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Mental Illness and the Labor Market in Developing Nations

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Introduction

Mental disorders have long been known to create a great deal of morbidity and mortality. Recent attempts to quantify the global burden of disease have highlighted the high prevalence and impairment created by mental illness. Mental disorders are prevalent over the life cycle. In fact some of the most disabling mental illnesses have onsets that are relatively early in life (15 to 30 years). This means that morbidity from mental disorders may have important impacts on the workplace activities of affected individuals. Such effects may thereby link mental health to macro-economic concerns such as employment, earnings and poverty. In this paper we are concerned with the degree that mental disorders may affect these macro-economic indicators.

Our approach is to examine evidence that relates to links between mental illness and labor market activities. We begin by examining the methodological development of studies aimed at estimating the effects of mental illness on labor market outcomes. We then review the existing evidence on the impact of mental illness on the labor market in industrialized nations based on the state of the art methodology. Next we turn to the evidence from developing nations. We find little evidence in that literature that provides comparable estimates to those found for industrialized nations. We therefore undertake an initial investigation of the impact of symptoms of psychiatric illness on labor supply outcomes. We pursue this investigation using data from a household survey in Indonesia, the IFLS.

Based on the results of our analysis of the IFLS we make observations regarding the degree to which the experience of industrialized nations offers useful information to developing nations. We also discuss areas that need special attention in order to make

progress on questions of linking the labor market impacts of mental illness to economy wide considerations of the pay-off to changing investments in mental health care in developing nations.

II. Background

In a recent review of studies of the relationship between health and labor markets, Currie and Madrian note with apparent surprise the large and varied impacts that mental and emotional problems seem to have on labor market outcomes.[1] In this section we describe the prevalence and nature of mental disorders and discuss conceptual issues that arise in studying the links between mental illness and labor market outcomes.

1. Mental Illness

At the very outset of *Mental Health: A Report of the Surgeon General,* it is noted that mental disorders create disability that affects the productivity of nations.[2] That Report cites the World Health Organization's Global Burden of Disease Study's estimate that mental illnesses impose high levels of disease burden on nations.[3] It also reports that depression ranks among the top five conditions creating disability adjusted life years. Many mental disorders are chronic relapsing conditions whose initial onset occurs in early adulthood, ages 15 to 30. Mental disorders commonly create disturbances of mood and cognition (the ability to organize and process information) as well as anxiety and psychosis (impacts on perception and thought processes). Given the nature of symptoms of mental disorders and the pattern of onset over the lifecycle one might expect these illnesses to have particularly pronounced effects on the formation of human capital and on performance in the labor market.

In the United States the 12-month prevalence of mental disorders has been estimated at about 21%. Anxiety disorders are estimated to have a prevalence of 16%, mood disorders 7% and psychoses about 1.5%.[4] Estimates of the prevalence in low-income nations vary considerably. The annual prevalence of all mental disorders ranges from about 10% in nations such as Senegal to 25% in Uganda, to 18% in Argentina to 45% in Brazil. These estimates are quite sensitive to the definitions and survey methods used.[5] For a specific illness such as schizophrenia, it is estimated that in Taiwan, India and Mainland China prevalence ranges from about 0.25% to 0.56% of the population. Anxiety disorders are estimated to have prevalence rates of between 5% and 12% in Taiwan. Finally, circumstances such as war, natural disaster and famine create very high levels of post traumatic stress disorder (PTSD).

Each of these disorders has the potential to disrupt functioning and reduce both short and long run productivity. Persons suffering from major mental disorders may experience decrements in concentration, cognitive abilities, focus and ability to go to the work place. The result may be absenteeism, reduced productivity and lower labor force participation. Long run impacts relate to the accumulation of human capital through disruption of investments in education, training and work experience. Some mental disorders create such severe impairment that they prevent many affected individuals from holding competitive jobs and often result in impoverishment.

2. Mental Illness and Labor Markets

The economic analysis of the impact of health status on labor market outcomes has its intellectual origins in the work of Gary Becker and Michael Grossman.[6] In the Becker-Grossman formulation, households are assumed to maximize an objective

function containing health status, consumption of goods and leisure time. Households maximize the objective function constrained by a health production function, income, assets and available time. Health in this model is valued for its own sake and because it contributes to the availability of productive work time and healthy leisure time. Thereby raising income and increasing the enjoyment of leisure. This formulation represents a point of departure for empirical investigations of the impact of health and in our case mental health on work effort, earnings, wages and poverty. This model predicts that ill health stemming from a mental disorder would tend to reduce earnings, labor market supply and labor force participation at prevalent market wages. While both intuition and formal theory yield expectations that mental illness would result in unfavorable labor market outcomes, obtaining clear empirical results on these questions has often been tricky. Methodological challenges include measurement of mental illness and establishment of causal links between illness and labor outcomes.

2a. Measurement of Mental Health Status

In research on mental illness and work, studies have adopted one of several strategies to measuring mental illness. One approach is to ask individuals if they have ever been treated for a mental disorders and if so, what disorder did their physician identify them as having. Frank and Gertler identify this as a utilization-based approach.[7] A second approach has been to ask people about their mental health status allowing them to characterize it as excellent, good, fair or poor. The third and most recent method involves using questionnaires that elicit clinical symptoms and either use those symptoms as direct indicators of mental distress or apply clinical algorithms to arrive at diagnoses.[8]

Empirical studies using the various measurement approaches obtain substantially different estimates of the impact of mental health problems on labor market outcomes. For example, Frank and Gertler tested a utilization based mental illness indicator against one based on a population interview that created diagnoses based on symptoms. They found that the presence of a major mental disorder as measured by symptoms from an interview reduced earnings by 21% whereas the utilization based indicator was associated with a roughly 5% reduction is earnings. Mullahy and Sindelar used self-reported mental health status as one indicator of mental health status and found some evidence of higher employment rates among rates among people with higher mental health status.[9]

In general there is reason to prefer symptom based indicators based on clinical interviews. Utilization based indicators tend to measure both the likelihood that someone with an illness gets treated and the nature of the illness for which they receive care. Because utilization is related to income, education and age there is likely to be a confounding between illness and labor market outcomes. In the case of self-reported health status there is a concern with bias in reporting. That is, people with lower labor market attachments appear to be more likely to report ill health as the reason for low work activity.[10]

Empirical analysis of differences between self reported assessments of mental health status and diagnoses based on clinical interviews reinforce concerns with self-report measures. Savoca analyzed differences between the two approaches to measuring mental health.[11] Compared with the measures from clinical interviews self reported mental health has a steeper gradient with education. White men tend to rate their mental health better than other gender and ethnic groups even when controlling for counts of

symptoms from clinical interviews. The implication is that impact estimates from models that include demographic covariates will be inconsistently estimated. The field has therefore, begun to focus efforts on community surveys that elicit symptoms of mental disorders.

2b. Causation

One implication of the Becker-Grossman model, mentioned above, is that employment, income and health are determined simultaneously. In particular it has been posited that the characteristics of particular occupations and work environments contribute to stress and possible emergence of mental disorders.[12] For this reason indicators of mental health or mental illness may be correlated with the error terms in regression models thereby leading to inconsistent estimates of the impact of mental illness on earnings.

Researchers have adopted one of three approaches to dealing with causal links between mental illnesses and labor market outcomes. One approach is to simply assume mental health to be exogenous to labor market outcomes. A second approach recognizes the possible two-way causality between mental health and work and uses temporal ordering of events to sort out causality. That is, this approach measures mental health status prior to the measurement of mental illness (by 3 or 6 months). This may reduce the influence of reverse causality, but because mental disorders are often persistent illnesses this approach may not remove all such effects. The third approach uses structural equation methods, such as two-stage least squares, to account for observable and unobservable effects on mental health and labor outcomes. The key challenge here is

meeting identification conditions via exclusion restrictions. Recent developments in the analysis of mental health on earnings labor supply and wages have made use of the clinical features of disorders, such as heredity, to identify the models and establish causal links.[13]

III. Evidence from Industrialized Nations

There has been an active research program in health economics on the labor market impacts of mental disorders. This line of research has typically focused on the impact of mental health problems on labor supply (hours and employment), earnings, and wages. A few analyses have also examined effects of mental health problems on job choice and the level of effort holding constant hours of work and employment. In this section we direct our attention to studies that measure mental health or mental illness by using data from clinical interviews that elicit symptoms and/or diagnoses. We also emphasize studies that attend to the causal issues either via use of panel data or by estimation of structural equation models.

Among the first studies conducted were those by Bartel and Taubman.[14] They used the National Academy of Sciences (NAS)-National Research Council (NRC) twins data. This is a longitudinal study of white-male twins that served in the U.S. armed forces. Mental health was measured by combining self-reports of illness and Veterans Administration medical records. Bartel and Taubman used the timing of illnesses and labor market outcomes to enhance causal inferences. They used ordinary least squares to estimate their wage models and a Tobit estimator for earnings equations. They reported

wage reductions of about 8% that were attributable to mental disorders. Earnings reductions of nearly 25% were estimated for individuals experiencing mental disorders. Moreover, depending on the specific mental illness the impacts were found to persist for up to 15 years. Specifically, psychoses and neuroses (which at that time could include depression) were estimated to have effects on earning that lasted for 11 to 15 years. Finally, employment levels were estimated to be 6.8% lower for individuals who suffered from mental disorders.

Robins and Regier used data from the Epidemiological Catchments Area (ECA) study, sponsored by U.S. National Institute of Mental Health (NIMH), to examine the number of people reporting an inability to carry-on their usual activities due to a mental or emotional problem.[15] They estimated that 3% of men and 4.5% of women were unable to work or engage in regular activities because of a mental or emotional problem.

Mitchell and Anderson also examined data from the ECA.[16] They analyzed a sample of people aged 50 and above from 3 study sites (Baltimore, Durham and Los Angeles). Mental health was measured via an index of symptoms of depression and alcohol abuse obtained from a structured clinical interview. They estimated employment models that treated mental health status as exogenous. They controlled for health status, demographics and market wages. Their results indicate that for older males higher levels of symptoms increase the likelihood of withdrawal from the labor market. The impacts for women were smaller and less precisely estimated.

Frank and Gertler used data from the ECA survey's Baltimore site to estimate the impact on male earnings of mental illness.[17] The mental illness indicator used a combination of diagnoses from a clinical interview and symptoms. Causal inferences

were strengthened by using diagnostic information for a period prior to the measurement of labor market outcomes. The analyses used Tobit estimators and found that males with a mental disorder had earnings that were 21% lower than for otherwise similar males.

Ruhm made use of a survey of women's health in Massachusetts to study the impact of mental health on female labor supply.[18] 2,500 women aged 45 to 55 were surveyed in 1981-82. Ruhm used the CES-D depression scale that counts and assesses the intensity of symptoms of depression. He treated symptoms of depression as exogenous in the labor supply models estimated. Probit and ordered probit models were estimated. His results indicate that levels of symptoms that are consistent with a high likelihood of a diagnosis of depression reduced labor supply. For example labor force participation rates were 2 to 9 percentage points lower for women with high symptom counts compared to similar low symptom count women. The probability of being employed full time was 9 to 12 percentage points lower for women with high symptom counts compared to otherwise similar women.

Ettner, Frank and Kessler used the National Comorbidity Survey (NCS) to study the impact of psychiatric disorders on wages, hours of work and earnings for males and females. The NCS yielded a nationally representative sample of 2225 males and 2401 women collected between September 1990 and February 1992. A structured clinical interview was administered to the entire sample that allowed for psychiatric diagnoses to be determined. Mental health was treated as endogenous. Instruments used to identify the mental health equation included parental history of mental disorders and onset of illnesses in early adolescence. Using a structural shift specification for the endogenous mental health indicator, Ettner et al estimated that the presence of mental illness led to

reduced earnings of 9.5% for men and 29% for women. Mental disorders were estimated to reduce hours worked per week by 5.4% for men and 2.7% for women. Mental disorders reduced employment levels by 14 percentage point for women (83.6 to 69.4) and by 12.6 percentage points (93.9 to 81.3) for men.

Kessler and Frank examined employment effects and reduced effort stemming from mental illnesses across occupations.[19] This study also used data from the NCS. Mental disorders were measured in terms of major diagnostic categories constructed from a structured clinical interview. The analyses showed that employment effects, stemming from the presence of a mental illness, were similar across occupations. However, reduced effort or "cut back" days were greater for people with mental disorders in professional occupations.

The evidence presented above clearly indicates that mental disorders affect individual labor supply and productivity. Significant impacts of mental disorders have been shown across a number of data sets for a diverse range of populations. These include women, men, older workers and minority populations. The evidence on economy wide impacts is somewhat less well developed. Cost of illness studies have estimated economy wide burdens of illness and found large impacts for mental disorders. For example, Rice and colleagues estimated that lost productivity from mental illnesses accounted for roughly $63 billion in 1990.[20] There is some evidence of downward mobility in economic status due to mental disorders yet there are no good estimates of the contribution of mental disorders to the poverty rate in industrialized nations.

IV. Evidence: A Developing Nation

The literature on the relationship between health, work effort and income in developing countries has grown noticeably in both volume and sophistication. The evidence related to the impact of mental disorders on labor supply and income in developing countries remains quite scarce. We were unable to uncover published research that offered empirical economic models of the links between indicators of mental disorders and labor market outcomes. However, relying on information from industrialized nations to develop notions of the impact of mental health problems on labor supply and income is potentially unreliable. For this reason we made use of a rich survey of households in Indonesia to develop some initial evidence that runs parallel to the existing evidence from the United States.

1. Data

The data used in the analyses reported below are from the first and second rounds of the Indonesian Family Life Survey, collected by RAND in collaboration with UCLA and Lembaga Demografi, University of Indonesia with funding from the Ford Foundation, USAID, and WHO. The IFLS is a large-scale integrated socio-economic and health survey that collects extensive information on the lives of respondents, their households, their families, and the communities in which they live. The household survey information collected includes details regarding household composition, consumption, income and assets, education, health care utilization, labor force participation and fertility. The community surveys measured infrastructure quality and availability of services for different types of health care providers and schools.

The sample is representative of about 83% of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country. The original IFLS sampling scheme balanced the costs of surveying the more remote and sparsely-populated regions of Indonesia against the benefits of capturing the ethnic and socioeconomic diversity of the country. Within 13 provinces, the scheme randomly sampled households from 321 enumeration areas (EAs). The provinces are four on Sumatra (North Sumatra, West Sumatra, South Sumatra, and Lampung), all five of the Javanese provinces (DKI Jakarta, West Java, Central Java, DI Yogyakarta, and East Java), and four provinces covering the remaining major island groups (Bali, West Nusa Tenggara, South Kalimantan, and South Sulawesi). The EAs were selected from a nationally representative sample frame.

1a. Household survey

A total of 7,730 households were targeted for interview and over 93% of these households were interviewed for a total of 7,224 households interviewed. From the 200-300 households in the 321 enumeration areas, 20-30 were selected for each area. In each household, after a representative provided household data, individual members were interviewed. The household information of interest included demographic characteristics, labor and non labor income, assets, health conditions, and mental health symptoms. From the adult questionnaire, information on mental health is available for approximately 12000 individuals. Employment history information was collected in 1993 dating back to 1973 for respondents old enough to have been employed then.

1b. Community survey

The Community-Facility Surveys (CFS) measure infrastructure quality and availability of services, for schools and health facilities and for a sample of communities as a whole. Health facility information from the community survey was collected in each area. Different provider-reports of quality including both structure and process measures, and provider-reported prices were measured in the survey.

1c. Information used

Information on employment was available from the first round of the IFLS. Employment history data included wages, hours worked, whether self employed, and information on additional jobs for 1973, 1983, 1988-1992, and 1993. An additional data point is available by linking the data to the 1997 survey. Although detailed employment information will be available, at this point only a question on whether the respondent is currently employed is publicly available.

Mental health symptom information was collected in 1993. Respondents were asked whether they experienced a specific symptom often in the past 2 weeks. Symptoms included sadness, anxiety, somatization, short temper, fatigue and insomnia.

2. Measurement of Mental Health Problems

The IFLS afford the opportunity to base an indicator of mental health problems on reported symptoms, which offers some clear advantages over general self-assessments of mental health, or utilization based reports of diagnosis. The IFLS included questions related to symptoms of depression and anxiety, which are among the most prevalent of the mental disorders and have been identified as accounting for significant burdens of

disease. These symptoms are not sufficient to arrive at diagnoses but the questions allow one to measure phenomenon similar to that found in other studies.[21]

The Diagnostic and Statistical Manual of the American Psychiatric Association, fourth edition (DSM-IV) identifies 9 key symptoms of depression. They are: 1) depressed mood, 2) diminished interest or pleasure in almost all activities, 3) significant weight loss/gain, 4) insomnia/hypersomnia, 5) psychomotor agitation/retardation, 6) feelings of worthlessness, 7) fatigue, 8) impaired concentration, and 9) recurrent thoughts of death or suicide. A diagnosis of depression requires one of the first two symptoms plus four others. Other measures of depressive symptoms include somewhat broader arrays of domains. The CES-D scale includes perceptions of relations with others and a question about a tendency to become bothered or annoyed. The General Health Questionnaire (GHQ), which measures symptoms of depression and anxiety, also asks questions about a somewhat broader array of symptoms than indicated by the DSM-IV. The additional domains include questions about feeling constantly under strain, the ability to face problems, and lost confidence. It has been shown that if the GHQ reports four symptoms for an individual, psychiatrists are highly likely to make a psychiatric diagnosis.[22]

Table 1 lists 6 symptoms of psychiatric illness (largely depression and anxiety) measured in the IFLS. The top panel of Table 1 lists counts and rates for individual symptoms. The lower panel of Table 1 presents clusters of symptoms. The table makes clear that while the prevalence of individual symptoms is quite high, clusters of symptoms that approximate those used by other mental health measures are far less prevalent. For example, only about 2% of the sample reported three or more symptoms of which one is sadness. Such a clustering is consistent with the CES-D, the GHQ and the

DSM-IV. It must be noted that such a clustering does not represent a diagnosis but rather a clustering of symptoms that previous research has noted is associated with psychiatric illness and impairment. Thus our primary indicator of mental health problems is a cluster of symptoms that includes sadness plus at least two of the other five symptoms measured. We perform sensitivity analysis by also using an indicator of four symptoms that corresponds more closely to the GHQ. The results were quite robust to differences in these indicators.

3. Empirical Strategy

The approach to the empirical analysis that we take builds on recent work on mental health and labor outcomes in industrialized nations. We focus on three basic outcome measures, the probability of being employed in 1993, the probability of being self-employed, and hours worked conditional on being employed. We begin by analyzing the simple relationship between, our indicator of a mental health problems and employment, hours supplied and self-employment. This means assuming that mental health is exogenous to labor market outcomes. We attempt to take account of some endogeneity by including a lagged dependent variable, in the regressions on hours of work, to account for the possibility that say, people with weak labor market attachment are more likely to be depressed. We then relax that assumption and estimate a model that treats mental health as endogenous. The IFLS includes a rich set of measures of the health care environment and economic conditions in markets within Indonesia. It does

not, however, provide very much information on the history of mental disorders for households or individuals.

To identify our models of employment, self-employment and hours supplied when mental health problems are endogenous, we use information on access and quality of the health care delivery system as determinants of mental health that are excluded from our equations for employment and hours worked. This follows the approach proposed by Strauss and Thomas.[23] Specifically, we use market level measures of access to health care such as average travel time to health centers, average distance to heath facility, the average cost of a prescription, the average cost of a treatment and an index of facility quality. Health care resources are inputs into the health production function. Prices (pecuniary and non-pecuniary) are assumed to be exogenous determinants of the use of health care inputs and will thereby affect mental health status. We therefore posit that greater access to high quality care will affect mental health status directly but would only affect labor outcomes indirectly through mental health status.

Specifically we estimate sex specific regression models first treating mental health symptoms as exogenous. In those ordinary least squares and logit models we include a set of demographic and human capital measures that include: educational attainment in years of schooling, marital status, age, household size, an indicator of whether the household is located in an urban area or not, a dummy variable indicating a household head, and a dummy variable if the individual is a Muslim. The dependent variable in the estimating equation for hours of work is the natural log of weekly hours of work. We also estimate models where the left hand side variable is a dichotomous variable indicating employment and one indicating a self-employment person.

Mental health symptoms are also treated as endogenous. In these regressions we use generalized method of moments (GMM) estimators. Since the endogenous regressor (symptoms) is dichotomous, it can be modeled as either a structural shift or a latent index. Since symptom scales such as the GHQ and CES-D are typically used in the context of "cut points" and because diagnostic evaluations involve clusters of symptoms, the latent index approach would be inconsistent with those uses of symptom counts. The structural shift model implies that only clusters of symptoms will have an impact on labor outcomes and not small changes in underlying symptom counts. In estimating the models we consider the strength of the instruments as predictors and apply an over-identification test to the models.

4. Results

Table 2 presents some simple descriptive results that associate the cluster of symptoms measure SAD+2 with our three labor market outcomes. The first column of Table 2 presents the rates of employment of adult men and women in the IFLS sample according to whether they experienced a cluster of symptoms of mental disorders. Males that meet the SAD+2 criteria had a considerably lower rate of employment than those without such a combination of symptoms of mental illness, 66% vs. 88%. For women the employment rates with and without the symptoms differed far less, 40% vs. 45%.

The second column of Table 2 reports weekly hours conditional on being employed. Both men and women meeting the SAD+2 criteria worked roughly 10% fewer hours than people without the cluster of symptoms. Finally, males meeting the SAD+2

criteria were considerably less likely to be self-employed than males without this set of symptoms. Women in contrast were somewhat more likely to to be self-employed when they had a cluster of psychiatric symptoms.

Simple Regression Results: Tables 3 and 4 present regression results for the models that assume that psychiatric symptoms are exogenous to labor outcomes. Table 3 presents the results for males and Table 4 those for females. The first row of Table 3 reports the estimates for the SAD+2 measure of symptom clusters. Column 1 of Table 3 present logit estimates for whether or not an individual was employed in 1993. The estimated coefficient for SAD+2 is negative and significant at the 7% level. The estimated coefficient implies that males with the cluster of symptoms are about 52% as likely to be working relative to otherwise similar males without such a cluster of psychiatric symptoms.

The second column of Table 2 reports estimates for the logit models of being self-employed. The estimated impact of the SAD+2 variable indicates that males with the cluster of psychiatric symptoms are less likely to be self-employed than otherwise similar males. However, the coefficient is imprecisely estimated and is not significantly different from zero at conventional levels. Finally, column 3 of Table 3 reports estimates for the hours of work regression conditional on being employed. The estimated coefficient for the SAD+2 variable is negative and significantly different from zero at the 6% level. The estimated coefficient indicates that males with a cluster of psychiatric symptoms work roughly 27% fewer hours per week than do otherwise similar males without the symptom cluster.

Overall these regressions fit the data reasonably well as evidenced by the R-square statistics that were 0.19, 0.11 and 0.27 for the employment, self-employed and hours of work outcomes respectively.

Table 4 presents estimates for women. In general the estimates of the impact of the SAD+2 variable are considerably smaller in magnitude and less precisely estimated. The coefficients estimates for SAD+2 in the employment and the hours of work equations are both negative. Neither approaches conventional levels of significance. Thus in the context of this approach to estimation there is no strong evidence of a labor market impact of the symptom cluster indicator. The SAD+2 variable is estimated to have a positive impact on the likelihood of being self-employed for females. This coefficient is also quite imprecisely estimated. Overall, the employment and self-employed models do not fit the data as well as the models for males. The fit for the hours of work model is better for females than for males.

Results for endogenous mental health. We estimated models that relax the exogenous symptom cluster assumption used above. As noted earlier, we used input prices (pecuniary and non-pecuniary) for health care services along with indicators of the quality and cost of the health facility as instruments for the endogenous mental health indicator. We also experimented with using lagged poverty (20^{th} percentile of household income in 1988) as an additional instrument. We used a Generalized Method of Moments estimator (GMM) to obtain parameter estimates for the three outcome indicators in models with endogenous symptom clusters. As discussed above this approach treats the endogenous variable parameter as a structural shift.[24]

The estimation results indicate that the coefficients for the symptom cluster measure were very imprecisely estimated. The sign and magnitude of the estimated coefficient was very sensitive to small changes in the specification of the model. Our analysis of the first stage fits and an application of the Staiger and Stock analysis of instruments suggests that the instruments in the model are weakly correlated. The simplest indicator of this is that the R-square statistics for the first stage models typically did not reach the 1% level in explanatory power. For these reasons we focus our attention on the models that assume that the symptom cluster indicator is exogenous to labor market outcomes.

Testing Inferences for OLS Results: One general concern with assuming exogenous psychiatric symptom clusters is the notion that symptoms of depression and anxiety may appear because of unfavorable economic circumstances experienced by individuals and households. Therefore were this an important explanation of the results reported on Tables 3 and 4 above, one might expect the SAD+2 variable to be a significant predictor of prior labor market outcomes. To test this we estimated regression models like those presented on Tables 3 and 4 on the same three labor supply indicators on these were measured for the year 1988 instead of 1993. For the employment outcome, there was no evidence of a negative relation between employment in 1988 and SAD+2 in 1993. The estimated positive coefficient estimates never reached the 30% significance level. The models for hours worked suggest no relation for men and a slightly positive relationship for women between SAD+2 and hours worked. In neither case was the estimated coefficient significantly different from zero at the15% level (for women it was significant at the 19% level). For the self-employment indicator, females were estimated

to have a positive association between SAD+2 in 1993 and self-employment in 1988. The coefficient was still rather imprecisely estimated ($p<0.16$). For males there was no relation ($p<0.76$). These results serve to strengthen the inferences that might be derived from the regression models on Tables 3 and 4.

IV. Conclusions

This paper was aimed at developing evidence with regard to the impact of mental illnesses on labor market outcomes that may be useful for considering the macro-economic impacts of ill health. The evidence from industrialized nations, primarily the United States, suggests that mental disorders have substantial effects on employment for both men and women and somewhat smaller effects on hours of work conditional on employment. The estimated impact of mental illnesses range in the 10% to 25% range for men and in the 15% to 20% range for women. Given the relatively high prevalence of mental disorders (15% to 20%) mental health effects appear to be notable for the economy of nations such as the U.S.

The evidence on the economic effects of mental disorders for developing countries is far less developed that that for the U.S. We reviewed the literature and did not find evidence of a similar quality to that reported for industrialized nations. We therefore made use of one household survey that included symptoms of psychiatric illness to begin to develop evidence that parallels that for industrialized nations. This initial investigation revealed some patterns in the data that assist us in considering the degree to

which evidence for industrialized nations is relevant as well as providing evidence for one developing nation, Indonesia.

The results point to substantial employment effects of clusters of symptoms of psychiatric illness in males. The magnitude of the employment effect is larger than what has typically been found in the U.S. We also found evidence of reduced hours of work associated with clusters of psychiatric symptoms. Again, the responses appear to be somewhat larger than what has been reported in the U.S. For women in the IFLS, the impacts of symptom clusters on labor market outcomes is far less certain and smaller. While not significantly different from zero we did estimate an employment effect of the symptom clusters of about 13%. We found no impact on hours of work, nor any strong effect on self-employment. Nevertheless, the patterns of employment for women are sufficiently different from what is observed in industrialized nations that considerably more effort needs to be devoted to how mental illnesses might affect the work place functioning of women in developing nations.

We view this exercise as suggesting that there may be important impacts on the macro-economy were a more comprehensive look at mental disorders be taken. Our results were based on a rather narrow set of symptoms of a subset of mental disorders. Moreover, given the significance of even low end prevalence estimates for mental illnesses in developing nations, employment impacts in particular may be quite important to the economies of these nations.

Finally, there is emerging evidence of strong labor market impacts of treatments for depression delivered in the primary care context.[25] This along side the relatively high prevalence of depression and anxiety disorders in developing nations, the relatively low

levels of spending on mental health care and the evidence of significant employment effects for males suggests that expanded treatment for these disorders may be a high pay-off investment for these nations. Clearly much more probing of these questions is required in order to make a strong statement about such policy measures

Table 1. Symptoms of Depression in IFLS

Individual Symptoms 1993	N (Out of 12,985)	%
Insomnia	889	6.85
Fatigue	1162	8.95
Short Temper	647	4.98
Somatic Pain	802	6.18
Sadness	579	4.46
Anxiety	222	1.71

Symptom Clusters 1993		
Sadness & Fatigue	212	1.63
Sadness & Insomnia	214	1.63
Sadness & Anxiety	133	1.02
Sadness, Fatigue & Insomnia	133	1.02
Sadness, Fatigue & Anxiety	71	0.55
Sadness, Anxiety & Insomnia	67	0.52
Sadness, Fatigue, Insomnia & Anxiety	55	0.42
Sadness, Fatigue, Insomnia, Anxiety, & Stomach Pain	42	0.32
Sadness, Fatigue, Insomnia, Anxiety, Stomach Pain, & Short Temper	27	0.21
Sadness or Fatigue or Insomnia or Anxiety or Stomach Pain or Short Temper	2506	19.30

Table 2. Labor Supply Outcomes

	Employed 1993	Weekly Hours 1993	Self Employed 1993
Males			
Symptoms – Yes	0.66	36.56	0.42
Symptoms - No	0.88	40.73	0.51
Females			
Symptoms – Yes	0.40	30.39	0.42
Symptoms - No	0.45	33.49	0.37

Table 3. Regression Results: Male
Assumes Exogenous Mental Health

	Employed 1993 (Logit)	Self Employed 1993 (Logit)	Log Hours 1993
Sad +2	-0.637 (1.81)	-0.412 (1.48)	-0.312 (1.87)
Education	0.295 (2.96)	-0.548 (8.72)	0.059 (2.63)
Married	1.958 (12.02)	0.427 (2.98)	0.029 (0.49)
Age	-0.054 (14.96)	0.011 (4.89)	-0.001 (1.62)
Hhsize	0.038 (1.63)	0.039 (2.52)	-0.0001 (0.03)
Urban	-0.656 (16.41)	-1.392 (22.25)	0.081 (3.60)
Headhh	1.840 (10.56)	0.315 (2.05)	0.035 (0.56)
Muslim	0.031 (0.22)	-0.270 (2.99)	-0.085 (3.20)
Lagged dep	- -	- -	0.849 (28.65)
Constant	1.133 (4.87)	-0.156 (0.87)	0.405 (2.88)
F or LR	671.53	751.04	116.07
R^2	0.19	0.11	0.27
N	4840		4349

* t or z statistics in parentheses.

Table 4. Regression Results: Female
Assumes Exogenous Mental Health

	Employed 1993 (Logit)	Self Employed 1993 (Logit)	Log Hours 1993
Sad +2	-0.140	0.232	-0.017
	(0.69)	(1.11)	(0.16)
Education	0.005	-0.316	-0.006
	(0.08)	(4.98)	(0.17)
Married	0.238	0.618	-0.070
	(2.13)	(4.96)	(1.25)
Age	0.016	0.024	0.003
	(6.66)	(8.78)	(1.86)
Hhsize	-0.032	0.024	0.005
	(2.11)	(1.54)	(0.54)
Urban	-0.620	-1.060	0.083
	(10.27)	(16.52)	(2.52)
Headhh	0.658	0.718	-0.092
	(5.12)	(5.31)	(1.47)
Muslim	-0.414	-0.470	-0.032
	(4.82)	(5.28)	(0.79)
Lagged dep	-	-	0.924
	-	-	(30.88)
Constant	-0.319	-1.102	-0.008
	(1.80)	(5.67)	(0.06)
F or LR	228.58	493.31	116.51
R^2	0.03	0.08	0.39
N	4948	2345	2345

* t or z statistics in parentheses.

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