NBER Pre-Doctoral Fellowship Proposal
Household Responses to Disability Shocks : Labor Supply, Home Production and Caregiving

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I am currently a fourth year Ph.D. student in economics at the University of Wisconsin - Madison. In this project, I would like to investigate the extent to which spousal labor supply can insure households against one household member's disability given time allocation constraints for home production and caregiving. I believe this project is appropriate for the Program of Economics of an Aging Workforce since deteriorating health (including disability shocks) has direct implications for labor supply decisions of older workers and their spouses both at the intensive and extensive margin.

Intuitively, one would expect an increase in spousal labor supply when one member of the household experiences a persistent negative wage shock. Indeed, recent works such as Blundell et al. (2016) argue that female labor supply accounts for a large fraction of the household's insurance mechanism. However, in the data, there is little evidence of increase in spousal labor supply in the event of a husband's disability (Figure 1a and Meyer and Mok (2013)). In contrast, significant spousal labor supply responses are observed when the husband is laid off (Figure 1b and Stephens (2002)).

These data patterns imply that not all wage shocks elicit the same household labor supply responses depending on the nature of the shock and the underlying government policy environment. A disability shock is distinct from a layoff shock in that it not only lowers one's productivity in the labor market but also in home production. Furthermore, it may require the spouse to provide care for the disabled member, especially if the disability is severe. This potentially limits the amount of time that the spouse can allocate for market work. Also, Unemployment Insurance (UI) and the Social Security Disability Insurance (SSDI) differ significantly in terms of their award rates, application processing time, and the amount and duration of benefits. Although SSDI has higher rejection rates and application costs[1], recipients are awarded with a lifetime annuity income.

Therefore, this project aims to investigate the following questions:

- To what extent can couple households smooth consumption against disability shocks through spousal labor supply in the presence of time allocation constraints for home production and caregiving? How much of the observed spousal labor supply responses are due to time constraints versus the presence of SSDI?
- How much do households value SSDI?

[1]These are in terms of longer processing time and other restrictions such as a five-month waiting period and income limits.

- How would changes in SSDI policies affect household labor supply responses and welfare (in terms of consumption)? How would these interact with other possible policy changes such as Medicare or Medicaid paying family caregivers or introducing insurance for family caregiving?

To answer these questions, I will construct a dynamic model of married households and estimate key parameters using simulated method of moments along with calibrating parameters that can be estimated outside of the model. I will first start with assuming a unitary model where households dissolve at some exogenous rate due to divorce or death of a spouse.[2] Households are risk-averse and receive utility from consumption and each household member's leisure.

The model incorporates the following features:

- *Disability shocks with different degrees of severity*: Husbands are subject to an exogenous process of disability shocks. For tractability, I assume that only husbands experience health shocks. A crucial aspect that differs from many models is the disaggregation of disability shocks by severity. This is necessary since the severity of the disability interacts with caregiving needs alongside the productivity in the market and at home. Disability enters both the household budget constraint (by reducing the husband's market productivity) as well as the time allocation constraint as detailed below.

- *Home production and caregiving needs*: Households are subject to time allocation constraints in which a certain amount of time needs to be spent in home production and caregiving depending on the degree of disability. Disability affects the time allocation constraint by lowering the husband's productivity in home production and increasing the amount of time required for the wife to provide care. This captures the aspect in which informal care provided by the spouse may be a cheaper or preferred option than formal care such as hiring helpers or long-term care (Mommaerts 2015).

- *Disability Insurance*: Households decide whether to apply for SSDI. SSDI will be rewarded with some probability based on age and disability severity.

The model allows me to perform various decomposition and counterfactual exercises. Especially, it allows me to evaluate how the insurance value of SSDI interacts with the severity of the disability and home production and caregiving needs within the household. To my knowledge, there are no previous works that consider home production and caregiving responsibilities in evaluating welfare consequences in the event of SSDI policy reforms.

To estimate the model, I will mainly be using the Health and Retirement Study (HRS), a biennial panel of older Americans since 1992. The HRS contains rich panel data on employment, health, income and assets of the respondents and their spouses. It also has detailed information regarding the date and status of each SSDI episode including whether respondents have applied or reapplied and whether they were rewarded benefits or rejected. Finally, data regarding the type of medical conditions and functional limitations (difficulty in various daily activities such as dressing, bathing, walking etc.) allows me to explore various definitions of severity of the disability.

In order to get time use and consumption data, I will also be utilizing the HRS Consumption and Activities Mail Survey (CAMS). HRS CAMS is a biennial panel supplement that has been

[2] I am also considering extending the model to a collective model in which disability shocks affect the bargaining power between the two spouses and lead to endogenous dissolution of households. Although the collective model provides richer predictions, I will first pursue with a unitary model as a starting point for simplicity and tractability.

collected in odd-number years since 2001 for a random subsample of the HRS.[3] It includes time use data on roughly 30 activities along with expenditure data on more than 30 categories of durable and non-durable items chosen to match the Consumer Expenditure Survey (CEX). Combining the HRS and HRS CAMS allows me to explore how time use and consumption interact with disability status and employment of husbands and wives. Table 1 documents summary statistics of wife's time use depending on the husbands' disability status from the HRS CAMS.[4]

Implications for the aging workforce

This project has important implications for the aging workforce. First, disability becomes increasingly prevalent among older workers and directly affects working hours, retirement age and transitions to different types of jobs with varying physical requirements. Indeed, roughly 30% of respondents in the HRS have health conditions that limit the type or amount of work that can be done. Furthermore, it affects the spouse's labor supply and non-market responsibilities as these decisions are made jointly at the household level. This will have greater implications for more recent cohorts due to the steady rise in female labor participation rates and earnings share within the household. Finally, this project has implications on how social insurance policies interact with labor supply and time allocation to home production and caregiving, and how changes in these policies affect household welfare.

Other projects related to the aging workforce

I have two other research projects that are relevant to the aging workforce. The first, joint with Kegon Tan, aims to identify the magnitude of voluntary bequest motives in retirement savings. We exploit a plausibly exogenous variation in Social Security wealth caused by changes in the benefit computation formula (the "Notch") and combine our IV estimates with a structural model to identify key preference parameters. Our estimates imply that a sizable portion of retirement savings is attributed to voluntary bequest motives. This leads us to conclude through our counterfactual experiments that a more progressive Social Security benefit formula has negligible impact on consumption.

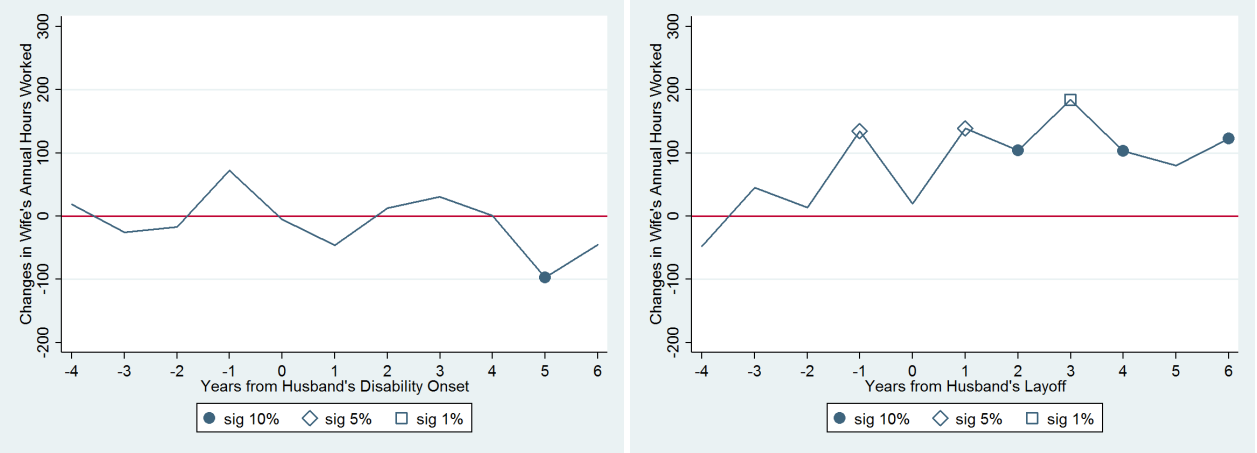
The second project attempts to understand self-employment dynamics among older workers. In particular, it aims to understand the underlying mechanism in which self-employment rates rise with age and become a significantly more prevalent method of older workers remaining in the labor force. I construct a dynamic model with job destruction, costly job search, and two types of jobs (wage-and-salary and self-employment) that differ in their earnings processes and flexibility in working hours to explain transitions from wage-and-salary jobs to self-employment along with the longer tenure and higher wealth of self-employed workers.

[3] There are roughly 7,000 respondents in each HRS CAMS survey year. About 3600 respondents are in all 8 survey waves (2001-2015).

[4] Alternatively, I am also considering to use the HRS and the Panel Study of Income Dynamics (PSID) in conjunction since HRS only samples respondents of age 51 and older. PSID contains rich consumption data for recent years along with number of hours spent on housework but lacks caregiving and SSDI application data.

Supplementary Figures and Tables

Figure 1: Changes in Wife's Annual Hours Worked by Husband's Wage Shock



(a) Husband's Disability **(b)** Husband's Layoff

Point estimates of regressing wife's annual hours worked on leads and lags of husband's wage shock. Sample restricted to white married couples in which husband and wife are both younger than age 65 in the HRS (1992-2012). All regressions control for individual, year and census division fixed effects, age quartic of husband and wife, household size and length of current marriage.

Table 1: Wife's Mean Weekly Time Use by Husband's Disability Status

	Wife's age							
	50-54		55-59		60-64		65+	
Husband Disabled?	Yes	No	Yes	No	Yes	No	Yes	No
Home production	33.30	32.00	36.20	33.71	35.09	35.04	34.95	34.13
Caregiving	6.43	2.78	3.24	2.62	4.51	2.30	5.53	2.36
Work for pay	24.51	25.72	15.85	24.01	10.14	13.52	2.51	3.02

Sample restricted to white married couples in HRS CAMS (2007-2013). Results are qualitatively similar even when the sample is restricted to couples with non-disabled wives. Home production is the sum of weekly hours spent on house cleaning, washing/ironing/mending clothes, yard work, running errands, prepping meals, pet care, managing money, home improvement and maintaining vehicles.

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Personal
Gender: Female
Citizenship: South Korea (F-1 Visa)

Education
Ph.D. Economics, University of Wisconsin-Madison — 2013 - Present
M.Sc. Economics, University of Wisconsin-Madison — 2015
B.A. Economics and Sociology, Seoul National University, *summa cum laude* — 2013

Research Interests
Primary: Labor / Public Economics
Secondary: Entrepreneurship, Firm Dynamics

Working Papers
"Beqeust Motives and the Social Security Notch" (with Kegon Tan)
"Understanding Self-Employment Dynamics Among Older Workers"

Work In Progress
"The Effect of Firm-Sponsored Training on Firm Productivity" (with Cristian Hernandez and Fu Tan)
"The Cyclicality of Entrepreneurship" (with Sarada and Oana Tocoian)

Awards
Summer Research Support Scholarship, UW-Madison — 2016
Two-Year University Fellowship, UW-Madison — 2013 - Present
Maeil Business News Student Paper Competition, Second Place — 2012
Scholarship for Superior Academic Excellence, SNU — 2010 - 2013
Samsung Undergraduate Scholarship — 2009 - 2013

Employment
Project Assistant for Professor Sarada, UW-Madison — 2015 - Present
Teaching Assistant, UW-Madison — 2014 - 2015
- Stats: Measurements in Econ (undergraduate), Spring 2015
- Econ Stats & Econometrics (Ph.D.), Fall 2014

Presentations
UW-Madison Labor Workshop — 2016
UW-Madison Empirical Micro Workshop — 2015

Skills
Computer: Stata, Fortran, MATLAB, LaTeX
Language: Korean (native), English (fluent), Japanese (conversational), Mandarin Chinese and French (basic)
Miscellaneous: Violin

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December 9, 2016

RE: Siha Lee

I am writing to recommend Siha Lee for an NBER Pre-Doctoral Fellowship in the economics of aging. Siha is a very promising applied microeconomist who is in her fourth year in the PhD program at Wisconsin. She is working on an interesting thesis (which I am supervising), and I expect that she will be one of the strongest labor economists on the market when she is done.

Siha is working on a very interesting project analyzing how declining health affects household labor force participation decisions (including retirement and partial retirement decisions). A major focus of this work involves the analysis of joint labor supply decisions made by couples in response to changes in health status of either partner. In much of the relevant literature, individuals are treated as if they make decisions in isolation, without reference to others who are part of the same household. While this approach is reasonable when considering single people, it is clearly unsatisfactory for couples, and thus it ignores an important segment of the labor force.

In addition to the disability and labor supply project, Siha has also co-authored a paper with Kegon Tan (another graduate student) that uses data from the Social Security "notch" cohorts to distinguish between bequest and precautionary motives for saving. Kegon Tan is on the job market this year, and this is his job market paper. It's a creative and very well executed paper which is attracting a lot of favorable reviews (as indicated by Kegon's impressive list of job interviews).

Siha is very smart, and very hard-working, and she knows how to work with models, and how to work with data, and how to make credible connections between the models and the data. She is ambitious and productive, and she finishes papers. Wisconsin has had a succession of very good PhD students in labor economics, including Suphanit Piyapromdee (UCL), Rebecca Lessem (Carnegie), Carl Sanders (WashU), Limor Golan (Carnegie/WashU), Shintaro Yamaguchi (McMaster), Luke Davis (Michigan/Haas), Kate Antonovics (San Diego), Eric French (Chicago Fed/UCL) and Peter Arcidiacono (Duke). Siha is comparable to the best of these people, judging by what she has done so far compared with what they had done at the same stage.

In summary, Siha is an outstanding candidate for a Pre-Doctoral Fellowship. I recommend her most enthusiastically, and with no reservation.

Sincerely,



John Kennan
Richard Meese Chaired Professor of
Economics