs in income and level of education. In other words, while there are some PWDs who made a great achievement in business and life, a substantial number of PWDs have very low monetary income with low level of education.

The rest of chapter is organized as follows. The next section scrutinizes level of income and poverty by disability. The section 2 shows empirical results of the Mincer equation and estimation of rate of return on education. The final section provides concluding remarks.

II. Income and Poverty of PWDs in Metro Manila

Income by Disability

[1] The authors gratefully acknowledge Tomohiro Machikita for valuable comments made in the middle of analyses.

The level of monetary income was analyzed in the previous chapter from various viewpoints. In this section the variation in income is highlighted.

The simple average of annual income of sample PWDs is 60,173 peso which is roughly equivalent to 1,200 US dollars. However, a great variation in income among sample PWDs. An interesting observation is that there is a significant difference in income among sample by disability.

Table 1. Difference in Personal Income by Disability

Variable	Coefficient	Ordinary Standard Error			Robust Standard Error		
		Standard error	*t*-value	*p*-value	Standard error	*t*-value	*p*-value
Constant	55,224.7	7,377.0	7.49	0.000	6,948.7	7.95	0.000
Dummy: Visual	19,188.6	9,897.5	1.94	0.053	9,390.0	2.04	0.042
Dummy: Hearing	-9,641.2	10,596.2	-0.91	0.363	10,770.0	-0.90	0.371
Dummy: Cognitive	2,287.8	43,539.0	0.05	0.958	24,895.0	0.09	0.927
Dummy: Others	-14,772.2	19,567.7	-0.75	0.451	12,044.6	-1.23	0.221

Note: The dependent variable is personal income. The reference disability is the mobility impairment. The R-squared and the adjusted R-squared are 0.022 and 0.012, respectively. The number of observations is 397.

Table 1 displays results of a simple exercise where income level is regressed to dummy variables of impairments. The reference disability is the mobility impairment, so that a coefficient on a disability dummy incorporates a difference in income between persons with the particular disability and those with mobility impairments[2].

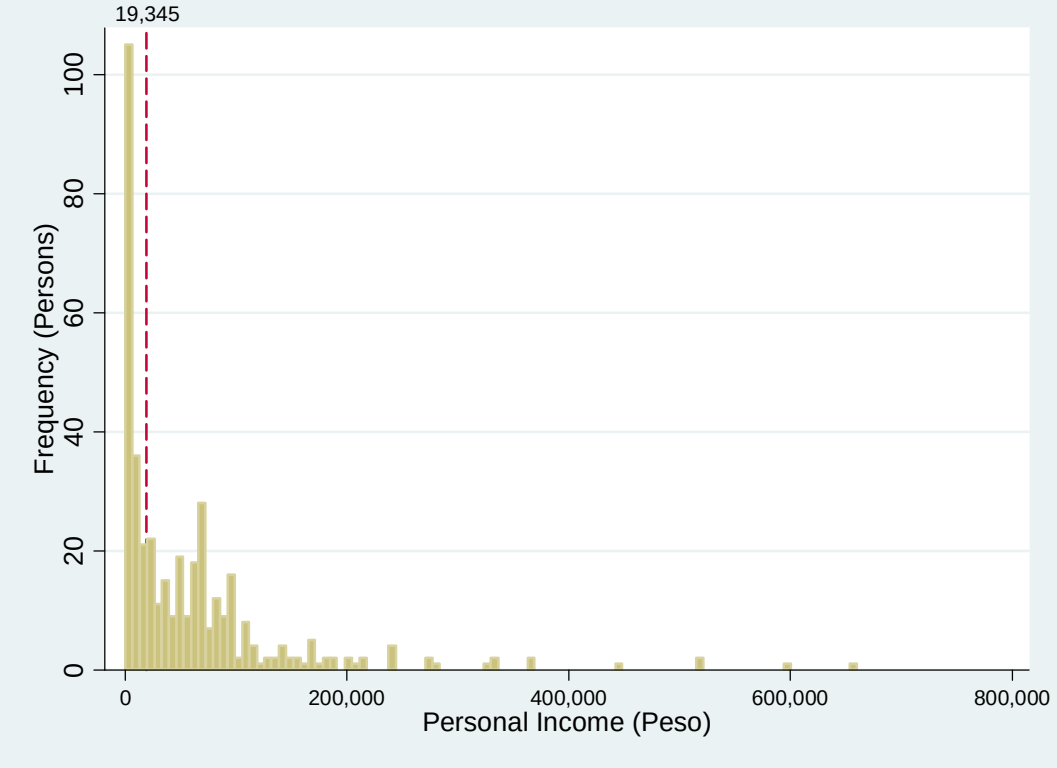
An impressive finding in Table 1 is that the estimated coefficient on the visual impairment dummy is significantly positive of 95 percent significance level if the robust standard error[3] is invoked. Since the *p*-value of the same coefficient with the ordinary standard error is as low as 5.3 percent, the significance of the visual impairment dummy is not affected very much by choice of standard error. This result implies that persons

[2] There is only one sample who has a mental impairment. Since the mental impairment dummy sometimes destabilizes estimation results, the mental impairment dummy is suppressed.

[3] The robust standard error reflects correlation between the squared error term and the explanatory variables and take care of possible heteroscedasticity.

with visual impairments are more likely to have high earnings among the sample PWDs.

Figure 1. Histogram of Sample in Personal Income



Note: The broken line indicates the poverty line in Metro Manila in 2007, which was released by the National Statistical Coordination Board, the Philippines.

The underlying factor affecting the significantly positive coefficient on the visual impairment dummy is that our data contain quite a few number of successful massagers with visual impairments. The teacher is another high income occupation for persons with visual impairments. Please refer to the previous chapter for details.

The dummy variables of the other impairments are all statistically insignificant.

Poverty Indices

A highly important and interesting question which this chapter addresses is the degree of poverty of PWDs. This has not been scrutinized in any developing countries, yet,

despite its seriousness and broadness which are casually observed all over the world.

Figure 1 depicts the distribution of sample PWDs in the level of personal income. It is apparent at a glance that there are a small number of persons who have high earnings. That implies high skewness of the distribution, which is a general feature observed in income distribution of any groups of people.

The broken line drawn at the income of 19,345 peso is the poverty line constructed by the National Statistical Coordination Board (NSCB) for Metro Manila in 2007[4]. People whose income is below the poverty line is categorized as the poor, and the poverty line is fundamental to measure degrees of poverty.

Table 2 shows values of poverty indices calculated with our data. As references, the same indices for Metro Manila which were computed with the *Family Income and Expenditure Survey* conducted by NSCB in 2006 are shown in the third column. This survey covers both PWDs and non-PWDs. Since the composition of PWDs and non-PWDs reflect that of total population, the poverty indices represent situations of non-PWDs more.

The choice of poverty indices shown in Table 2 is conventional[5]. The head count ratio is nothing but the ratio of people living below the poverty line to total population, and known as P0. The poverty gap ratio is the ratio of income gap between actual income of the poor and the poverty line to the amount of the hypothetical total income for the case that everybody has income which is equal to the poverty line. The poverty gap ratio reflects the depth of poverty and is known as P1. Finally, the squared poverty gap ratio penalizes income inequality among the poor by squaring the poverty gap ratio for each of the poor. It is known as P2, and called the “severity of poverty” by NSCB in the Philippines.

The head count ratio of our data is 40.8 percent which implies that PWDs living below

[4] See the following site (http://www.nscb.gov.ph/poverty/2006-2007/pov_th_07.asp).
[5] For details, see Deaton [1997] and Foster, Greers and Thorbecke [1984] among others.

the poverty line to total sample PWDs is 40.8 percent. The corresponding figure from the FIES 2006 which represents non-PWDs more is 10.4 percent. The ratio for PWDs is remarkably higher than that for non-PWDs[6]. The poverty gap ratio and the squared poverty gap ratio from our data are remarkably higher than the counterparts of FIES. What really are impressed is a great difference in the squared poverty gap ratio. Since this index emphasizes inequality among the poor, this great difference appears to incorporate high inequality among sample PWDs. In fact, 162 sample PWDs live below the poverty line and 74 out of them have no monetary income including income transfer.

Since most of samples of our data are based on the lists of PWDs which the Local Government Units maintain for comprehensive services to them, the percentage of poor PWDs in our data might be greater than reality. Thus, there could be downward bias in income in our data. However, even a downward bias is taken into account, the head count ratio of 40.8 of our data still looks considerably higher than the same ratio of 10.4 from FIES 2006. Therefore, it is highly likely that PWDs's poverty is wider and deeper than that of non-PWDs.

Table 2. Poverty Indices in Metro Manila

	IDE-PIDS Survey 2008	FIES 2006
Head Count Ratio	40.8	10.4
Poverty Gap Ratio	30.6	1.5
Squared Poverty Gap Ratio	27.0	0.5

Note: FIES is the abbreviation of the *Family Income and Expenditure Survey* which was conducted by the National Statistical Coordination Board in the whole country in 2006. The figures of the FIES 2006 are cited from Tables 2 and 11 of the following site: http://www.nscb.gov.ph/poverty/ 2006_05mar08/tables.asp. The squared poverty gap ratio is called the "severity of poverty" on the site.

[6] Precisely speaking, figures from the FIES represent both non-PWDs and PWDs. However, since the reported ratio of PWDs in total population is as low as 1.23 percent according to *2000 Census of Population and Housing* (NSO [2004]), the FIES data incorporate non-PWDs mostly.

Table 3. Difference in Head Count Ratio by Disability

	Linear Estimation		Binary Estimation			
Estimation Method	OLS	OLS	Logit	Logit	Probit	Probit
Standard Error	Ordinary	Robust	Ordinary	Robust	Ordinary	Robust
Constant	0.422**	0.422**	-0.303	-0.303	-0.189	-0.189
	(0.041)	(0.043)	(0.177)	(0.179)	(0.110)	(0.111)
	[0.000]	[0.000]	[0.088]	[0.091]	[0.087]	[0.088]
Dummy: Visual	-0.172**	-0.172**	-0.792**	-0.792**	-0.485**	-0.485**
	(0.055)	(0.055)	(0.254)	(0.256)	(0.153)	(0.154)
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Dummy: Hearing	0.185**	0.185**	0.741**	0.741**	0.461**	0.461**
	(0.059)	(0.062)	(0.256)	(0.259)	(0.159)	(0.159)
	[0.002]	[0.003]	[0.004]	[0.004]	[0.004]	[0.004]
Dummy: Cognitive	-0.218	-0.218	-1.021	-1.021	-0.625	-0.625
	(0.216)	(0.193)	(1.136)	(1.154)	(0.650)	(0.655)
	[0.314]	[0.259]	[0.369]	[0.376]	[0.336]	[0.340]
Dummy: Others	-0.023	-0.023	-0.108	-0.108	-0.059	-0.059
	(0.109)	(0.123)	(0.485)	(0.541)	(0.290)	(0.316)
	[0.833]	[0.852]	[0.824]	[0.842]	[0.838]	[0.851]
$R^2, \bar{R}^2$	0.086,0.077	0.086, -	-	-	-	-
Log Likelihood	-	-	-251.50	-251.50	-251.49	-251.49
Observations	399	399	398	398	398	398

Table 4. Difference in Poverty Gap Ratio by Disability

Estimation Method	OLS		Tobit	
Standard Error	Ordinary	Robust	Ordinary	Robust
Constant	0.329**	0.329**	-0.234	-0.234
	(0.036)	(0.038)	(0.165)	(0.171)
	[0.000]	[0.000]	[0.157]	[0.173]
Dummy: Visual	-0.131**	-0.131**	-0.666**	-0.666**
	(0.048)	(0.048)	(0.223)	(0.234)
	[0.007]	[0.007]	[0.003]	[0.005]
Dummy: Hearing	0.097	0.097	0.417	0.417*
	(0.051)	(0.054)	(0.218)	(0.210)
	[0.060]	[0.073]	[0.056]	[0.047]
Dummy: Cognitive	-0.107	-0.107	-0.634	-0.634
	(0.188)	(0.187)	(0.929)	(1.104)
	[0.571]	[0.568]	[0.495]	[0.566]
Dummy: Others	-0.022	-0.022	-0.003	-0.003
	(0.095)	(0.106)	(0.412)	(0.476)
	[0.817]	[0.836]	[0.995]	[0.995]
$R^2, \bar{R}^2$	0.049,0.039	0.049, -	-	-
Log Likelihood	-	-	-370.96	-370.96
Observations	399		399	399

Note: As for the Tobit estimation, the number of left-censored observations at the poverty gap ratio of zero and that of right-censored at the ratio of one are 237 and 74, respectively, while that of uncensored observations is 88.

Table 5. Difference in Squared Poverty Gap Ratio by Disability

Estimation Method	OLS		Tobit	
Standard Error	Ordinary	Robust	Ordinary	Robust
Constant	0.296**	0.296**	-0.256	-0.256
	(0.035)	(0.037)	(0.159)	(0.163)
	[0.000]	[0.000]	[0.108]	[0.117]
Dummy: Visual	-0.117*	-0.117*	-0.630**	-0.630**
	(0.047)	(0.047)	(0.215)	(0.226)
	[0.013]	[0.014]	[0.004]	[0.006]
Dummy: Hearing	0.066	0.066	0.371	0.371
	(0.050)	(0.053)	(0.209)	(0.203)
	[0.190]	[0.215]	[0.078]	[0.068]
Dummy: Cognitive	-0.067	-0.067	-0.559	-0.559
	(0.184)	(0.186)	(0.890)	(1.065)
	[0.714]	[0.717]	[0.530]	[0.600]
Dummy: Others	-0.021	-0.021	-0.003	-0.003
	(0.093)	(0.105)	(0.396)	(0.459)
	[0.825]	[0.845]	[0.994]	[0.995]
$R^2, \bar{R}^2$	0.034,0.024	0.035, -	-	-
Log Likelihood	-	-	-366.91	-366.91
Observations	399	399	399	399

Note: As for the Tobit estimation, the number of left-censored observations at the poverty gap ratio of zero and that of right-censored at the ratio of one are 237 and 74, respectively, while that of uncensored observations is 88.

Poverty Indices by Disability

The exercise applied to the analysis on income by disability is repeated for the poverty indices. Since the head count ratio, (aggregated) poverty gap ratio and (aggregated) squared poverty gap ratio are simple averages of the poverty dummy (the poor=1, the non-poor=0), (individual) poverty gap ratio and (individual) squared poverty gap ratio, respectively, the regression analysis of the three variables on the disability dummies work as the regression applied to income as shown in Table 1. By this regression analysis the difference in poverty indices by disability is examined.

Table 3 exhibits the results of the regression analysis of the poverty dummy on disability dummies. Again, the benchmark disability is the mobility impairment. The estimation methods are OLS, logit and probit estimations. The heteroscedasticity robust standard error is used as well as ordinary standard error. The estimation results are qualitatively the same across the estimation methods and sorts of standard errors. The coefficient on visual impairment dummy is significantly negative across the board,

which is harmonious with the regression analysis in income shown in Table 1. In addition, the coefficient on hearing impairment dummy is significantly positive irrespective of estimation methods and sorts of standard errors. These two observations indicate that the incidence of poverty is narrower for persons with visual impairments and wider for persons with hearing impairments than persons with mobility impairments.

The depth of poverty is investigated with the regression of individual poverty gap ratio on the disability dummies. Since the individual poverty gap ratio has the minimum of zero and the maximum of one by construction, a censored regression such as the Tobit regression makes sense.

The estimation results are largely consistent with those of the head count ratio (Table 4). The coefficient on the visual impairment dummy is significantly negative, while that of the hearing impairment dummy is positive and marginally significant. Thus, the poverty is “shallower” for persons with visual impairments while it is marginally “deeper” for persons with hearing impairments than those with mobility impairments.

Finally, the same experiment is made with the squared poverty gap ratio (Table 5). Since the individual squared poverty gap ratio is also censored with the floor of zero and the ceiling of unity, the Tobit regression is applied as well as OLS. Again, the results are consistent with the former regression analyses. The coefficient on the visual impairment dummy is significantly negative. The coefficient on the hearing impairment dummy is significant only by the Tobit regression with the significance level of 90 percent. If we follow the terminology used by the NSCB, the severity of poverty, which is incorporated by the squared poverty gap ratio, is lighter for persons with visual impairments and marginally greater for persons with hearing impairment than those with mobility impairments.

III. Estimation of the Mincer Equation

A next question is what are determinants of income. The analytical method which we take is a traditional and conventional one, i.e. the estimation of the Mincer equation (Mincer [1958]). Mincer regressed the logged income on years of education and other control variables in order to estimate the rate of return on education. Since Mincer's approach has been adopted in a large number of studies, the estimation with the Mincer equation is useful to examine the importance of education and other determinants of income through comparison with the existing literature.

For this examination, logged income is regressed to years of education[7], age, age squared, sex dummy (female = 1), marriage dummy[8] (the married =1), and the disability dummies as defined in the previous section.

As a result, the equation for estimation is the following:

$$\ln(\text{income}) = \beta_0 + \beta_1(\text{years of education}) + \beta_2(\text{age}) + \beta_3(\text{age}^2) + \beta_4 D_{Sex}$$
$$+ \beta_5 D_{Marriage} + \beta_6 D_{Visual} + \beta_7 D_{Hearing} + \beta_8 D_{Intellectual} + \beta_9 D_{Others} + u\,. \quad (1)$$

The estimation methods are OLS and Tobit regression with the minimum of zero[9].

The results are qualitatively similar between OLS and Tobit regressions. The coefficient on years of schooling is interpreted as the rate of return on education. The estimated rate is 24.7 percent with OLS and 30.1 percent with Tobit regression. These estimates are

[7] In the questionnaire, highest educational degree obtained was asked. The variable of years of education was constructed as follows; (1) Kindergarten/Prep: 1 year; (2) Grade I to V: 3 years; (3) Elementary graduate: 6 years; (4) 1st to 3rd Year High School: 8 years; (5) High School Graduate: 10 years; (6) Vocational school: 10 years; (7) Post-secondary (diploma courses/ certificate): 11 years; (8) College level: 12 years; (9) College or University graduate: 14 years; (10) Master or higher: 15 years.

[8] The common-law marriage is also counted as a marriage.

[9] As indicated in the previous section, 74 sample PWDs do not have any monetary income. Since logarithm is applicable only positive numbers, 1 peso is assigned to the income of the 74 sample PWDs in place of zero. One peso is as small as zero peso as annual income of the Philippines, so that there will not be any discernible effect.

high as a rate of return on education[10]. For example, the OLS estimate implies that one year increase in education raises income by 24.7 percent.

Table 6. Estimation of the Mincer Equation

Explanatory variables	OLS	Tobit
Intercept	0.371	-1.826
	(2.229)	(2.855)
Years of schooling	0.247**	0.301**
	(0.053)	(0.066)
Age	0.292*	0.357*
	(0.116)	(0.146)
Age squared	-0.003*	-0.004*
	(0.001)	(0.002)
Sex dummy (female = 1)	-1.115*	-1.360*
	(0.437)	(0.537)
Marriage dummy (the married = 1)	-0.104	-0.174
	(0.450)	(0.537)
Disability dummy: Visual	1.825**	2.170**
	(0.514)	(0.628)
Disability dummy: Hearing	0.900	1.152
	(0.562)	(0.689)
Disability dummy: Cognitive	-1.490	-1.929
	(2.375)	(2.970)
Disability dummy: Others	-0.078	-0.076
	(1.171)	(1.428)
Number of observations	396	396
R^2	0.133	0.025

Note: The dependent variable is the logarithm of income of PWD. For respondents who do not have any income, the income of them is assumed to be one peso instead of zero peso, because of the convenience with the log transformation. As annual income, one peso is taken to be as small as zero peso in Metro Manila. The figures in parentheses are heteroscedasticity-robust standard error. The coefficients with ** and * are statistically significant with the significance of 99% and 95%, respectively. As for the Tobit estimation, 73 observations are left-censored at the log income of zero. The log pseudo likelihood is -1,053.8. For information, the value of R^2 is the pseudo R^2.

Other significant explanatory variables are age, age squared, sex dummy and visual impairment dummy. The point estimates of coefficient on age are higher than the

[10] The 95 percent confidence interval is (14.3%, 35.1%) with OLS and (17.1%, 43.1%) with Tobit regression. The estimates of rate of return on education as high as 20-40 percent were not very unusual among studies for developing countries in the 1960s-70s (Willis [1986: 540-541]). However, the estimates commonly observed in the world in these years (Card [1999: 1834-1854]) as well as those found with data from the Philippines are likely to be around 10 percent (Maluccio [1998], Schady [2003], Yamauchi [2005: 965]), the estimation in the text should be elaborated further. The endogeneity of years of schooling and differentiated rate of return by level of education (primary, secondary, and tertiary) will be issues to be addressed.

estimated coefficients on years of education, irrespective of estimation method. This coefficient is conventionally interpreted as the "rate of return on experience in life". Precisely speaking, effects of age squared must be taken into account to compute the rate of return on experience. Since the estimates on age squared are significantly negative, an increment in income according to age decreases as aging.

A practically important finding is that the coefficient on sex dummy is significantly negative, and that the magnitude is so great as the absolute values of the estimated coefficients exceed unity for both OLS and Tobit regression. The significantly negative coefficient implies that a woman receives significantly lower income than a man with the same years of education, age, marital status and disability. Moreover, the coefficient exceeding unity in the absolute value means that the difference in income between the woman and the man with the same education, age, marital status and disability is more than twice[11]. Thus, female PWDs incur double disadvantages.

Finally, the estimates of coefficient on visual impairment dummy are around 2 for both OLS and Tobit regression. The coefficient of 2 corresponds to 7.39 times gap[12] between a person with visual impairment and a person with mobility impairment (the reference impairment) with the same education, sex, age and marital status. This observation is consistent with the analyses displayed in the previous section.

IV. Concluding Remarks

As for the poverty problem of persons with disabilities in Metro Manila, both level and variation in income matter. The average level of income of PWDs is absolutely low. In addition, the variance in income is great. While successful PWDs earn a handsome income, quite a few PWDs neither earn money nor receive income transfer from family or friends at all.

[11] Hypothetically speaking, if the coefficient on the sex dummy is one, then the conditional male to female income ratio is e^1 (=2.718...).
[12] e^2 is roughly equal to 7.39.

Key factors affecting the variation turn out to be sex and education. The sex dummy is so important as an income becomes twice greater. The estimated rate of return on education is so great that highly educated PWDs may earn a substantial income. However, the flip side of this is that PWDs without education earn far less than educated PWDs. Furthermore, an issue which has not been elaborated sufficiently in this note, is determinants of level of education. Though education was treated as an independent variable in this chapter, level of education is in fact a choice variable which might be affected by level of income. This issue remains to be addressed for future research.

In sum, this note stresses that the importance of two key factors, i.e. gender and education, for empowering PWDs on the economic ground. Economic empowerment will gain importance as well as that on the ground of human rights, both of which will offer PWDs wider freedom in life.

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