# Work, Retirement, and Depression

**Jinkook Lee** and
Ohio State University

**James P. Smith**[*]
The RAND Corporation

## INTRODUCTION

Depression is one of the health problems that is thought most likely to cause worker absences and lower productivity (Kessler, Greenberg, Mickelson, Meneades & Wang, 2001). On the other hand, some researchers argue that retirement increases the risk of depression (Hamilton, Merrigan, & Dufresne, 1997; Szinovaca & Davey, 2004). Whereas the associative relationship between labor force participation and mental health has been established (Zimmerman & Katon, 2005), the causality of the relationship between depression and work or retirement has been studied less in extant literature. In this paper, we investigate this issue by examining: (1) whether retires are more at risk of depression than current workers, and (2) whether depression influences labor force participation. To address the endogeneity of depression, we control for the retirement motives when we compare retirees with current workers, and we use the instrumental variables when estimating the impact of depression on labor force participation.

## METHODS

### Data

Data from this study come from the 2006 baseline wave of the Korean Longitudinal Study of Aging, a large longitudinal survey of the Korean population aged 45 and older who reside in a community. The baseline survey instrument is modeled after the Health and Retirement Survey, using an internationally-harmonized baseline survey instrument with the following core content: demographics, family and social networks, physical, mental, and functional health, health care utilization, employment and retirement, income and assets. Since our focus is the relationship between retirement and depression, our sample is limited to those age 50 to 64.

Baseline data was collected from August 1 to December 22, 2006. Of those contacted, 64.2% of households had at least one age-qualifying respondent, and among those who are age qualifying, 75.4% complete the interview. A total of 10,255 respondents from 6,171 households completed the interview, and among them, 4,303 are between ages 50 to 64. The study sample is drawn from the 2005 Census, using a stratified multi-stage area probability sample design. To account for design effects created by the stratified multi-stage area probability sampling, weight and strata are used in estimation.

[*]Corresponding author: James P. Smith, The RAND Corporation, 1776 Main Street, PO Box 2138, Santa Monica, CA 90407-2138, smith@rand.org.

### Measures

Depression is measured using the Korean version of a 10-item Center for Epidemiologic Studies Depression (CESD-10) scale. CESD is a self-reporting scale of depressive symptoms developed to identify high-risk groups for epidemiological studies and screening purposes in a clinical setting (Radloff 1977). Reliability and validity of the CESD has been established, and the measure is used with various populations, including Koreans (Lee & Farran 2004). The 10 items question symptoms experienced during the past week, and responses are scored using a 4-point Likert scale. CESD-10 scores ranges from 0 to 30 with higher scores representing greater depressive symptoms. A threshold of 10 is used to indicate significant depressive symptoms, which correlates well with a clinical diagnosis of major depression (Andreasen, Malmgren, Carter, & Patrick 1994).

Employment status is determined from responses to the following series of questions. First, respondents are asked whether they are currently working, and if not whether they are looking for a job and able to work (unemployed). If respondents are not, they are then asked whether they are retired, or have never worked before.

Based on these questions, we create a categorical variable of employment status into four groups: (1) working (2) never worked; (3) retired; (4) unemployed. Previous literature suggests unemployment and retirement to be risk factors for depression, however there is no clear indication as to whether never having been in the labor force is a risk factor for depression. This distinction is particularly important in Korea, where many women have never been in the labor force.

Retirees are asked to report primary reasons for retirement up to two main reasons, which include: (1) due to poor health; (2) due to company's mandatory retirement policy; (3) for voluntary reasons, such as having enough income, don't want to work, for more leisure, to do volunteer work, and to pursue hobbies; (3) due to family responsibilities, to take care of household, children, or family members; (4) unable to find a job; and (5) for other reasons. We divide retirees by the primary reason for retirement and examine whether depression differs by primary motive for retirement.

We measure physical health by disease prevalence and self-reported functionality. A set of binary variables indicate whether a respondent was diagnosed with specific chronic diseases: diabetes, hypertension, cancer, lung disease, heart problems and stroke. Respondents were asked to report functional abilities in performing activities of daily living (i.e., dressing, bathing, and eating). A binary variable of respondents' perceptions of personal difficulty is employed (base: having no ADL difficulty). Finally, two binary risky health behavior variables are included: ever smoked (base: never smoked) and no exercise (base: regularly exercise).

Socio-economic status measures include educational attainment, household income, and household net worth. Educational attainment is divided into five groups for descriptive statistics: (1) no formal schooling, (2) elementary school (1~6th grade), (3) middle school (7~9th grade), (4) high school (10~12th grade), and (5) some college education or more. A continuous variable of number of years of schooling is used in analyses, but the results are not sensitive to this specification.

Total household income and household net-worth are divided into three equally-sized terciles, so that one third of the population is in each group. Total household income and total household net worth are defined as the sum from all sources of all individuals' incomes living in the household and the sum of total assets that all household members hold minus all debts.

Finally, multiple measures of social network are employed. Structural characteristics of informal networks include: (1) presence of social ties; currently married or living with a partner (base: having spouse or partner); presence of children (base: having child), presence of sibling (base: having sibling); (2) total frequency of contacts with parents, children, and other close friends, including face-to-face, phone calls, e-mails, and postal mails per month; and (3) a set of binary social support variables, including financial transfers received and given and informal care received and given.

We also create the following social engagement variables: (4) presence of a formal network, a binary variable whether a respondent belongs to church or other religious group, social club, or other interest groups; and (5) frequency of social activities, which is a continuous measure of how many times a respondent participates in social activities through formal networks per month.

### Statistical Analysis

We first model the relationship between depression and employment status. As noted above, two measures of depression, a continuous measure of CESD and a binary measure of depression, are examined. Ordinary Least Squares (OLS) estimation is used to model the CESD measure and probit models are used for the probability of depression. After accounting for the stratified sampling design, we report weighted mean score of CESD and weighted mean percentage of depression across different employment status.

To unravel the effect of depression on work, we (1) differentiate non-working status into never worked before, unemployed, and retired; and then (2) identify the primary reasons for retirement among the retirees. Reasons for retirement include: (a) due to poor health; (b) due to mandatory retirement policy; (c) for voluntary reasons, (d) due to family responsibilities, (e) unable to find a job; and (f) for other reasons. We then estimate the effect of work status on depression, first examining working or not, second across employment status, and then controlling for retirement motives, health, social network and age.

As depression can also affect labor force participation, we further investigate the impact of depression on work status, taking into account the endogenity of depression. We deal with the endogeneity of depression with two instrumental variables—the presence of a sibling and whether one is religious. These variables should not affect work directly but only through a possible effect on depressive symptoms. Using instrumental variables of depression, we then model labor force participation where CESD is included as one of the determinants. We then employ Amemiya's Generalized Least Squares (AGLS) for dichotomous dependent variable approach (Maddala 1983) and then compare the findings with probit models.

# RESULTS AND DISCUSSION

### Descriptive Findings

Table 1 presents the relationship between work and depression by gender. Not surprisingly and consistent with the prevailing literature, women report more depressive symptoms than men. Mean CESD score is higher for women (6.3 versus 5.4), and a greater proportion of women show signs of major depression than do men (19.5% versus 11.7%).

A significant negative relationship between work and depression is also observed. Those working for pay have lower CESD scores than those not currently working (4.9 versus 6.6), and the percent depressed is much smaller among paid workers than those not working (8.9% compared to 21.3%). The strength of this correlation between work and depression by itself tells us little about the underlying forces at work that produce it.

A first step toward trying to understand the possible reasons involves examining this relation by gender as the association between work and depression is considerably stronger for men than for women. For example, there is almost a four-fold difference in depression rates from men among workers (6% compared to non-workers 23%). In contrast, this differential is much smaller among women (16% for workers compared to 21% for non-workers).

A simple work-not work dichotomy conceals illuminating information about the nature of the relation between depression and work. To see this, we separate non-workers into those who never worked before, those who are unemployed, and those who are retired.

Ninety percent of those who have never worked before are women and 50% of older Korean women in our sample never worked in their lifetimes. Women remaining out of the labor force and being full-time mothers instead was quite common in traditional Korean society. Most important, there seems to be little difference in rates of depression for never-worked women compared to women who are currently working (17.7% compared to 16%). Not being in the work force ever in their lives does not appear to have increased the likelihood of depression among women.

The situation for Korean men who never worked is quite different. Not surprisingly, having never worked is much less common among men (only 4%), but these men who never worked are characterized by extremely high rates of depression (23.2%). Since these men did not work even when they were young, it would seem much more likely that these men were suffering from health and depressive problems a long time ago which would support an interpretation in this case flowing from depression to not working. The reported average length of current depression among men is about 20 years.

Isolating causal pathways is much more difficult for the unemployed who are more depressed than those currently working among both men and women. There are compelling reasons for causal pathways flowing from unemployment to depression as well as from depression to unemployment. There is nothing in our cross-sectional data that would help disentangle the relative importance of these alternative pathways for the unemployed.

Much more is possible for the work state of retirement where once again higher rates of depression are found among the retired compared to those currently working—a differential of almost three to one in the percent depressed. Once again, there are a-priori compelling reasons why retirement may be a cause or a consequence of depression. People who are in poor health and depressed may find work very difficult to manage. Alternatively, work may give meaning and a social context to peoples' lives and the absence of work may be difficult to deal with and cause depressive systems.

The reasons respondents gave for their retirement status potentially offers important insights about causal pathways. To see this, Table 1 presents mean CESD scores and the proportion of depressed by the most important reason listed for retirement. More than one third of retirees (36.4%) listed poor health as the most important reason for retirement, followed by a mandatory retirement policy in the workplace (17.8%). Another 15% of retirees said they retired voluntarily and basically wanted more leisure and free time while approximately 13% cited a set of family related responsibilities. Finally, 7% said they could not find a job, and a wide set of other reasons for retirement were listed but by only a few respondents each.

Each of these broad categories of reasons for retirement has different implications about the nature of the pathways involved. For example, the large fraction who cited poor health, which is often associated with depressive systems, most likely reflects a pathway from poor health and depression to retirement rather than the reverse. Forty-one percent of retirees who

name poor health as the most important retirement reason have symptoms that indicate major depression.

Similarly, retirees who report family responsibility such as caring for a spouse's health problem as their main reason for retirement have relatively high rates of depression (21%), and the burden of these family responsibilities rather than retirement per se would seem the principal reason for the depression. A more ambiguous category on which our data allow us to say little about the direction of causality are those who say that they cannot find a job and who exhibit high depressive symptoms. However, this group represents only 7% of the total retired population in this sample.

The most informative category in our view about causality from work to depression is those who retired because of the mandatory retirement system in Korea. The retirement of these respondents is due to institutional factors in the Korean labor market which are in place to encourage early retirement. These retirements are not due to pre-existing depressive symptoms so that if these retirees are more likely to be depressed it would be strong evidence that their retirement lead to their depression. This will be tested below, but at a descriptive level the data in Table 1 indicate that these retirees due to mandatory retirement provisions are no more likely to be depressed than those who are currently working.

Similarly, those who report voluntary retirement to pursue leisure related activities also have a relatively lower level of CESD scores and proportion depressed, which is similar to those who report mandatory retirement as the most important reasons for retiring.

### Estimating the Effect of Retirement on Depression

To test these ideas more formally, Tables 2 and 3 present results obtained from models of CESD and the probability of being depressed respectively. The statistical methods are OLS regression for CESD and a probit for the probability of being depressed. To highlight the impact of work status, we show three regression models in each table. Model 1 includes a binary variable of current working status, and an interaction between gender and working status, after controlling for both gender and educational attainment. As the descriptive analysis above suggested, for both measures of depression, we find that women are more depressed than men and a negative gradient of depression with schooling that is stronger for women than for men. After controlling for education and gender, we find a strong negative and statistically significant association between depression and current work that is stronger for men than women.

Model 2 includes a more detailed breakdown of work status separating those who are not working into those who have never worked before, who are unemployed, and who are retired. Depression symptoms are higher in all three non-work states with the estimated effect of having never worked being much smaller for women compared to men.

In the final and complete Model 3, we further divide retirees into six groups based on their primary reason for retirement. We also in this model include other relevant determinants of depression including financial position of the household (terciles of household income and net worth), the availability of social support particularly by family members (spouse, child, and sibling), social engagement, and indicators of respondents' health. Not surprisingly, most health indicators are strongly positively correlated with depression as is being in the lowest income or wealth tercile. Finally, all positive aspects of family social network availability (having a spouse, child, or sibling) are strongly protective of being depressed.

By controlling for retirement motive and other factors that influence depression in the third model variant, we are able to examine the potential effect of retirement on subsequent

depression. Retirees who report poor health as the primary reason for retirement have a CESD score 3.9 points higher than current workers. Retirees who retired due to family responsibility have a CESD score that is 3.1 points higher than current workers, while retirees whose primary reason for retirement is that they could not find a job have a CESD score that is 5.9 points higher than current workers. People who report these reasons for retirement are not good candidates for identifying the impact of retirement on depressive symptoms. Those retirees who give other reasons, which include low profit, poor business, etc., also have a higher CESD score than current workers.

More importantly, retirees who report to have retired due to their employer's mandatory retirement policy are found not significantly different from current workers in terms of CESD score or the probability of being depressed. Retirees whose primary reason for retirement includes voluntary reasons, such as pursuing a hobby and for more leisure time are also found not to be different from current workers in their depressive symptoms. This finding suggests that retirement itself does not necessarily cause depression. Although some retirees exhibit more depressive symptoms, this might be due to the reasons that also cause retirement, such as poor health and the inability to find a job.

### Estimating the Effect of Depression on Work

Since depression can affect labor force participation, it is important to also evaluate the causal pathway from depression to work. One way to solve the endogeneity problem in cross-sectional data is to identify instrumental variables that can plausibly only affect work through their effect on depression—that is these variables have no direct effect on work. We selected two such variables—the presence of a sibling and religiosity—both of which strongly affect depression (see Tables 2 and 3) but would not be expected to affect work unless the pathway operated through depression.

Table 4 contains two models of the probability that one is currently working. The first model listed in the first two columns is a simple probit of the probability that a respondent now works. In this model, the determinants of currently working include gender, marital status, whether or not one has children, education, terciles of net worth, and a set of indicators on the presence of chronic health problems and whether or not one currently smokes or exercises. In addition to this standard list of covariates, the model includes the CESD measure which is strongly negatively (statistically significant) associated with the probability of working.

The difficulty with the first model concerns the possible endogenity of the CESD depression measure. In the second model contained in the final two columns, the CESD measure is instrumented in a first-stage regression where the identifying variables are the presence of a sibling and an indicator variable that one is religious. In this model, essentially the only remaining variation in depression which can affect work is variation through either religiosity or having a sibling. The first-stage F-test rejects the null of weak instruments, and individual instruments are strongly correlated with CESD. As indicated in Table 4, we find that our instrumented measure of depression remains a strong predictor of current work status indicating that the pathway from depression to non-work is in part a causal one.

## CONCLUSIONS

In this study, we find that those who retire due to mandatory retirement policy, an important institutional feature of the Korean labor market, are not any more depressed than those who are remain in the labor force. Since those subject to mandatory retirement are not plausibly due to the existence of depressive symptoms, this result suggests that retirement by itself may not create depression. Although retirees are more depressed than paid workers, it seems

that causes that induce retirement, such as poor health, care-giving responsibilities, and the inability to find a job are also associated with depression. In contrast, we find strong evidence that the existence of depression leads to reduced labor force participation even after we use instrumental variables to predict the existence of depressive symptoms among respondents. Such empirical evidence sheds lights to which way the causality runs, going beyond the confirmation of associative relationship between depression, work, and retirement.

## References

Andreasen EM, Malmgren JA, Carter WB, Patrick DL. Screening for depression in well older adults: Evaluation of a short form of the CES-D. American Journal of Preventive Medicine. 1994; 10(2): 77–84. [PubMed: 8037935]

Hamilton VH, Merrigan P, Dufresne E. Down and out: Estimating the relationship between mental health and unemployment. Health Economics. 1997; 6(4):397–406. [PubMed: 9285232]

Kessler RC, Greenberg P, Mickelson K, Meneades L, Wang P. The effects of chronic medical conditions on work loss and work cutback. Journal of Occupational and Environmental Medicine. 2001; 43(3):218–225. [PubMed: 11285869]

Lee EE, Farran CJ. Depression among Korean, Korean American, and Caucasian American family caregivers. Journal of Transcultural Nursing. 2004; 15(1):18–25. [PubMed: 14768412]

Maddala, G. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge: Cambridge University Press; 1983.

Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1(3):385–401.

Szinovacz ME, Davey A. Retirement transitions and spouse disability: Effects on depressive symptoms. Journals of Gerontology Series B: Psychological and Social Sciences. 2004; 59(6):S333–S342.

Zimmerman FJ, Katon W. Socioeconomic status, depression disparities, and financial strain: What lies behind the income-depression relationship? Health Economics. 2005; 14(12):1197–1215. [PubMed: 15945040]

**Table 1**

Mean CESD Score and % Depressed by Working Status

| | Mean CESD Score | | | % Depressed | | | N | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | Men | Women | All | Men | Women | All | Men | Women |
| All | 5.8 | 6.3 | 5.4 | 15.5 | 11.7 | 19.5 | 4273 | 1941 | 2332 |
| Currently Working | 4.9 | 5.7 | 4.6 | 9.1 | 6.5 | 15.2 | 2041 | 1340 | 701 |
| Not Currently Working | 6.7 | 6.5 | 7.2 | 21.9 | 23.3 | 21.3 | 2262 | 611 | 1651 |
| Never Worked Before | 6.4 | 6.2 | 7.6 | 18.3 | 23.2 | 17.7 | 1299 | 132 | 1167 |
| Unemployed | 7.6 | 8.6 | 7.0 | 27.6 | 23.2 | 35.6 | 295 | 176 | 119 |
| Retired | 7.1 | 7.0 | 7.2 | 26.1 | 23.6 | 28.5 | 642 | 294 | 348 |
| Retired Due to Poor Health | 8.9 | 8.3 | 9.6 | 41.0 | 40.0 | 41.9 | 235 | 100 | 135 |
| Retired Due to Mandatory Ret Policy | 5.0 | 3.6 | 5.2 | 10.2 | 10.6 | 6.7 | 113 | 98 | 15 |
| Retired for Voluntary Reasons | 5.2 | 5.6 | 4.4 | 9.4 | 3.6 | 13.3 | 93 | 33 | 60 |
| Retired Due to Family Responsibility | 5.9 | 6.0 | 5.6 | 20.9 | 21.5 | 20.8 | 88 | 10 | 78 |
| Retired Due to Inability to Find a Job | 8.9 | 8.1 | 9.7 | 30.2 | 31.6 | 28.7 | 43 | 19 | 23 |
| Retired for Other Reasons | 7.1 | 7.0 | 7.2 | 28.7 | 27.0 | 30.4 | 71 | 34 | 37 |

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**Table 2**

CESD Regression

| | Model 1 Estimate | t | Model 2 Estimate | t | Model 3 Estimate | t |
|---|---|---|---|---|---|---|
| Female | 1.761 | 4.66 | 0.850 | 2.58 | 1.084 | 3.55 |
| Years of Schooling | −0.092 | −3.38 | −0.109 | −3.92 | −0.019 | −0.99 |
| Female × Years of Schooling | −0.115 | −3.18 | −0.092 | −2.26 | −0.076 | −2.71 |
| Not Currently Working | 2.567 | 12.56 | | | | |
| Female × Not Currently Working | −1.698 | −5.50 | | | | |
| Never Worked Before | | | 1.205 | 6.18 | 0.935 | 5.95 |
| Unemployed | | | 2.162 | 5.98 | 1.409 | 3.49 |
| Female × Unemployed | | | 1.203 | 2.45 | 1.215 | 2.60 |
| Retired | | | 2.035 | 5.31 | | |
| Retired Due to Poor Health | | | | | 2.210 | 3.89 |
| Retired Due to Mandatory Policy | | | | | −0.013 | −0.03 |
| Retired for Voluntary Reasons | | | | | 0.128 | 0.34 |
| Retired Due to Family Responsibility | | | | | 0.669 | 3.14 |
| Retired Due to No Job Available | | | | | 3.090 | 5.91 |
| Retired for Other Reasons | | | | | 1.223 | 2.00 |
| Low Income | | | | | 0.926 | 5.31 |
| Medium Income | | | | | 0.198 | 1.31 |
| Low Net-worth | | | | | 0.421 | 0.96 |
| Medium Net-worth | | | | | 0.031 | 0.14 |
| Unmarried | | | | | 1.369 | 5.79 |
| Childless | | | | | 1.599 | 2.64 |
| No Sibling | | | | | 0.757 | 2.74 |
| No Church or Club | | | | | 0.459 | 2.72 |
| Frequency of Total Contact | | | | | −0.024 | −3.24 |
| Frequency of Social Activities | | | | | −0.043 | −2.31 |
| Transfers Received | | | | | 0.155 | 1.03 |
| Transfers Given | | | | | −0.233 | −1.52 |
| Care Received | | | | | 0.786 | 1.69 |

| | Model 1 Estimate | t | Model 2 Estimate | t | Model 3 Estimate | t |
|---|---|---|---|---|---|---|
| Care Given | | | | | 0.647 | 1.98 |
| Diabetes | | | | | 0.441 | 1.58 |
| Hypertension | | | | | 0.225 | 1.12 |
| Cancer | | | | | 1.883 | 4.08 |
| Lung Disease | | | | | 1.464 | 2.41 |
| Heart Problem | | | | | 1.720 | 2.64 |
| Stroke | | | | | 1.866 | 4.90 |
| ADL | | | | | 3.821 | 8.88 |
| Age | | | | | -0.050 | -1.69 |
| _constant | 5.558 | 15.50 | 5.952 | 16.61 | 5.998 | 5.02 |
| R-square | 0.068 | | 0.069 | | 0.176 | |

**Table 3**

Depression Probits

| | Model 1 dy/dx | z | Model 2 dy/dx | z | Model 3 dy/dx | z |
|---|---|---|---|---|---|---|
| Female | 0.124 | 4.01 | 0.059 | 2.57 | 0.073 | 2.94 |
| Years of Schooling | −0.009 | −4.61 | −0.011 | −6.31 | −0.005 | −2.05 |
| Female × Years of Schooling | −0.006 | −2.80 | −0.004 | −2.06 | −0.003 | −1.49 |
| Not Currently Working | 0.166 | 11.08 | | | | |
| Female × Not Currently Working | −0.107 | −5.25 | | | | |
| Never Worked Before | | | 0.063 | 3.79 | 0.034 | 2.62 |
| Unemployed | | | 0.198 | 5.12 | 0.138 | 3.95 |
| Female × Unemployed | | | 0.021 | 0.66 | | |
| Retired | | | 0.170 | 5.46 | | |
| Retired Due to Poor Health | | | | | 0.166 | 5.23 |
| Retired Due to Mandatory Retirement Policy | | | | | 0.019 | 0.67 |
| Retired for Voluntary Reasons | | | | | −0.014 | −0.27 |
| Retired Due to Family Responsibility | | | | | 0.077 | 3.28 |
| Retired Due to No Job Available | | | | | 0.143 | 2.35 |
| Retired for Other Reasons | | | | | 0.130 | 2.28 |
| Low Income | | | | | 0.051 | 2.68 |
| Medium Income | | | | | 0.009 | 0.56 |
| Low Net-worth | | | | | 0.028 | 1.32 |
| Medium Net-worth | | | | | −0.005 | −0.35 |
| Unmarried | | | | | 0.065 | 3.19 |
| Childless | | | | | 0.084 | 2.34 |
| No Sibling | | | | | 0.058 | 2.52 |
| No Close Friend | | | | | 0.037 | 1.37 |
| No Church or Club | | | | | 0.038 | 3.97 |
| Frequency of Total Contact | | | | | −0.002 | −3.86 |
| Transfers Received | | | | | 0.026 | 1.91 |
| Care Received | | | | | 0.064 | 2.31 |
| Diabetes | | | | | 0.041 | 2.24 |
| Hypertension | | | | | 0.012 | 0.54 |

| | Model 1 dy/dx | z | Model 2 dy/dx | z | Model 3 dy/dx | z |
|---|---|---|---|---|---|---|
| Cancer | | | | | 0.125 | 4.20 |
| Lung Disease | | | | | 0.107 | 2.41 |
| Heart Problem | | | | | 0.113 | 3.23 |
| Stroke | | | | | 0.084 | 2.24 |
| ADL | | | | | 0.154 | 3.21 |
| Age | | | | | −0.002 | −1.16 |

**Table 4**

Labor Force Participation

|  | Probit Estimate | z | IV Probit Estimate | z |
|---|---|---|---|---|
| CESD | −0.040 | −8.99 | −0.148 | −2.32 |
| Female | −0.069 | −0.53 | −0.028 | −0.22 |
| Age | −0.061 | −17.06 | −0.052 | −4.85 |
| Married | 0.683 | 6.20 | 0.324 | 1.10 |
| Female × Married | −0.962 | −7.64 | −0.758 | −3.21 |
| Childless | −0.295 | −2.75 | −0.081 | −0.45 |
| HS | −0.079 | −1.82 | −0.133 | −2.62 |
| BS | 0.057 | 0.92 | −0.030 | −0.36 |
| Log of Other HH income | −0.091 | −14.14 | −0.082 | −5.87 |
| Mid Net-worth | 0.280 | 3.97 | 0.224 | 2.71 |
| High Net-worth | 0.285 | 3.98 | 0.216 | 2.39 |
| Female × mid net-worth | −0.246 | −2.72 | −0.265 | −3.11 |
| Female × high net-worth | −0.422 | −4.66 | −0.448 | −5.18 |
| Hypertension | −0.043 | −0.89 | 0.004 | 0.08 |
| Diabetes | −0.096 | −1.44 | −0.019 | −0.21 |
| Cancer | −0.279 | −2.17 | −0.006 | −0.03 |
| Lung Disease | −0.315 | −1.91 | −0.042 | −0.17 |
| Heart Problem | −0.059 | −0.44 | 0.159 | 0.94 |
| Stroke | −0.748 | −4.87 | −0.348 | −1.02 |
| ADL | −0.891 | −4.09 | −0.180 | −0.33 |
| Ever smoke | −0.092 | −1.64 | −0.041 | −0.60 |
| Regular exercise | −0.341 | −8.35 | −0.368 | −8.97 |
| _cons | 4.155 | 17.69 | 4.445 | 16.50 |