The Economic Cost of Disability, Morbidity, and Illness on Labor Market Outcomes in Indonesia

Subha Mani*
Sophie Mitra†
Usha Sambamoorthi,‡

September 2012
Work in Progress

Abstract

The purpose of this paper is to use data from the four waves of the Indonesian Family Life Survey to estimate the economic cost of poor health measured by ADL limitations differentiated by severity and length, self reported morbidity, and illness on earnings, labor force participation, and hours worked. Our preliminary findings from FD-OLS specification indicate that the onset of disability - decreases the probability of employment by 2.8 percentage points, decreases the probability of labor force participation by 4 percentage points, and decreases hours worked during the last week by about 1.2 hours. Similar effects are observed between other measures of disability, morbidity, illness and the labor market outcomes.

*Subha Mani, Department of Economics, Fordham University
†Sophie Mitra, Department of Economics, Fordham University
‡Usha Sambamoorthi,, University of West Virginia

1 Introduction

The purpose of this paper is to measure the economic cost of poor health on employment outcomes for prime-age adults in Indonesia. In developing countries, an estimated 22 percent of the population lives below dollar 1.25 a day (World Bank 2012). Because the poor or near poor derive their income from labor earnings as opposed to investment or other sources, interruptions in their ability to participate in the labor market can have a disproportionate effect on their income relative to other segments of the population. In developed countries, where a smaller percentage of the population is poor or near poor, health problems and disability have been shown to lead to a reduction in labor supply and earnings (Meyer and Meck 2012 add more references). However, little is known about the impact of health on welfare outcomes in these countries, not because of a dearth of data regarding labor supply and earnings, but due to a lack of data on health.

Despite the long standing interest by economists in examining the impact of health on welfare outcomes, in the 2008 Handbook of Development Economics, Strauss and Thomas (2008) write that, "till this date, there is limited empirical evidence on the impact of levels and changes in health on wage earnings, schooling, and future health outcomes". Health changes can take many forms and levels of intensity and can be measured in different ways including self-reported illness, symptoms and "normal activity" (Strauss and Thomas 2008) and few data sets offer measurement tools for health.

In addition, econometrically, it is very challenging to isolate the impact of health on employment outcomes. OLS estimates of health will suffer from omitted variables bias, feedback effects from employment to health, that may be positive through social networking or negative through work related stress, and random or systematic measurement error bias. Several recent studies have attempted to address the endogeneity of health and employment using an instrumental variable (IV) framework (Schultz and Tansel 1997; Schultz 2008). An IV specification used with cross sectional data, while potentially addressing measurement error bias, does not address potential feedback effects from employment to health and omitted variables bias, in particular systematic reporting bias due to unobserved personal characteristics (e.g., low self-esteem) that may affect both health

and labor market outcomes. Several studies adopt the first-difference OLS specification (Kochar 1995; Gertler and Gruber 2002)[1] while addressing the omitted variables bias problem and the potential feedback effects, such specification can still magnify any random measurement error bias in health (Griliches and Hausman, 1986).

Recently, Genoni (2012) uses two waves of the Indonesia Family Life Survey (IFLS) to estimate the impact of health shocks, a measure of health deterioration on consumption, income, and transfers. She uses a first-difference IV specification to estimate the impact of deterioration in health on income and consumption. Such a specification is used to address biases that arise from omitted variables, simultaneous determination of labor supply and health, reverse causality between employment to health, and systematic and random measurement error in health. The Genoni (2012) paper primarily focuses on household level welfare outcomes related to earnings and consumption. She finds little effect for household earnings and no effect on consumption. A limitation of her work is that she only uses data on two measures of health and these measures represent a selected and very narrow range of physical functioning abilities: ability to walk 5km, and abilities in other intermediate ADLs (carrying a heavy load, bowing or kneeling, sweeping the floor or yard, and drawing a pail of water from a well). More specifically, her paper does not cover basic ADLs (e.g. self care limitations), although such questions have been recommended recently as part of international efforts to measure disability (Maddans, 2011).

Our paper, distinct from Genoni's work does not aim to focus on deterioration in health status between waves, instead, our focus is to estimate the economic cost of illness, morbidity, and disability in terms of forgone earnings and employment opportunities. Thomas and Strauss (1997) estimate the mincer type wage equation to measure the economic returns of height in cm using data from Brazil. Similar to the framework outlined in Thomas and Strauss (1997), we now estimate the economic costs or loss in earnings and employment associated with variation in ADL limitation, illness episodes, and morbidity. We use individual level data on health measures (ADL limitations differentiated by severity and length, self reported morbidity, and illness) to capture the unbiased economic cost of illness, morbidity, and disability on labor market outcomes such as probability of em-

[1]Further note that Gertler and Gruber, 2002 do not estimate a full fledged first-difference specification

ployment, labor force participation, hours worked, and monthly earnings. This paper also provides an improvement to the earlier literature on health and employment outcomes by using an first difference IV estimation strategy. Results may have implications for the desirability of insurance against deteriorations in health and disability in the context of developing countries (Chandra and Samwick 2005).

Our preliminary first-difference OLS estimates controlling for non-linearity in age, gender difference, marital status, location, year, completed grades of schooling, and height in cm suggest that disability - decreases the probability of employment by 2.8 percentage points, decreases the probability of labor force participation by 4 percentage points and decreases hours worked during the last week by about 1.2 hours. All these effects are statistically significant at the 5% significance level. Similar effects are observed between severity of disability, morbidity, illness and the labor market outcomes.

2 Data

The data used in this paper comes from the 1993, 1997, 2000, 2007 waves of the Indonesian Family Life Survey (IFLS), a large-scale socio-economic survey conducted in Indonesia. The IFLS collects extensive information at the individual, the household, and the community level. The survey includes modules on measures of health (ADL, illness, symptoms and morbidity), household composition, labor and non-labor income, farm and non-farm assets, pregnancy, schooling, consumption expenditure, contraceptive use, sibling information, and immunization [see Frankenberg et. al 1995, 2000; Strauss et. al 2004 for more details on sample selection and survey instruments].

We analyze a comprehensive range of individual employment outcomes: employment status, labor force participation status, hours worked during the last week, and monthly wage earnings. The IFLS makes it possible for us to characterize disability and health problems in four main ways. The IFLS asks individuals nine questions related to limitations in ADLs. For instance, one question is as follows: "if you had to carry a heavy load (like a pail of water) for 20 meters, could you do it?". Each of the ADL questions has a three point answer scale: (1) easily; (2) with difficulty; (3) unable to do it. First, we use the

ADL questions to develop a disability status variable: persons answering (2) or (3) above are considered as having a disability. We also plan to use the three point answer scale for ADL questions to break down the disability status variable into moderate and severe disability, and long term versus short term disability (disability in two consecutive waves or more, vs. disability in one wave only). Second, we use an ADL index as a measure of physical functioning limitation. The ADL index is the normalized sum of answers to the nine ADL questions. Third, individuals are asked about morbidity symptoms in the past four weeks for 23 types of symptoms (e.g. fever, nausea/vomiting). We construct a variable equal to one for someone who has experienced symptoms and zero otherwise. Fourth, we construct a variable to measure the intensity of morbidity by summing all symptoms for which the individual responded yes, this variable can take a maximum value of 23 and a minimum value of 0. Fifth, we measure miss days by counting the number of days of primary daily activities missed during the past month due to poor health.

3 Empirical Specification

Our objective is to estimate the following first-difference specification instrumenting for health status in the right hand side. The first-difference equation can be written as follows:

$$\delta E_{it} = \beta_1 \delta H_{it} + \sum_{j=1}^{R} \beta_j^X \delta X_{jit} + \delta \epsilon_{it} \tag{1}$$

OLS estimation applied to a FD specification magnifies the measurement error bias in health status [see Griliches and Hausman, 1986]. Therefore to address both omitted variables bias and measurement error bias, we follow the FD-IV estimation technique instrumenting for the endogenous nature of health status in the right hand side. The first-difference IV specification will therefore address biases that arise from the (a) presence of unobserved heterogeneity, (b) joint determination of labor supply and mental health, (c) feedback effects between health and employment, and (d) measurement error bias in health status.

The outcome variable of interest in this paper are – employment status, labor force participation, hours worked during the last week, and monthly wage rate. The right hand side variables included in the regressions control for – non-linearity in age, gender difference, marital status, dummy for the head of the household, spouse of the head of the household, household size, location, year, completed grades of schooling, height in cm, and year fixed-effects.[2] Descriptive statistics on the outcome variable and all the regressors used in the empirical specification are summarized in table 1.

4 Results

The FD-OLS estimates of equation (1) for employment, labor force participation, and hours worked are reported in tables 2, 3, and 4 respectively. In each of these tables, columns 1-4 capture the association between health status (disability, disability score, total symptom and missed days) and labor market outcomes. The FD-OLS estimates suggest that there is strong negative association between illness, morbidity, ADL and labor market outcomes.

Our preliminary first-difference OLS estimates controlling for all right hand side variables indicates that disability is associated with - a 2.8 percentage point decrease in employment probability, a 4 percentage point decreases the probability of labor force participation and 1.2 hours decrease in hours worked during the last week. All these effects are statistically significant at the 5% significance level. Similar effects are observed between severity of disability, morbidity, illness, and the labor market outcomes.

Our aim is to report the FD-IV estimates for these specifications by the PAA meetings.

5 Conclusion

The economic cost of disability, morbidity and illness for Indonesia is important for research and policy on poverty in developing countries. There is a critical need to determine

[2] we will be estimating all specifications controlling for the full set of community-time fixed-effects

the extent to which health problems make it harder for the poor or near poor to make ends meeta topic of intense interest plagued by a dearth of data and empirical evidence. However, the methodology we have developed to use in conjunction with the Indonesia Family Life Survey will allow us to present unbiased estimates of the economic cost of disability, illness, and morbidity in terms of forgone earnings, employment, and labor force participation.

Our preliminary first-difference OLS estimates controlling for non-linearity in age, gender difference, marital status, location, year, completed grades of schooling, and height in cm suggest that disability - decreases the probability of employment by 2.8 percentage points, decreases the probability of labor force participation by 4 percentage points and decreases hours worked during the last week by about 1.2 hours. All these effects are statistically significant at the 5% significance level. Similar effects are observed between severity of disability, morbidity, illness and the labor market outcomes.

References

Chandra, A. and A. A. Samwick. 2005.Disability Risk and the Value of Disability Insurance. National Bureau of Economic Research Working Paper 11605.

Currie, Janet, and B.C. Madrian (1999). Health, Health Insurance and the Labor Market. In O. Ashenfelter and D. Card (eds.), Handbook of Labor Economics, 3:3 (Elsevier), 3309-3416.

Gertler, P. and J. Gruber. 2002. Insuring Consumption Against Illness. American Economic Review, 92(1), 51-70.

Griliches, Z., and J. A. Hausman. 1986. Errors-in-Variables in Panel Data, Journal of Econometrics, 31, 93-118.

Kochar, A. 1995. Explaining Household Vulnerability to Idiosyncratic Income Shocks. American Economic Review Papers and Proceedings, 159-164.

Maddans, J.(2011). Measuring disability and monitoring the UN convention on the rights of persons with disabilities: the work of the Washington Group on Disability Statistics. BMC Public Health, 11(Suppl 4: S4).

Schultz, T. P. and A. Tansel (1997). Wage and Labor Supply Effects of Illness in Cote dIvoire and Ghana: Instrumental Variable estimates for Days Disabled. Journal of Development Economics, 53, 251-286.

Strauss, J. and D. Thomas. 2008. Health over the life course, in the Handbook of Development Economics, vol. 4, edited by T. Paul Schultz and John Strauss.

World Bank(2012) . An Update of the World Bank Poverty Estimates of Consumption Poverty in the Developing World.

Table 1: Summary statistics of all variables used in the empirical specification

Variables	Observations	Mean	Std. dev
Employment status	26632	0.74	0.43
Labor force participation (LFP)	26632	0.66	0.47
Hours worked	26632	46.36	24.5
Monthly earnings (in '000 Rupiah)	26632	538	965
Disability	26632	0.31	0.46
Disability score	26632	0.05	0.11
Total symptoms	26632	2.10	1.93
Acute morbidity	26632	0.74	0.44
Missed days	26632	1.74	4.56
Age in years (Age)	26632	48.42	12.61
Dummy for head of the household (HOH)	26632	0.52	0.49
Rural dummy (Rural)	26632	0.56	0.49
Dummy for marital status (Married)	26632	0.85	0.35
Dummy for spouse of the head of the household (Spouse HOH)	26632	0.42	0.49
Household size	26632	5.43	2.36
Completed grades of schooling (Grades)	26632	4.72	4.30
Height in cm (Height)	26632	154.07	8.01
Dummy for women (Women)	26632	0.56	0.49

Source: IFLS – 1993, 1997, 2000 and 2007

Variable names given in parenthesis

Table 2: Determinants of Employment Status - First-difference OLS Estimates

Variables	(1) Employment status	(2) Employment status	(3) Employment status	(4) Employment status
Disability	-0.028***			
	(0.007)			
Disability score		-0.358***		
		(0.031)		
Total symptoms			0.001	
			(0.002)	
Missed days				-0.005***
				(0.001)
Age	0.035***	0.030***	0.026***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
HOH	0.115***	0.101***	0.137***	0.131***
	(0.020)	(0.020)	(0.022)	(0.022)
Rural	-0.007	-0.006	-0.008	-0.006
	(0.016)	(0.015)	(0.017)	(0.016)
Married	0.008	0.004	0.022	0.021
	(0.020)	(0.019)	(0.023)	(0.023)
Spouse HOH	0.039	0.030	0.054*	0.052*
	(0.027)	(0.027)	(0.031)	(0.031)
Household size	-0.008***	-0.008***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
R-squared	0.041	0.049	0.052	0.057

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Year dummies suppressed

Table 3: Determinants of LFP - First-difference OLS Estimates

	(1)	(2)	(3)	(4)
Variables	LFP	LFP	LFP	LFP
Disability	-0.040***			
	(0.007)			
Disability score		-0.384***		
		(0.031)		
Total symptoms			-0.000	
			(0.002)	
Missed days				-0.007***
				(0.001)
Age	0.025***	0.021***	0.022***	0.021***
	(0.004)	(0.004)	(0.005)	(0.005)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
HOH	0.071***	0.057***	0.086***	0.078***
	(0.020)	(0.020)	(0.023)	(0.022)
Rural	-0.025	-0.024	-0.023	-0.021
	(0.017)	(0.016)	(0.018)	(0.018)
Married	0.007	0.003	0.032	0.031
	(0.021)	(0.021)	(0.025)	(0.025)
Spouse HOH	-0.005	-0.014	-0.004	-0.007
	(0.028)	(0.028)	(0.033)	(0.033)
Household size	-0.007***	-0.006***	-0.005**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
R-squared	0.028	0.036	0.029	0.036

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Year dummies suppressed

Table 4: Determinants of Hours worked - First-difference OLS Estimates

Variables	(1) Hours worked	(2) Hours worked	(3) Hours worked	(4) Hours worked
Disability	-1.202**			
	(0.504)			
Disability score		-6.869**		
		(2.791)		
Total symptoms			0.059	
			(0.145)	
Missed days				-0.063
				(0.071)
Age	0.508	0.512	-0.072	-0.067
	(0.347)	(0.347)	(0.379)	(0.379)
Age squared	-0.014***	-0.014***	-0.014***	-0.014***
	(0.003)	(0.003)	(0.003)	(0.003)
HOH	3.964**	3.971**	3.888**	3.877**
	(1.701)	(1.699)	(1.965)	(1.966)
Rural	-0.714	-0.732	-1.085	-1.037
	(1.266)	(1.266)	(1.338)	(1.336)
Married	-0.317	-0.327	-0.551	-0.530
	(1.547)	(1.547)	(1.900)	(1.899)
Spouse HOH	0.772	0.744	1.401	1.365
	(2.231)	(2.229)	(2.598)	(2.598)
Household size	0.223	0.222	0.370**	0.369**
	(0.172)	(0.172)	(0.186)	(0.186)
R-squared	0.009	0.009	0.010	0.011

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Year dummies suppressed