Household responses to individual shocks: disability and labour supply

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Very Preliminary and incomplete

Abstract

Shocks are experienced at the individual level: however responses to shocks can encompass the whole household. Understanding and accurately modeling these responses is essential to the analysis of optimal intra-household allocations, especially labour supply decisions, and, ultimately, the design of effective policies. To illustrate the empirical relevance of household level responses to shocks we exploit variation in health status. This paper provides an overview of the prevalence, persistence and consequences of work-limiting disability for individuals and households in Canada using the longitudinal data available in the Survey of Labour and Income Dynamics (SLID). Based on these observations, we develop an analytical framework to model optimal household responses to disability shocks. We numerically simulate four life-cycle models comprised of one- and two-member households and compare their performance in replicating basic empirical observations. The different models allow for different assumptions about the wage determination mechanism and about the nature of household-level insurance. For wages, the main difference is whether or not we allow for human capital accumulation acquired through previous work experience; as for intra-household insurance, we consider different channels through which insurance can be provided, with a special focus on whether spouses are able to "care" for each other through what are effectively intra-household transfers of time. We find that both human capital accumulation and caring are important factors in matching the data. Our models could provide a suitable framework to assess the effects of different disability policies. Such policies are particularly relevant for economies characterized by an aging work-force. Through numerical simulations we can also measure how much of total life-cycle idiosyncratic uncertainty can be attributed to health shocks.

1 Introduction

Shocks are experienced at the individual level. Responses to, and consequences of, shocks are experienced at the household level: this generalization applies to health and disability

shocks. For instance, Charles (1999) finds no evidence that the incidence of disability shocks is correlated across spouses in the United States; however, descriptive studies of disability have shown that the effects of a head's disability for U.S. households, whether measured in terms of participation, income, predicted future wages, or consumption, are large (Stephens (2001), Meyer and Mok (2006)).

A large economic literature on disability has focused on describing and quantifying the costs, in terms of income and labour time loss, experienced by households with a sick or disabled member (Meyer and Mok (2006), Charles (2003), Stephens (2001), Spector (2006)). A related literature focuses on individual workers' responses to declining health or disability onset and to the incentives provided by disability insurance programs. Recent contributions based on American data include Burkhauser, Butler, and Gumus (2004), Kreider (1999), Autor and Duggan (2003), while some of the major contributions based on the Canadian experience include Campolieti and Lavis (2000), Gruber (2000), Campolieti and Krashinsky (2006) and Bolduc, Fortin, Labrecque, and Lanoie (2002). Another branch of this literature focuses on added worker effects and spousal responses to individual disability shocks. Coyle (2004), using the HRS, and Charles (1999), using the PSID, provide two recent examples.

This draft consists of four sections. After an introduction, we provide an empirical overview of chronicity and labour supply responses of Canadian households to disability onset in one member using longitudinal data available in the 1999 and 2002 panels of the Survey of Labour and Income Dynamics (SLID). The SLID partly resembles large U.S. panel household surveys such as the Panel Study of Income Dynamics (PSID) and the Health and Retirement Study (HRS). Relative to the PSID, which like the SLID contains information on households at all stages of the lifecycle, the SLID has both a plus and a minus for our purposes. The plus is that the questions posed in the disability module are sufficiently detailed to allow us to classify subjectively reported disability shocks as either strictly labour-limiting or as both labour- and leisure-limiting. A minus is that its short panel dimension (households are followed for six years) makes it less straightfoward to follow households over time and requires a strongly unbalanced panel approach.[1]

We find generally large effects of disability onset on the behaviour and incomes of Canadian households, with the effects increasing in the maximum level of severity reported by the affected household member over the course of the panel. We also observe very large differences in consequences by gender and marital status, with singles of both genders facing much larger and longer lasting reductions in labour supply and personal income from

[1]Disability is self-reported and its severity is subjectively assessed. 'Justification' bias, where individuals with lower incomes or worse labour market prospects report more disability, is a problem with all subjective measures. However two recent studies by Au, Crossley, and Schellhorn (2005) (for health measures) and Campolieti (2002), both using Canadian data from the National Health and Population Study, find that justification bias is small enough to be of less concern than measurement error due to varying interpretations of the disability question.

disability onset and also being much more likely to report disabilities in subsequent years. The effects of household insurance also vary greatly by gender and marital status. Married couples insure each other but do not appear to gain additional insurance from their extended family or household. Single women, by contrast, appear to be surprisingly well insured at the family and household level while single women are not.

In section 3 we introduce our dynamic model of the household and describe our calibration process. We consider households comprised of one or two members who value only their own consumption and leisure but optimize over a household-level utility function which is an explicit function of both members' preferences: this is a generalization of the standard unitary framework. For simplicity we assume that only one member of the household is subject to work-limiting disability shocks. Disability shocks can be labour-limiting or both labour and leisure-limiting; two special case occurs when (1) disability shocks limit labour and leisure equally; and (2) they are strictly labour-limiting. In the former case, disability shocks are "time-stealing" shocks, in the sense of Batavia and Beaulaurier (2001), in that the time-loss from disability is lump-sum: an equivalent measure of time is lost to disability regardless of whether the affected individual devotes his time to labour or leisure. In the latter case, disability shocks are labour-limiting, in that impose an additional time loss on individuals only when they work.

We provide a brief analytical representation of the effects of these respective disability shocks on individuals' optimization choices and on own and spousal labour supplies in a dynamic model without saving. We show that a very basic model with exogenous, autocorrelated wages does not do a good job of predicting the effects seen in the data. Specifically it overstates the labour supply response of married individuals relative to singles, and also predicts a stronger spousal labour supply response ("added worker effect") to disability onset relative to what we observe in the data. We therefore propose two modifications. The first is the introduction of endogenous wages determined through the acquisition of human capital. In this model, the individual's labour supply response to disability onset may be muted by the fact that reducing his labour supply today results in lower productivity tomorrow due to a reduction in human capital.

Second, we consider the idea of spousal "caring". Household models often assume implicitly that transfers within the household (i.e. between spouses), take the form of consumption goods. In the presence of disability shocks, and particularly "time-stealing" shocks that drive up the affected individual's marginal utility of leisure, the household may be best off if one spouse provides all the labour and consumption transfers. However, when the time loss associated to disability gets larger, transferring consumption goods becomes progressively less effective in avoiding large drops in household utility: lowering the disabled spouse's marginal utility of consumption will not be an effective way to safeguard household's utility as long

as their marginal utility of leisure remains high. Therefore we examine the possibility that a healthy spouse can make also a "leisure transfer", in the form of home production or caring services, to her partner: the implications for observed spousal labour supply responses to disability are discussed in the last part of section 3.1.

Finally, in section 4, we turn to some (very!) preliminary calibration exercises using our calibrated numerical versions of lifecycle models (1) without human capital or caring; (2) with human capital but no caring and (3) with human capital and caring. We examine how these models fare at replicating our empirical observations on labour supply.

Ultimately, our numerical models should provide a framework to assess the effects of different types of disability policy. In future work we plan to examine the labour supply and welfare effects of three specific types of disability policy: (1) an income-support for workers conditional on non-participation while the disability persists and the benefit is being received; (2) A permanent, unconditional (possibly lump-sum) benefit awarded to workers who enter a phase of severe disability for a minimum number of periods; and (3) a wage supplement, in the form of a negative payroll tax, that accrues to individuals with a sufficient degree of disability. The first two policies roughly correspond to the disability benefit provided under the Canadian/Quebec Pension Plan and to the permanent component of many provincial workers' compensation programs. The third type of policy has no direct counterpart within the Canadian disability system but has been proposed as a possible work-incentive for the disabled in the disability literature (see Bound and Burkhauser (1999)).

2 Disability in Canada: Empirical Evidence

The following section describes our measurement approach and documents facts about the occurrence and effects of disability.

2.1 Definition of disability

Our primary source of information on disability are the self-reported measures available in the 1999 and 2002 panels of the SLID.[2] Global self-reported measures of disability have come under attack in the disability literature, but other some researchers, most recently Bound and Burkhauser (1999), have found them to yield unbiased estimates of true disability status. In the Canadian literature, Campolieti [2002] finds little evidence of justification bias. He argues that disability self-reports are likely to understate the true effects of disability due to measurement error introduced by the interpretive nature of the questions.

The disability questions in the SLID concern different types of activity limitations. For this section, we consider only disability that limits work and ignore subjective reports of

[2]Previous panels cannot be used with the 1999 and 2002 panels because the questions in the disability module of the SLID questionnaire changed in 1999 to reflect the questions posed on the 2000 census.

"leisure-limiting" disability. Since 1999, the SLID has asked a constant series of questions about how disability limits work and various other activities, reflecting similar questions posed in the 2001 Canadian Census. Individuals are classified as disabled if they affirm at least one of the following statements: during the reference year, he or she "had a physical condition, mental condition or health problem that limited the amount or type of activity that could be done" (1) "at work"; (2) "at a job, or business or at school".[3]; that the condition "prevented [the individual] from working more [in the reference year]"; that because of the the condition the individual "wanted to work less [in the reference year]"; that the condition "makes it difficult [for the individual] to change jobs to get a better job." Individuals are additionally asked if their condition "completely prevents" them from "working at a job or business or looking for work". Below, we refer to those who answer in the affirmative as "acutely" disabled and those who do not reply in the affirmative as "partially" disabled.[4] We note that temporal frame is not identical across the questions, since some questions refer to work in the previous calender year and some to the current condition. However, unless the condition is a long-term condition, we expect that, in responding, individuals will consider only the part of the previous year (say, the last three months), if any, that were affected by the disability.

2.2 Incidence and chronicity

Incidence statistics in this section are computed using the overlapping 1999 and 2002 panels of the SLID (for the years 2002, 2003 and 2004, treated as a cross-section) with the appropriate weights provided by Statistics Canada. Chronicity statistics (in Tables 2-4) are reported using the 1999 panel, restricted to those individuals who show up in all six years of the panel, again weighted with the appropriate weights from Statistics Canada.[5] Our

[3]The question about disability limitations "at work" are asked of respondents or about subjects under 70 who worked in the reference year. The question about disability limitations "at a job or business or at school" is asked of respondents under 70 who did not work in the previous year. In the longitudinal file, the responses to these questions are combined into a single variable reported for the entire sample population under 70, which is the age range we consider. The questions about changing jobs and about the condition limiting the time at work are asked only of individuals who worked in the reference year. Some respondents report being limited in their ability to change jobs or to work the desired amount even though they did not report a work-limiting disability. These individuals reported a disability that limits them in non-work related capacity, but may may feel that the limitation disadvantages them in the labour market if not in their capacity to perform work or to make optimal labour market decisions. We therefore consider these individuals relevant to our work-limitation measure.

[4]The complete limitation question is asked only of individuals who did not work in the reference year. We include the relatively few of these individuals who report positive hours on the grounds that the onset of preventative disability may have occurred during course of the year after some work hours had been logged.

[5]A benefit of using the combined 2002-2004 panel for our incidence reports is that it omits data from 1999 which Statistics Canada warns should be used with caution. We find significant differences between 1999 and other years only for the question regarding the difficulty in changing jobs which makes us relatively confident about including 1999 in our chronicity reports.

sample represents the population aged 16-69. We define low educated individuals as those who have less than a postsecondary degree (i.e. some university or technical training but no diploma or degree) and high educated individuals as those who have some form of degree or certificate beyond a high school diploma. We take educational attainment as the highest attainment recorded during the course of the panel. In order to keep our population as large as possible, we replace education with this value in any year it is not recorded. We define four categories of marital status: currently married (including common law married); never married; previously married but currently divorced or separated; and, where cell counts allow, widowed. For individuals in the "acute" disability state whose hours are listed as unknown, we impute hours equal to zero. We then keep all individuals for which information on age, education, marital status, and *at least one* of the disability responses making our composite measure are available.[6]

For our global 2002-2004 sample, in a given year 86.6% report no work limitation, 8.5% report being partially disabled, and a further 4.7% report being acutely disabled. Among the single adult population, 5.7% are partially and a disproportionately high 8.6% are acutely disabled. Among economic families (family units related by blood), the proportions with either head or spouse partially and acutely disabled in a given year are 14.5%, and 7.56% respectively. For households, the number with at least one adult increases slightly to 14.7% for partial, and 7.7% for acute disability. As well, 1.4% (0.6%) of economic families and 1.5% (0.8%) of households have more than one adult member who is partially (acutely) disabled. Not surprisingly, the incidence of work-limiting disability increases sharply over the working life, from around 6% (7%) for men (women) under 30 to around 36% (37%) for men (women) between ages 60 and 69.[7]

Table 1 breaks our measure of partial disability into its component parts, for the whole partially disabled population and by sex. The main component of our partial disability measure is the limited-in-work (or in potential work) measure. About 90% of the work-limited sample answers that they are limited in their work activity "sometimes" or "often". Men and women are almost equally likely to report being limited in their work activity "often" and women about 2% more likely to report being limited "sometimes". Disabled individuals are also quite likely to report feeling restricted in their ability to change jobs or advance in their careers due to disability, with men about 4.5 percentage points more likely than women. Smaller proportions of both sexes reported being unable to work more hours due to disability and less than 1% of respondents reported that they wanted to work less

[6]We count refusals and "not applicable" answers as missing data. Individuals who reply that they "don't know" how their disability affects their work capacity or opportunities are considered as negative (not disabled) in relation to the question. Only 56 observations are dropped from the sample due to unreported disability status.

[7]Tables showing incidence by age are omitted to save space but but are available in a companion paper [forthcoming] and from the authors.

than they actually did due to a disability. This last finding suggests that the labour market may not impose serious constraints on the choice of hours, so that individuals who want to reduce their hours due to disability are able to do so. This is an important consideration when deciding how to model the labour supply choice in our numerical model.

Table 1: Components of partial disability

Component	All (%)	Men (%)	Women (%)
Limited in work "sometimes"	54.6	53.5	55.5
Limited in work "often"	34.5	34.7	34.3
Difficulty changing jobs	47.0	49.3	44.9
Prevented from working more	9.0	9.9	8.2
Wanted to work less	1.0	1.2	0.8

Table 2 describes the chronicity of disability in terms of the frequency with which work-limiting disability is reported by individuals in the 1999 panel (weighted to reflect the population of Canadian households in 2004).[8] Marital status is assigned as the status reported in the final year of the panel. The first column gives the frequency with which any disability is reported within the entire population over the six-year period. The second column reports the frequency of partial disability reports, restricted to the population that *never* reports an acute disability during the course of the panel. Column 3 reports the frequency of acute disability reports, this time for the entire sample population.

Table 2: Chronicity of disability over time

Frequency of reports	Par ∪ Acute	Par/Acute (%)	Acute (%)
0	0.705	0.705	0.910
1	0.118	0.108	0.029
2	0.053	0.041	0.016
3	0.037	0.023	0.011
4	0.028	0.015	0.010
5	0.030	0.011	0.013
6	0.028	0.007	0.011

[8]Restricting the sample to individuals who show up in all six years gives us a total sample population of 15412 individuals.

Table 3: Persistence of disability over time by gender, education, marital status

Freq (z)	Men (%)	Women (%)	Low Ed (%)	High Ed (%)	NM (%)	M (%)	S/D (%)	W (%)
0	0.722	0.690	0.635	0.763	0.728	0.723	0.609	0.520
Frequency of reports conditional on reporting at least once								
1	0.414	0.391	0.342	0.476	0.344	0.438	0.331	0.299
2	0.183	0.175	0.175	0.184	0.171	0.183	0.174	0.165
3	0.107	0.143	0.132	0.119	0.119	0.128	0.123	0.136
4	0.096	0.094	0.106	0.081	0.108	0.086	0.108	0.149
5	0.109	0.097	0.124	0.076	0.144	0.090	0.101	0.156
6	0.091	0.100	0.120	0.064	0.114	0.076	0.163	0.095

Finally, Table 3 gives further breakdowns of the persistence of any disability within the whole population (equivalent to column 1 of Table 2), by gender, education and the four categories for marital status, where marital status is defined to be the status in the final year that the individual shows up in the panel. This time, the second through last rows show the percentages reporting a disability in z periods conditional on reporting a disability in at least one period (called 'affected" individuals below). Since the numbers in the table may be sensitive to the age of the individuals in different marital categories, Table 4 reports age-adjusted predicted probabilities for the 40-49 year old population from an ordered probit regression of the frequency count on 10-year age categories and the demographic variable in question. Additional tables for the acute and partial groups and for additional age categories are not shown to save space but are available on request.

Table 4: Age-adjusted chronicity by gender, education, marital status for 40-49 year olds

Frequency of reports (z)	Men (%)	Women (%)	Low Ed (%)	High Ed (%)	NM (%)	M (%)	S/D (%)	W (%)
0	0.713	0.682	0.635	0.750	0.625	0.730	0.598	0.645
Predicted probability of reporting z times conditional on reporting once								
1	0.120	0.128	0.140	0.111	0.141	0.116	0.146	0.137
2	0.053	0.058	0.066	0.047	0.067	0.05	0.071	0.064
3	0.036	0.041	0.047	0.031	0.049	0.034	0.052	0.046
4	0.027	0.03	0.036	0.022	0.037	0.025	0.041	0.035
5	0.028	0.032	0.039	0.022	0.041	0.025	0.046	0.038
6	0.024	0.029	0.037	0.017	0.039	0.020	0.046	0.035

The results show that women are slightly more likely than men to report a disability at least once in the panel, and female disabilities are also slightly more chronic. 9.1% of affected women report being disabled in four or more of the six years compared to 7.9% of affected men. From additional breakdowns by disability category (not shown), the gender differential is concentrated on the partially disabled; men and women are nearly identical in incidence and chronicity in terms of acute disability. Larger distinctions exist across education groups. 8.2% of affected low educated individuals report a disability in four or more years, while the corresponding number for higher educated affected individuals is only 6.1%. These persistence effects compound the fact that low educated individuals are more than 11.5 percentage points more likely than high-educated individuals to report a disability in the first place.

The age-adjusted results also show strong differences by marital status. Married individuals are 10.5 percentage points more likely to never report a disability and 4.7 percentage points less likely to report four or more times conditional on reporting once than never-marrieds. Interestingly, divorced individuals fare the worst of the four groups. Widows fall between marrieds and singles in terms of both incidence and chronicity of their disabilities. Tests of the estimated coefficients on the three unmarried categories from the ordered probits show that difference in terms of chronicity between divorcees and widows is significant for all partial, acute and pooled measures of disability, but the difference between singles and divorcees is significant only for the acute disabled group.

2.3 Longitudinal effects of disability

In examining the effects of disability on household variables over time, we are aided by the structure of the SLID, which reports economic measures at various levels of aggregation. First, data on hours worked, hourly earnings, labour earnings and total income is reported at the individual level, from which we can derive responses and consequences of disability for the affected individual and for his/her spouse. Next, the SLID defines an "income family" as a husband and wife or a single adult, and his/her/their legal children under 16. In the tables, we refer to this category as "single head/couple".[9] The "economic" family can consist of one or more income families related by blood or marriage and living together. Finally, the "household" consists of one or more unrelated economic families sharing the same residence. Since we are interested in how far beyond the affected individual the effects and imperatives of disability onset are felt, at various points we report results for all these measures.

Our sample consists of the 1999 and first four years of 2002 panels of the SLID, pooled without weights. In order to maximize our cell counts, we include in our core sample all

[9]The definition is similar to the definition of a census family, except it includes one-person households and excludes children between the ages of 16-25.

individuals who appear in the sample for at least two consecutive years; who meet the basic conditions outlined in subsection 2.2; and who report a valid response for the measure (hours worked, income etc.) under consideration. Additional sample selection criteria are outlined below.

Our primary reference point for these results is the year in which an individual experiences the onset of disability. The SLID asks individuals who report a disability to recall the year and age at which their condition began. These reports are not always consistent from year to year, and individuals may report no limitation at all for several years into the panel before claiming a previous condition of long duration. To deal with this problem, we take the reported duration of the disability in the first year the individual reports a disability in the sample as "the truth" and then assign years from onset for the remaining years of the panel to be consistent with this report. Since we only consider individuals between -5 and +10 years from onset, those who report very long durations of disability are excluded from the analysis. This is appealing given that we might expect the accuracy of the report to be decreasing in reported duration.

Our methodology follows Meyer and Mok (2006), who also use an unbalanced panel, but we adjust for the smaller panel dimension of the SLID relative to the PSID and for our smaller number of disability groupings relative to these authors. We estimate by fixed effects the following equation:

$$y_{jt} = \alpha_j + \gamma_t + X_{jt}\beta + \sum_h \sum_k \delta_k^h A_{kit}^h + e_{jt} \tag{1}$$

where X contains observation-specific information including a cubic in age; education categories (high and low); household size; number of children; a dummy for living in a city of at least 50,000; a dummy for having changed jobs in the previous year and regional dummies (the Atlantic provinces, Ontario, Quebec, Western provinces and B.C. The SLID does not sample households from the Northwest Territories or Navenut.) i is the disabled individual, and j the unit of analysis (individual, spouse, income family, household). k, ranging from -3 to +10, represents the number periods from the initial onset. A is the dummy variable corresponding to the h, k combination and is the primary focus of what follows.

The y is the economic variable of interest. We examine own and spousal annual labour supply on the intensive, extensive and composite margins, as well as labour earnings, income from transfers, in the aggregate and broken down by source, and before-tax income including transfers. We also examine the effects of disability onset and post-onset work on long-run hourly wages. Because in all cases we are primarily interested in the implications of marriage and family arrangements on disability, we estimate (1) separately for married and unmarried (pooling single, divorced and/or widowed) men and women, and for each disability category.

We consider three disability groupings based on reported severity: "mild", "any" and "severe" disability. The "any" disability group comprises everyone who reports a work-limiting disability at some point during the course of the panel, the same definition as in Table 3. For the other categories, we consider an index of limitation running from 1 to 3. Index level 1 corresponds to those who report being limited in their work activity "sometimes" or who report no direct limitation but feel constrained in their ability to work enough hours or to change jobs. Index level 2 corresponds to those who report being limited in their work activity "often". Index level 3 corresponds to those who reported being limited in their work activity "completely". Based on this index, the "severe" group are those who report an index of 2 or higher at least once during the panel (though not necessarily in the year of onset). For this subsample, individuals who report a milder disability at least once but never a "severe" disability are omitted from the analysis. The "mild" group are those who report *at most* a disability index of 2. For the regressions based on this subsample, all those who report acute disabilities at some point are omitted.

Our classifications of disability differ from those of Charles [2005] and Meyer & Mok [2006], which makes direct comparisons between our studies difficult. In particular, we do not consider additional classifications of disability based on chronicity. The short panel dimension of the SLID compared to the PSID, and the nature of our unbalanced panel approach makes it more difficult to identify to chronic disabled from the only temporarily disabled, especially for the important subset of individuals for whom the year of onset is directly observed.

2.4 Sample selection

Charles (2003) and Meyer and Mok (2006) measure the effects of disability onset using as their omitted category the group of individuals six or more years before onset ($A \leq -6$). Meyer and Mok (2006) omit from their regressions the portion of the PSID population who never experience a disability on the grounds that this group differs fundamentally from the future-disabled group and therefore that using the whole non-disabled (combining the never- and future-disabled) population will produce estimated coefficients that confound these timing effects with the effect of being the sort of person who will someday experience a disability. The much smaller panel dimension of the SLID makes this type of sample restriction less feasible. Even limiting our omitted category to those individuals three or more years before onset, for some groups and definitions of disability we are still left with a control group of fewer than 60 observations.

Instead, we choose a subsample of the never-disabled individuals who are close in terms of demographic characteristics and economic outcomes, averaged over the sample period, to the future-disabled samples using matching on propensity scores (see Smith and Todd (2005)

for a recent discussion of the effectiveness of this method). Our strategy is to match mainly on demographic and subjective characteristics of our samples and then to test whether economic outcomes for the matched groups still differ significantly from future-disabled control groups. Our matching algorithm for single men and single women is based on ten nearest neighbours (with replacement). Due to sensitivity of the matching estimator to choice of control variables, we use a slightly different set of regressors to select the appropriate male and single female control groups.[10] The set of regressors by gender is identical for all disability subsamples, but the resulting matched sample is different, as is the global subsample for each definition. For married men and married women, we found that propensity matching did not improve the fit of the sample (that is, increasing the number of neighbors used always improved the fit of the first-stage model). As a result, we include the entire never-disabled population along with the future-disabled (those three or more years before onset) in our control group.

Tables 5 and 6 show the results of this exercise for all four groups - unmarried men, unmarried women, married men and married women, for the mild and severely disabled samples. For unmarrieds, columns 2 to 4 report means [medians] of the economic or demographic variable in question for the unselected never-disabled (USND), selected never-disabled (SND) and future disabled (FD) groups respectively. Asterisks in columns 2 and 3 indicate whether the mean is significantly different from the mean in column 4 at the 5% confidence level. The SND sample turns out insignificantly different from the FD sample on most metrics for both the mild and severe subsamples. Interestingly, the numbers in the table show that, for the mild-disability sample, the future-disabled work more, report significantly higher own earnings and receive little additional support from the government compared to the never disabled. However, the future disabled tend to live in significantly poorer households than their never-disabled counterparts, though this effect is mostly corrected by the selection procedure. These effects hold for the future severely-disabled expect that this group receives (insignificantly) more government support prior to onset than the never-severely-disabled.

For marrieds, columns 5 and 6 of Tables 5 and 6 show means [medians] for the never- and future-disabled groups. Asterisks in column 4 indicate significant difference in the means at the 5% confidence level. The mild disabled group is the worst fit, with the differences concentrated on the probability of participation (hours also differ between the groups at 5% but the effect goes away when workers with zero hours are excluded). For the severe group, there appears to be almost no difference between the NDs and FDs. The difficulty in using a propensity score estimator to improve the sample used in the married control groups is

[10]Regressors common to both groups include a quadratic in age, occupation dummies, household size, dummies for whether previously married and paying/receiving support, dummies for multiple-job holding, and reported levels of subjective health and stress.

suggested by the small differences between FDs and SDs by demographic characteristics, particularly age, compared to singles. Results for the mild group should be interpreted cautiously, although several tests we ran suggest that differences of subgroups within the pooled control group are not major.[11]

Table 5: Sample selection results: Mild disability group

Variable	Singles			Married	
	UND	SND	FD	ND	FD
Men					
Demographic					
Age	31.8* [27]	39.0 [40]	39.0 [40]	46.3*	45.0
Hh size	2.69* [3]	2.20 [2]	2.21 [2]	3.36 [3]	3.39 [3]
Educ cat	1.47 [0]	1.53 [1]	1.52 [1]	1.55 [1]	1.59 [1]
Economic					
Hours	1488* [1788]	1651 [1955]	1630 [1911]	1854* [2086]	1976 [2086]
Part	.764* [1]	.879 [1]	.917 [1]	.802* [1]	.895 [1]
Hh income	68861* [57807]	58988 [49090]	56353 [49296]	82370 [71990]	75927 [67270]
Transfers	1842 [327]	2169 [327]	2461 [340]	1857 [0]	1468 [0]
Earnings	23883 [17253]	28416 [23140]	26698 [18127]	44701 [39109]	41147 [39256]
Women					
Demographic					
Age	35.4* [29]	40.9 [42]	40.6 [42.5]	44.9* [44]	43.5 [44]
Hh size	2.68* [2]	2.22 [2]	2.20 [2]	3.33 [3]	3.40 [3]
Educ cat	1.55 [1]	1.63* [1]	1.55 [1]	1.55 [1]	1.60 [1]
Economic					
Hours	1193* [1304]	1530 [1825]	1657 [1950]	1191* [1408]	1326 [1564]
Part	.721* [1]	.832 [1]	.841 [1]	.685* [1]	.780 [1]
Hh income	61215* [47649]	52665 [40759]	49904 [40024]	80167 [69742]	77440 [69802]
Transfers	2902 [434]	2732 [470]	3023 [586]	2361* [472]	1832 [249]
Earnings	17993* [11673]	27345 [23500]	26673 [25443]	21453 [15706]	22827 [19263]

2.5 Own and spousal labour supplies

Figures 1 and 2 plot the estimated coefficients for men and women respectively by marital status for the mild and acute disability groups. To save space, in this and subsequent sections we omit results for the "any" disabled group, which typically make a midpoint between the reported results for severe and mild groups. The corresponding tables 9-11 are given in the appendix. The tables report the estimated coefficients on the year-from-onset dummies as a

[11] Using only the future-disabled (3 years and before disability onset), as in Meyer and Mok (2006) results in samples that are too small for effects of disability to be identified by Stata's fixed effects estimator if age terms are also included. However, running similar estimations on hours and income data using a random effects estimator or a pooled OLS estimator, and comparisons of means of the dependent variables by year from onset within five-year age categories, suggest that the trends described below, especially with respect to differences across marital groups, are robust to the control group used.

Table 6: Sample selection results: Severe disability group

Variable	Singles		Married		
	UND	SD	FD	ND	FD
Men					
Demographic					
Age	32.3* [27]	39.1 [40]	39.1 [42]	46.3	46.6
Hh size	2.66* [2]	2.15 [2]	2.03 [2]	3.36 [3]	3.08 [3]
Educ cat	1.50* [0]	1.34 [0]	1.33 [0]	1.55* [1]	1.41 [0]
Economic					
Hours	1526* [1825]	1354 [1570]	1382 [1835]	1854 [2086]	1891 [2086]
Part	.781* [1]	.778 [1]	.796 [1]	.802 [1]	.851 [1]
Hh income	68643* [57361]	54962 [47020]	46410 [45399]	82370 [71990]	74647 [65527]
Transfers	1811 [322]	2860 [386]	2189 [312]	1857 [0]	1639 [0]
Earnings	24586 [18162]	24042 [16330]	24041 [16330]	44701 [39109]	40652 [36763]
Women					
Demographic					
Age	35.4* [30]	44.0 [44]	45.2 [46]	44.9 [44]	44.8 [45]
Hh size	2.64 [2]	2.38 [2]	2.34 [2]	3.33 [3]	3.38 [3]
Educ cat	1.55 [1]	1.63* [1]	1.57 [1]	1.50 [1]	1.50 [1]
Economic					
Hours	1242 [1390]	1285 [1565]	1424 [958]	1191 [1408]	1191 [1564]
Part	.736 [1]	.728 [1]	.734 [1]	.685 [1]	.704 [1]
Hh income	60930* [47395]	52606 [39099]	43591 [33811]	80167 [69742]	80896 [69412]
Transfers	2793* [414]	4159 [1247]	4926 [2722]	2361 [472]	1887 [202]
Earnings	19188 [12733]	22387 [15909]	21408 [19148]	21453 [15706]	21452 [15892]

percentage of the control group (future and selected never disableds) by gender and marital status for the "any"-disability group. Asterisks indicate that the fixed-effect estimate was significant at 10%. More detailed tables of reported coefficients and standard errors are omitted for brevity but are available from the authors. Figure 3 and Tables 12-14 (in the Appendix) show the same information for the labour supply responses of the affected individuals' spouses.

The figures plot coefficients for three labour supply measures: total hours, which includes individuals reporting zero hours in the sample; intensive margin hours, which includes only current workers, and probability-of-participation, where the plotted coefficients are from a linear probability model regressing a dummy for non-zero hours on the set of independent variables.

2.5.1 Labour supply: own responses

From the figures, we observe clear differences by marital status for both men and women. The response of total hours worked for married men and married women to mild disability

shocks is negligible, compared to a significant and persistent reduction in total hours worked for single men and women (on the order of about 20% of average hours of the control for each group), and a temporary and significant drop on the intensive margin for both single groups. The extensive margin (participation) responses are also stronger for single men than for married men, but a reverse pattern holds for married women vis-a-vis single women, with married women significantly and increasingly likely to be non-working after mild disability onset, eventually reaching about a 10% decline relative to the married women control group. Thus, mild disability has a significant participation effect only on single men and married women.

For the case of severe onset, the own-response in hours is strong for both married and non-married agents, but much again stronger for singles on both the total hours and intensive hours margins. The drops in total hours for singles are large, with an average drop of 40% for single men and even more for single women, and they get progressively worse, with some evidence of recovery close to the end of the observed period for men but not for women. Again, the labor supply response of married individuals is smaller, as they report roughly half the size of the labour supply drop experienced by single workers.

On the extensive margin, the pattern is reversed, with marrieds responding more to severe-onset than singles. For women, there is no statistically significant difference between the predicted drops either in levels (percentage points) or in shares of the control group mean (single women have a slightly lower drop in levels and a slightly higher share drop given that they have higher participation to begin with than married women). However, married men are significantly less likely to work positive hours after severe onset than single men over 10 year period after onset. At ten years post-onset, single men are a statistically insignificant 2.9% less likely than the single-male control group to work. Married men are 10.2% less likely to work than the control and the effect is strongly significant.

Finally, women experience substantially larger drops in labour supply in response to disability onset than men, especially in the case of the married group, whose total hours response is roughly twice the size of men's. Nevertheless, single women's decline in total hours worked is proportionally more than twice as large the decline for married women.[12]

2.5.2 Labour supply: spousal responses

Two results stand out from the estimations of spouse responses to a partner's disability onset. First these effects are much weaker than are the own effects. For instance, the maximum predicted participation response is +10% for the wife of a severe-disabled husband eight years after onset, less than half the predicted proportional own participation response of

[12] Additional estimations, using scheduled hours of work and measures of job churn, are omitted for brevity.

either husbands or wives. Second, spouse responses differ by gender. Wives of mild-onset husbands do not appear to respond at all to their spouse's shock on either the intensive or extensive margins. However, wives do respond to severe disability onset in their husbands in two ways: they decrease their probability of working (with a lag) and *increase* their hours *conditional on working*. These two sizable effects cancel out at the combined total hours level producing insignificant results.

Husbands are actually slightly more responsive to wives' disability onset when the onset is mild. The effects are concentrated on the intensive margin. For the mild groups, our findings are consistent with those from studies by Coyle (2004) and Charles (1999) using US data who also find modest added worker effects for the husbands of disabled wives but not viceversa. For the severe group, we see the same pattern at the total hours level, but this masks the fact that wives of disabled husbands are actually more responsive on both the intensive margin (though the differences are not significant) and the extensive margin, on which husbands of severe-onset wives do not respond at all. Additional regressions [not reported] splitting the spouses by primary/second earner rather than by sex, suggest that these patterns are actually slightly stronger by gender than by earner status.

2.6 Human capital and wages

Figures 4 and 5 plot the coefficients from the hours regressions converted to proportions (the numbers in Tables 9 against coefficients from a regression of ln wages on X and our years-from-onset dummies. The regressions for own and spousal wages are adjusted for selection (observation of a wage) using the fixed-effects selection estimator proposed by Wooldridge (1995) with bootstrapped standard errors calculated using 50 bootstraps. Exclusion restrictions include household size, number of children, a dummy for having experienced a death in the family in the previous years, and amounts of capital income. For the spouse wages, additional controls including the spouse's age and disability status are combined with X.

The figures suggest that disability does have a long-run effect on wages and that the fall in wages follows the fall in hours with a lag. However, the effects are proportionally much milder than the effects on hours and the small hours drops associated with mild-onset singles have no effect on wages (no clear pattern based on whether hours drops are extensive or intensive emerges either.) Nevertheless, for the severe-onset group, by 10-years-post-onset, hourly wages are predicted to be on the order of 20% below the adjusted mean for married men and 15% below th adjusted mean for married women. For single men, the wage drop for the severe group reaches its nadir at 8 years post-onset at about 30% below the adjusted mean. For single women, the corresponding decline is about 20%.

One curious effect from figure 5 is that the husbands of severe-onset wives also appear to experience a decline in wages over time along with their wives, despite evidence that they

increase their work effort in response to her disability. We posit one explanation for this observed effect is that these men take second or "moonlighting" jobs that pay lower wages causing a fall in the composite wage. However, further exploration of this hypothesis is necessary before drawing any conclusions.

2.7 Long-term effects of disability on family and household income sources

Figures 6, 7 and 8 show effects of disability on household income, labour earnings and public and private transfers respectively, measured at the single head/couple (income family) level, the economic family level and the household level. The corresponding tables 16-24 reporting the estimated coefficients as proportions of the mean value of the dependent variable from the corresponding control group are given in the appendix.

Several patterns stand out. First, there are significant declines in income and labour earnings[13] and significant increases in transfer income, for both the mild and severe disabled groups. The declines in labour earnings for the mildly disabled are disproportionately large and persistent relative to the corresponding declines in hours worked and participation, which is consistent with the observed gradual decline in wages following disability onset.

As was the case with labour supply, singles of both genders experience larger proportional declines in income and labour earnings than their married counterparts at the income family level. This is more evident from the tables that show proportional declines than from the figures that plot level declines. Ten years after onset, a single male in the mild (severe) disability group has an expected income 35% (34%) lower than the relevant control group while a married male has an expected income only 13% (19%) lower. In large measure this difference is due to the effects of spousal insurance. Even in the absence of added worker effects, marrieds whose own income falls in response to a shock experience a smaller proportionate drop at the income family level. The modest added worker effects for husbands of disabled wives further increase the proportional drop in income of single women (about 30%) relative to married women (about 10%).

Singles do not derive insurance from spouses; however, single men appear to derive significant insurance from their economic families and households. This is particularly obvious from examining the left hand side of figure 6. At the income family level, single men's income drop following mild disability onset is almost identical in levels to married men's. However, at the economic family and household levels, the effect becomes increasingly muted for both levels of disability and are in fact statistically insignificant for both mild and severe-onset

[13]Labour earnings are not the same as total earnings, which includes business and self-employment income. This is the major reason why the total decline in household income is in some cases is very similar in levels to the decline in labour earnings, even though total income includes transfer income.

groups except in the fifth and sixth year post-severe-onset. The same pattern holds, to a lesser extent, for severely disabled single males. Single females, by contrast, do not appear to experience similar insurance. Their declines in income and earnings are reflected and (in level effects) even magnified at the economic family and household levels. Married men and women exhibit almost identical patterns of income and earnings responses to disability at the couple, economic family and household level in terms of levels and proportions. This feature of the data is important in considering how to best model the affects of family insurance.

Turning to differences across disability categories, we observe that the magnitude of the decline in labour earnings between the mild and severely disabled, as for the hours and participation responses, is quite a bit larger than the corresponding difference across disability groups in the total income table. Transfer income appears to account for much of this difference. The severely disabled groups receive typically much larger increases in transfer income than the mildly disabled groups. Married men in the severely disabled category ten years after onset receive on average two times as much transfer income as the average man in the married-male control group while married men in the mildly disabled group receive only 25% more than the average married male in the control-group. Similar differences across disability categories exist for single women and, to a lesser extent, married women. Single men are an anamoly, receiving significantly higher transfer incomes relative to the control group only in the mildly disabled category, and only six or more years after onset.

To gain a further idea of the role of transfer income, Figure 9 and Tables 25-28 in the appendix further decompose transfer income at the household level into four of its major components: income from the Canada Pension Plan; income from worker's compensation, income from private transfers (such as alimony or child support payments) and income from Social Assistance. The top four panels of Figure 9 show show results for the mild-onset group the bottom four panels for the severe-onset group. Transfer income from all four sources is relatively minor for the mild disabled groups. For the severe disabled, workers compensation is the major payer, followed by CPP. This is consistent with aggregate data on disability transfers (see Campolieti and Lavis (2000)). Only single women draw significant amounts of private transfers, and the effects are typically insignificant and decline in both magnitude and significance with year from onset.

These effects suggest that the patterns in labour supply and participation observed in section 2.5.1 can not be readily explained by differences in access to public transfers. Married men draw significantly more transfer income in response to disability onset than single men; yet their reductions in labour supply are less severe (especially when recalling that there is essentially no added worker effect among wives of the disabled.) Two caveats are in order, however. For women, the somewhat larger increases in transfer income of

singles relative to marrieds, at least for the severely disabled, may be one factor driving the weaker labour market performance of single women after disability onset. As well, the relatively restricted coverage of workers compensation relative to CPP combined with the large contribution of workers compensation to the households of severe-onset married males may suggest that a subset of this group receives transfer payments sufficient to encourage retirement or withdrawal from the labour force while the rest remain employed. Also unclear is why single males' workers compensation payouts fall so short of their married counterparts.

In additional regressions [not shown to save space] we also examined the effect of disability onset on additional economic variables at the household level, including income from asset holding, the probability of making an RRSP withdrawal, private pension income and direct medical expenses. We find significant effects in all cases only for the severely disabled group. Direct medical expenses are typically small, not rising above $600 annually in any period. Private pension income rises for single men and married men for several years after onset before trailing off. Married women experience significantly negative effects of disability onset on private pension income, which could be related to the large participation effects of disability for this group that imply early withdrawal from the labour market and the termination of pension contributions. We see some evidence that wealth declines over time after disability onset, as the coefficient on a measure of income from capital gains and investments tends to be negative and increase in absolute value over time from onset. By contrast, we see little effect of disability onset on the probability of making an RRSP withdrawal for any of the gender-marital status groups.

2.8 Comparison to U.S. studies

Because of our disaggregation by marital status and because we use alternate classifications of disability, our findings for household effects of disability are not directly comparable to those for U.S. men in the PSID reported by Meyer and Mok (2006). Nevertheless, comparing the responses of our sample of married men (the majority of men in the sample) to their study, we find that our sample behaves most similarly to the group they label "chronic not severe" – that is, men who report disability repeatedly in the sample but who also report that their disabilities limit them to a moderate extent.[14] For instance, five years after onset, our sample of severely disabled married men work on average 355 fewer hours than the control group while Meyer and Mok (2006)'s chronic-not-severe group work 304 hours less. At ten years after onset, our sample of severely disabled married men who experienced at least one

[14]Meyer and Mok (2006) define a "severely" disabled group as well, but their definition of severity – more than 50% of disability reports reach a given threshhold of severity (otherwise "not severe) – is both more and less stringent than ours. We only require one "severe" report during the sample. On the other hand, due to the way the disability question is asked, the PSID data contains few reports of total limitation in constrast to the SLID. In fact, their 'severe' group fares much worse than ours on all measures, suggesting the first effect dominates.

year of acute disability or near-acute disability work 278 hours less while their sample of all chronic-not-severe men work 343 hours less. The falls in participation are also very similar between these groups at around 9 percentage points.[15] By contrast, their "chronic severe" group report a decline in hours of 1211 by ten years after onset. Only single women in our sample come close to this magnitude of loss at -1032 hours ten years after onset. Finally, labour supply effects of disability on our mildly disabled group are closest to those for the "one time" disabled in the PSID as categorized by Meyer and Mok (2006) - those who report a disability only once over the course of the panel.

For income and earnings, Meyer and Mok (2006) report declines in total family income for their chronic-not-severe group of -24% of the control group by the tenth year of onset, slightly higher than our severe married male group's decline of 15.2% and higher still than our single men's decline of 10.8%. Total annual earnings the chronic-not-severe group fall by 20.4%, relative to 21.1% for our severe group. For the income and earnings measures, our mildly disabled group of married men is well-matched with Meyer & Mok 's "not severe" group (see footnote above) with earnings declines of 11.6% relative to their 13.7%, and earnings declines of 11.0% relative to their 12.4% decline.

The added worker effects we find are very similar to findings in previous U.S. studies, in particular Coyle (2004) using the HRS and Charles (1999) using the PSID. Both authors find no evidence of an added worker effects for wives of disabled husbands and only small added worker effects for the husbands of disabled wives.

3 A dynamic model of disability and the household

3.1 The household's problem

In this section, we introduce the model of disability used in our numerical simulations and provide a brief analytical exposition of the model's properties.

3.1.1 Types of disability shock and household responses

We assume that disability can take two basic forms: labour-limiting (δ_n) and and leisure-limiting (δ_l). A static optimization problem for a single individual who values consumption and leisure can be written:

$$\max_{c,l} u(c,l) \tag{2}$$

$$s.t. \qquad (T - \delta_l l)w = c\delta_n \tag{3}$$

[15] Meyer and Mok (2006)'s reported participation rates are not age-adjusted however.

Table 7: Incidence of reported disability by type in the sample

l-inhibiting	n-inhibiting	l, n-inhibiting
3.3%	1.6%	11.6%

The disability questionnaire in the SLID allows us to distinguish between labour- and leisure-limiting disabilities. The construction of labour-limiting disability measures is described in 2. Leisure-limiting disability is taken as affirmative answers to the questions about whether activities are limited 'at home" or "in other activities".[16] Table 3.1.1 shows the distribution of responses across labour and leisure categories. Most disabilities are reported as comprising both labour- and leisure-limiting effects.

Whether disability is labour- or leisure-limiting turns out to have important effects on household behaviour for some versions of our model. For our analytical results, we consider two special cases. In the first (relatively rare) case, disability is strictly labour-limiting ($\delta_l = 1$). In the second, we assume that $\delta_l = \delta_n = \delta$. It is easy to show that in this case, the substitution effects from leisure- and labour-limiting disability cancel. We can define $\delta_t = T - \frac{T}{d}$ as a pure negative wealth effect which is simply subtracted from the individual's time endowment. This is the notion of disability as "time-stealing" described in Batavia and Beaulaurier (2001). We report household responses to both types of shocks below.

3.1.2 Basic model

In our most basic model, households consist of one or two members. One member is subject to disability and wage shocks and we denote this member with subscript o (for 'own'). For married households the other partner is denoted with subscript sp, for 'spouse'. In all the models, we assume there is no saving, which simplifies the analytics and allows us to focus on labour supplies.

For the single household, the individual's age-j value function is:

$$V_j(w_o, \delta_t, \delta_l) = u(c_o, l_o) + \beta E_{\delta,\mathbf{w}}[V_{j+1}(w_o^{'}, \delta_t^{'}, \delta_l^{'})|\mathbf{w}, \delta] \tag{4}$$

and the constraint set is:

$$(T - \delta_t - l_o)w = c_o\delta_n \tag{5}$$

$$l_o < T - \delta_t \tag{6}$$

For a married couple, the corresponding value function is:

[16] As for the labour-limitation questions, individuals may respond that they are limited "sometimes" or "a lot".

$$V_j(w_o, w_{sp}, \delta_t, \delta_l) = u(c_o, l_o) + \lambda v(c_{sp}, l_{sp}) + \beta E_{\delta,\mathbf{w}}[V_{j+1}(w_o^{'}, w_{sp}^{'}, \delta_t^{'}, \delta_l^{'})|\mathbf{w}, \delta] \tag{7}$$

with constraint set:

$$\begin{aligned} &\frac{(T - \delta_t - l)w}{\delta_n} + (T - l_{sp})w_{sp} = c_{sp} + c_o \\ &l_o < T - \delta_t \\ &l_{sp} < T \end{aligned} \tag{8}$$

Here, T is the total time endowment in the absence of disability shocks, l_i is leisure of member i, c_i is consumption of member i, $\mathbf{w}$ is the vector of household wage rates, δ is the vector of possible disabilities, β is the household discount rate and primes denote next period values (to avoid subscript clutter). λ is the weight the household places on the spouse's preferences in the maximization problem. Here, we assume it is constant and does not vary with wage or disability status of the couple – that is, the couple is "committed" to the parameters of whatever arrangement they came to when they married.

We assume that $u_j > 0$, $u_{jj} < 0$, and $u_j(0, k) > A$ for A large, where $j = \{c, l\}$, $k \neq j$. Similar assumptions hold for v. These conditions taken together imply that an internal solution is optimal in most cases. For analytical tractability, we also focus on the class of preferences for which $u_{jk} = 0$ - that is, individual preferences are separable in consumption and leisure.

In the basic model, there is no intertemporal component (because we shut down household saving) and the problem reduces to a static optimization. We solve for the set of first order conditions and calculate comparative statics for responses of leisure to changes in δ_n (letting $\delta_t = 0$ and δ_t (letting $\delta_n = 1$) respectively. This gives us the following sets of conditions for single (9), married own (10), and married spouse (11) response respectively:

$$\begin{aligned} \frac{dl}{d\delta_n} &= \frac{-w_o}{\delta_n^2}\left[\frac{(T - l_o) + \frac{u_c}{u_{cc}}}{\frac{w_o}{\delta_n} + \frac{u_{ll}}{u_{cc}}}\right] \lesseqgtr 0 \\ \frac{dl}{d\delta_t} &= \frac{-1}{1 + \frac{u_{ll}}{w_o^2}\frac{\delta_t^2}{u_{cc}}} < 0 \end{aligned} \tag{9}$$

$$\begin{aligned} \frac{dl_o}{d\delta_n} &= \frac{-w_o}{\delta_n^2}\left[\frac{(T - l_o) + \frac{u_c}{u_{cc}} + \frac{v_c}{v_{cc}} + \frac{v_l}{v_{ll}}}{\frac{w_o}{\delta_n} + \frac{u_{ll}}{u_{cc}} + \frac{u_{ll}}{v_{cc}\lambda} + \frac{u_{ll}w_{sp}^2}{v_{ll}\lambda}}\right] \gtreqless 0 \\ \frac{dl_o}{d\delta_t} &= \frac{-1}{1 + \frac{u_{ll}}{w_o^2}\left[\frac{\delta_t^2}{v_{cc}\lambda} + \frac{\delta_t^2}{u_{cc}} + \frac{\delta_t^2 w_{sp}^2}{v_{ll}\lambda}\right]} < 0 \end{aligned} \tag{10}$$

$$\frac{dl_{sp}}{d\delta_n} = \frac{-w_o}{\delta_n^2}\left[\frac{(T-l_o) - \frac{\lambda v_l}{w_{sp} v_{ll}}}{w_{sp} + \frac{\lambda v_{ll}}{u_{ll} w_{sp}} + \frac{v_{ll}}{v_{cc} w_{sp}} + \frac{\lambda v_{ll}}{u_{cc} w_{sp}}}\right] < 0$$

$$\frac{dl_{sp}}{d\delta_t} = \frac{-1}{\frac{w_{sp}}{w_o} + \frac{v_{ll}}{w_o w_{sp}}\left[\frac{\delta_t^2}{v_{cc}\lambda} + \frac{\delta_t^2}{u_{cc}} + \frac{\delta_t^2 w_o^2}{u_{ll}}\right]} < 0 \tag{11}$$

For both singles and marrieds, the effect of a labour-limiting disability shock on own leisure can be decomposed into a (negative) wealth effect and a (positive) substitution effect, working in opposite directions. The substitution effect occurs because every unit of labour costs the worker (household) $d\delta_n$ more units of total time, so that the relative cost of consumption, paid for by labour, increases, making leisure, which imposes no time cost, more attractive. In contrast, a time disability shock (increase in δ_t) has an unambiguous negative effect on leisure so long as the marginal utility of consumption is decreasing. The change in leisure is a less than one-for-one decline, so that total labour supply declines as well. A single individual who experiences a time disability shock reduces his enjoyment of both consumption and leisure optimally.

Comparing the own-effects equations for marrieds and singles, we see that the substitution effect of labour-limiting disability is threefold for married households: there is substitution toward own leisure not only from own consumption but also from spousal consumption and spousal leisure which also become relatively more expensive. The addition of negative terms in the numerator and positive terms in the denominator of the $d\delta_l$ equation indicates that a married person gives up less of the cost of a efficiency disability shock as leisure than a single person receiving the same shock, at least so long as husbands and wives are roughly similar in terms of their preferences and wages in the absence of disability, and if λ is set so that both members' utilities are roughly equally represented. This is the effect of spousal insurance. There is another claimant on the wealth generated by a positive shock (for example, a positive wage shock would have similar effects in the opposite direction), and another member to share the burden of a negative shock. A similar argument holds for the own-effects of a time-disability shock, which for reasonable preference specifications should lead to smaller swings in leisure, and correspondingly larger swings in labour, for marrieds relative to single individuals.[17] Finally, from the first part of 10, if utility is such that u_{ll} and v_{ll} are approximately linear over the feasible range of leisure choices, then we should expect leisure to adjust less (labour supply to adjust more) if the higher-earning spouse is the one hit with the shock than if the lower-earning spouse is the one hit.

[17] For the labour-limiting shock, the corresponding change in labour supply is $-\frac{(T-l)}{\delta_n^2} - \frac{dl}{d\delta_n}$. The first term is identical for marrieds and singles, so a smaller or more positive leisure response for marrieds translates into larger swings in labour.

The spousal response to labour-limiting and time disability shocks is unambiguously negative: the spouse of the disabled partner should unambiguously reduce his/her own leisure. For the case of the labour-limiting shock, there is a negative wealth effect and a negative substitution effect as spouse leisure becomes relatively more expensive. For the time-stealing disability shock, spousal leisure is reduced through a pure wealth effect. Since a partner's disability shock has no effect on the spouse's time endowment, spousal labour supply effect is inversely proportional to the leisure effect and we should observe a clear added worker effect.

We saw in the previous section that none of these predictions of the basic model fits the data very well, at least at interior solutions. On the intensive margin, marrieds reduce their labour supply less than singles in response to disability shocks, and married women (typically the secondary earners) adjust proportionately more than men. Added worker effects, especially for wives, are quite small and, for the severe-onset group of husbands, appear to work in the opposite direction, with wives of severe-onset husbands more likely to drop out of the labour force. The following two modifications of the basic model are designed to counter these predictions.

3.1.3 Human capital

Adding human capital to the problem introduces a dynamic element to the household's problem. We consider only the two-earner problem, which can now be written as:

$$V_j(w_o, w_{sp}, \delta_t, \delta_l) = u(c_o, l_o) + \lambda v(c_{sp}, l_{sp}) + \beta E_{\delta,\mathbf{w}}[V_{j+1}(w_o^{'}, w_{sp}^{'}, \delta_t^{'}, \delta_l^{'})|\mathbf{w}, \delta] \tag{12}$$

subject to constraint set:

$$\begin{aligned} & E[w_o^{'}] = \kappa \frac{(T - \delta_t - l_o)}{\delta_n} + \varsigma w_m \\ & \frac{(T - \delta_t - l_o)w_o}{\delta_n} + (T - l_{sp})w_{sp} = c_{sp} + c_o \\ & l_o < T - \delta_t \\ & l_{sp} < T \end{aligned} \tag{13}$$

For simplicity, again only one member is subject to the human capital process, and he is also subject to the disability shocks. We assume the depreciation rate of human capital, $\varsigma \in (0, 1)$ and $\kappa > 0$ is the rate of replacement of the stock as a function of current hours worked.

The comparative statics for the problem with human capital is messier than for the static case, so we focus on a simpler case in which consumption levels for both spouses are

fixed, which leaves a single optimality condition plus the intratemporal budget constraint. Substitution for own leisure and application of the envelope theorem condition:

$$u_l \frac{w_{sp}\delta_n}{w_o \lambda} = v_l + \beta E_{\delta,\mathbf{w}}[\kappa \lambda v_l^{'} \frac{(T - \delta_t^{'} - l_o^{'})}{\delta_n^{'} w_{sp}^{'}}]$$
$$\frac{(T - \delta_t - l_o)w_o}{\delta_n} + (T - l_{sp})w_{sp} = c_{sp} + c_o \tag{14}$$

When κ is zero, or when either δ_t or δ_n are large enough, the optimality condition reduces to the corresponding condition for the static case. Increases in this period's labour supply relative to the static case depend on the ability to reap the returns of the higher wage in future periods, which is decreasing in the chronicity of disability.

Added worker effects smaller in the case of mild or non-chronic disability because the disabled worker has an extra incentive to keep working.

3.1.4 Spousal "caring" trough transfers of leisure

So far we have assumed that spouses are bound by their individual time endowments. However, time-management, through specialization and the ability to allocate tasks to each other when time becomes tight, is arguably an important part of marriage. In this section we therefore add to the household model the ability of one spouse to "transfer" time to her partner at rate ϕ. The transfer is h with $\phi' > 0$ and $\phi'' < 0$. We assume for simplicity that the spouse who makes the transfer is the spouse who is not subject to the disability shocks. The general dynamic problem for the couple in this environment is:

$$\begin{aligned}
& V_j(w_o, w_{sp}, \delta_t, \delta_l) = \max_{c_o, c_{sp}, l, l_{sp}, h} u(c_o, l_o) + \lambda v(c_{sp}, l_{sp}) + \beta E_{\delta,\mathbf{w}}[V_{j+1}(w_o^{'}, w_{sp}^{'}, \delta_t^{'}, \delta_l^{'})|\mathbf{w}, \delta] \\
s.t. \quad & \frac{(T - \delta_t + \phi(h))w_o}{\delta_n} + T w_{sp} - c_o - c_{sp} - \frac{l_o w_o}{\delta_n} - w_{sp}(l_{sp} + h) = 0 \\
& c_i \geq 0, i = \{o, sp\} \\
& l_o \leq T - \delta_{ti} + \phi(h) \\
& l_{sp} \leq T - h
\end{aligned} \tag{15}$$

In the case of no disability ($\lambda_n = 1; \lambda_t = 0$), the solution to the couple's problem is simply a variant of a model with home production (with the restrictions that it can only be provided by the spouse who faces lower labour market risk and that home production is not public). The intratemporal optimality condition for h is simply $\phi^{'}(h) = \frac{w_{sp}}{w_o}$.

In the presence of disability, the ability to transfer time can play two distinct roles, depending on the type of the disability shock and on whether the disabled spouse's participation constraint binds at the optimum. The first role of time transfer occurs when the nature and extent of disability is such that the household is best off when the disabled partner is not working. In this case, the transfer plays a role in directly augmenting the utility of the disabled spouse, and of the household by re-equating marginal utilities across each spouse's consumption and leisure. The second role comes into play in the model in which labour choices have both inter- and intra-temporal components (the model with human capital). In this case, the time transfer may help smooth period-by-period welfare while encouraging the disabled spouse to maintain a high labour supply in order to keep the household's permanent wealth from falling through a loss of human capital. This variant has the further advantage of mitigating the prediction of the basic model that married individuals should experience larger swings in labour supply than singles since singles are not privy to the spousal time transfers.

3.1.5 Binding participation constraint.

So far we have assumed that time-stealing disability shocks are not so large that they cause the affected spouse's labour supply to decline to zero. In the data, however, we often see disabled individuals withdraw temporarily or permanently from the labour force, even in the absence of transfers (Bound, Cullen, Nichols, and Schmidt (2004)).

Consider the couple's problem for the model without human capital when a global (time-stealing) disability is sufficiently severe that the optimal leisure choice for the disabled spouse is $l_o = T - \delta_t$, and let λ be the multiplier associated with the household budget constraint and μ be the multiplier associated with the disabled spouse's participation constraint. To simplify notation, we set $\delta_n = 1$ and omit it. The system of FOCs and constraints is:

$$\begin{aligned} & u_c = \lambda \\ & u_c = \lambda \\ & v_l = \mu \\ & v_l = \lambda w_{sp} \\ & T w_{sp} - c_o - c_{sp} - l_{sp} = 0 \\ & T_o - \delta_t - l_o = 0 \end{aligned} \tag{16}$$

For the case of separable preferences, it is easy to show (since the change in c_o, c_{sp}, and l_{sp} must have the same sign and since there is no household-wide wealth effect associated with $d\delta_t$) that:

$$\begin{aligned} \frac{dc_o}{d\delta_t} &= \frac{dc_{sp}}{d\delta_t} = \frac{dl_{sp}}{d\delta_t} = 0 \\ \frac{d\lambda}{d\delta_t} &= 0 \\ \frac{d\mu}{d\delta_t} &= -v_{llo} > 0 \end{aligned} \tag{17}$$

When the disabled spouse's disability shock becomes large enough that his participation constraint binds, household insurance essentially shuts down since it is inefficient to transfer additional units of consumption to the disabled spouse. Because the disabled member's spouse can no longer efficiently provide insurance, all of the shock is absorbed by the disabled member's leisure and the marginal value of remaining household wealth (λ) is not affected.[18]

The problem is different if time transfers are feasible. The optimal transfer is independent of δ_t when the disabled spouse is still working. But at the point where his participation constraint begins to bind, the healthy spouse begins to increase her time transfer in order to restore the balance of marginal utilities within the household. The system of optimality conditions for this problem gives:

$$\begin{aligned} & v_{co} = \lambda \\ & v_{csp} = \lambda \\ & v_{lo} = \mu \\ & v_{lsp} = \lambda w_{sp} \\ & \phi'(h) = \frac{\lambda w_{sp}}{\mu} \\ & T w_{sp} - c_o - c_{sp} - w_{sp} l_{sp} - w_{sp} h = 0 \\ & T + \phi(h) - \delta_t - l_o = 0 \end{aligned} \tag{19}$$

[18]The effect of the binding participation for the case of inseparable preferences is even starker. Some algebra shows that:

$$\frac{dl_{sp}}{d\delta_t} = \frac{-v_{cl,o}}{(v_{cc,sp} + v_{cc,o})K + w_{sp} v_{cc,o} + v_{cl,sp}} \tag{18}$$

where $K = \frac{v_{ll,sp} w_{sp} - v_{cl,sp}}{v_{cc,sp} - w_f v_{lc,sp}}$. (18) is not directly signable because of the positive $v_{cl,sp}$ term in the denominator but will be positive for most reasonable specifications of preferences. Since $\frac{c_{sp}}{d\delta_t}$ must have the same sign as $\frac{dl_{sp}}{d\delta_t}$, we must have $\frac{dl_{sp}}{d\delta_t} > 0$, $\frac{dc_o}{d\delta_t} < 0$, and $\frac{d\lambda}{d\delta_t} < 0$ (the wealth constraint becomes less important). In this case, as the disabled spouse's leisure declines, his marginal utility of consumption declines also causing the household to allocate less total resources to him. If $v_{co}(c, 0) = 0$ (as for example with Cobb-Douglas preferences), then in the extreme case where $\delta_t = T$ (the disabled spouse is in a coma) he gets no resources at all.

Figure 10 plots the effect on h and disabled labour supply (n_o) as d_t increases. Note that a corresponding effect does not hold for severe levels of δ_n. It is easy to show in this case that the optimal spousal transfer is declining in the level of disability, since the efficiency shock acts like a negative wage shock lowering the value of the marginal time transfer to the household. Once δ_n becomes so large that the the participation constraint binds for the disabled spouse (for occurs if labour supply is discreet), then so long as the disabled spouse has sufficient leisure from the household's perspective, the optimal transfer is zero.

3.1.6 Time transfers and human capital

Forthcoming.

3.2 Numerical simulation

3.2.1 The economy

Given the complexity of the household decision problem and the ambiguity of many of the analytical predictions above, most questions about optimal household behaviour in the presence of disability, and hence optimal policy, must be resolved numerically. We now describe our basic computational model, and the numerical approximations of the human capital and spousal time-transfer variations described above.

Our simulated economy is populated by one-member (single) and two-member (married) households, made of of individuals who differ permanently by education (ed) and gender (g). Low-education individuals enter the model at age 19, and high-education individuals enter the model at age 23. The maximum lifespan is 90 years, with conditional survival probabilities ς_j^g for every age taken from Canadian vital statistics, and adjusted for disability status using the mortality data in the SLID and Bayes Rule.[19] Individuals do not work after age 70. For clarity, all values in the model are expressed in 2002 Canadian dollars. A model period is one year, but we normalize most of our results to correspond to the representative week within the year.

Policy in the base model consists only of a social security system very loosely based on the retirement, survivor and disability components of the Canada/Quebec Pension Plan. Individuals older than 62 or in the two highest disability states receive a benefit equal 25% of the average earnings of their education-gender cohort in any year they do not work. Spouses whose partners die first receive the partner's benefit, if it is greater than their own, until their own death. Individuals face a payroll tax of 9.9% and a progressive income tax with brackets of $\{21.2, 31.8, 42.1, 46.4\}$ on income above $\{\$9600, \$47,485, \$84,320, \$132,784\}$, which are

[19] We thank Kevin Milligan for providing us with the Canadian mortality data. The adjustment process across health states for a given age is borrowed from Rivas (2007).

approximately equal to the 2008 rates and brackets for the median Canadian taxpayer.[20] Tax revenue not spent on social security is wasted.

Single households make consumption, labour and (by implication) saving decisions recursively. Married households make decisions over both members' consumption and leisure enjoyment within periods, over spousal time transfers (in the applicable extension) and over the intertemporal allocation of permanent income, collectively. When pairs are first formed, the relative allocation of resources is decided following an egalitarian rule. In the simulations presented here, this rule is not subject to change. In forthcoming versions incorporating renegotiation and divorce, we relax this assumption.

3.2.2 Preferences

Individuals in the model are egoistic. Consumption and leisure are enjoyed privately by household members and, for simplicity, there are no household public goods. Preferences are strongly separable across time and states of nature, and have a conventional Cobb-Douglas isoelastic form:

$$U_i = \sum_{t=j_1(ed)}^{90} \varsigma_{j,ds} u_t(c_{it}, l_{it}) = \sum_{t=j_1(ed)}^{90} \varsigma_{j,ds} \frac{[(\frac{c_{it}}{\tilde{n}})^{\alpha^g} l_{it}^{1-\alpha^g}]^{1-\omega^g}}{1-\omega^g} \tag{20}$$

We adopt the gender-specific coefficients of relative risk aversion estimated by Mazzocco (2004): $\omega^f = 4.5$ for women and $\omega^m = 2.5$ for men. The specification does not allow us to target Frisch elasticities, but we choose the $\alpha^g, g \in \{m, f\}$ to match the labour supply of men and women in the model to the first moment of the gender-specific labour supplies in the SLID. The $\tilde{n}$ captures the number of non-spouse adult equivalents with which we expect the individual to share his or her consumption, as well as economies of scale associated with marriage. We also assume that the discount rate for both men and women (and hence married couples) is equal to 1. This facilitates welfare analysis and is also a midrange estimate of β from the related literature[21]

3.2.3 Wage processes

1. *Exogenous wages*

[20] The median taxpayer by rates on income other than capital gains and dividends lives in Ontario. We calculate these rates based on the federal standard exemption and the smoothed combined provincial and federal rates.

[21] For well known simulation studies with discount rates greater than 1 see Imrohoroglu, Imrohoroglu, and Joines (1995) or French and Jones (2007).

In our basic model (21, with parameters denoted E), an individual's wage at age j is a combination of a deterministic age effect and an exogenous stochastic process that combines an autocorrelated and a strictly transitory component. We first estimate the age effects for high- and low-educated men and women separately using the 1999 and 2002 panels of the SLID using the fixed-effects selection estimator proposed by Wooldridge (1995), and then estimate the stochastic processes from the residuals of the second-stage regression using non-linear least squares. Our estimator uses time-averages of the individual's X variables - containing age and other predictors not accounted for in the numerical simulation - to capture the fixed effect, which consequently does not show up in our error term. The top panel of Table 3.2.3 shows our estimates for the autocovariance coefficient ρ, the variance of the autocorrelated term, σ^2_ρ, and the variance of the the transient component σ^2_{tr} by gender and education.

$$
\begin{aligned}
w^E_{it} &= \exp\left(\beta X_{it} + v_{it}\right) \\
v_{it} &= e_{it} + \epsilon_{tr;it} \\
e_{it} &= \rho^E e_{it-1} + \epsilon_{\rho;it} \\
\epsilon_{tr;it} &\sim N(0, \sigma^{2,E}_{tr}) \\
\epsilon_{\rho;it} &\sim N(0, \sigma^{2,E}_{\rho})
\end{aligned} \tag{21}
$$

2. *Endogenous wages*

To capture a process for wages that assumes they evolve as a byproduct of labour market decisions, we follow a variation of the empirical strategy introduced by Shaw (1989). Hours of work are denoted n and the stock of human capital by H. We pool high and low education individuals by gender. Education, measured here as years of schooling, enters the equations interactively with human capital and hours worked. The process for wages in this case is:

$$
\begin{aligned}
w_{it} &= \exp(R_t H_{it}) \\
H_{it+1} &= \beta_1 H_{it} + \beta_2 H^2_{it} + \beta_3 H_{it} n_{it} + \beta_4 n_{it} + \beta_5 n^2_{it} + \zeta_{t+1} + v_{it+1} \\
\beta_j &= \beta_{j1} + \beta_{j2} ed \\
R_t &= R = 1.0 \qquad \forall t \\
v_{it} &= e_{it} + \epsilon_{tr;it} \\
e_{it} &= \rho^H e_{it-1} + \epsilon_{\rho;it} \\
\epsilon_{tr;it} &\sim N(0, \sigma^{2,H}_{tr}) \\
\epsilon_{\rho;it} &\sim N(0, \sigma^{2,H}_{\rho})
\end{aligned} \tag{22}
$$

Table 8: Estimated productivity parameters

Exogenous wage regressions				
	Males		Females	
	Low educ	High educ	Low educ	High educ
age	.119	.178	.080	.207
age^2	-.0020	-.0033	-.0017	-.0040
age^3	.0000077	.000017	.000010	.000023
$\sigma_{\rho}^{2,E}$	.020	.027	.009	.019
ρ^E	.945	.940	.984	.947
$\sigma_{tr}^{2,E}$	.018	.018	.015	.019
Human capital regressions (H_{it+1})				
	Males		Females	
n_{it}				
n_{it}^2				
$n_{it} \times ed$				
H_{it}				
H_{it}^2				
$H_{it} \times ed$				
$H_{it} \times n_{it}$				
$H_{it} \times n_{it} \times ed$				
$\sigma_{\rho}^{2,H}$				
ρ^H				
$\sigma_{tr}^{2,H}$				

Our specification adds a simplification and a complication to Shaw's framework. The simplification is that we assume the rental rate of human capital R is constant across the years of our sample. Since we are estimating human capital on a short panel (four years of data), this simplification is intuitive and makes it straightfoward to estimate the system in logs rather than levels by replacing (unobserved) human capital with (observed) wage rates in the regression. The complication is that we allow v_{it} to retain its autocorrelated component, which requires that we instrument for hours and lagged wages, which may be correlated with the current error term through ρ. To reduce this endogeneity as much as possible, we use on the left hand side of our estimating equation only the last three years of data for the subsample of men in the 1999 SLID panel who appear in all six years. We instrument hours in 2001, 2002 and 2003 with hours in 1999, and the human capital stocks by the wage observed in 1999 (adjusted for selection using time averages of the covariates and the inverse mills ratios from a first-stage fixed-effects selection equation). As a test of whether disability has a direct effect on wages, we included current disability status in our selection, first-stage and second-stage regressions. In the second-stage regression, measures of work-limiting and leisure-limiting disability come out insignificant.

3.2.4 Disability process

We assume six disability states in the model, comprising combinations of labour- and leisure-limiting disability. Labour-limiting disability has two levels taken from the data (see the discussion in Section 2: (1) activity limitations at work occur "sometimes" or "often"; and (2) activity limitations "completely prevent" the individual from working or looking for work. The leisure-limitation has only one level which encompasses both "sometimes" and "often" reports of limitations at home and in other non-work activities. If no work limitation is reported or has been reported recently, the individual is in the healthy state (ds 1). In ds 3, the individual is limited in leisure but not in work. In ds 4, the individual is limited in work partially and not limited in leisure. In ds 5, the individual is limited in both work and leisure. In ds 6, the individual is limited completely in work. Since almost no one (less than .4% of the entire sample) reports a complete limitation but no corresponding leisure limitation, we assume that all "completely" work-limited individuals also face a leisure limitation. Finally, ds 2 corresponds to individuals who do not currently report a work or leisure-limiting disability but have in recent periods.

Transitions between the six categories are follow a Markov process estimated from multivariate OLS estimation of disability state dummies on their lags. Transition matrices are estimated separately by gender, ten-year age categories, and "disability risk level", which we take to be a fixed effect estimated from a similar set of covariates (health level, stress level, occupation, education, region of residence, whether receiving or paying support) as was used to estimate propensity scores for our control groups in section 2. Disability risk

level is correlated with education status. In the data, we estimate the transition out of ds 2 by assuming individuals remain in this recovery or remission state for two periods after reporting a disability before returning to the healthy state.[22] The values of δ_n and δ_l are calibrated so that individuals in the model in each state work the hours of their counterparts in the SLID. We subject them to the restriction that all reports yield the same value regardless of the composite disability state (e.g. the calibrated labour loss is the same in ds 4 as in ds 5.) In the "acute" disabled state, individuals in the SLID do not work at all making precise calibration tricky. To replicate this in the model, we set a very large labour limitation for this group and set the leisure limitation to be the same calibrated for the other disability states with leisure-limitation.

3.2.5 State space and optimization

The time-varying state variables in the model are household age j_{hh}, household assets a_{hht} (which we constrain to be zero in preliminary simulations), human capital of each family member, H_{it},{i=m,f}, the current level of the productivity shock v_{it},{i=m,f}, and the disability status of each family member ds_{it},{i=m,f}. For computational tractability, we allow only one member's disability status (before retirement) and human capital endowment to vary, and we currently set this member to be the husband. For simplicity we impose that in married households, the husband and wife are the same age, and that low education individuals match only with other low-education individuals and vice-versa. Couples are matched in the first period they enter the model, at which point they determine a value for household utility-weighting λ through equal-weighted Nash bargaining over the marriage surplus. At the time of matching, individuals are healthy, have zero assets and human capital and differ only by their initial draw of v_{it} and their disability risk-factor which is common knowledge. In the current simulations, positive surplus exists for all potential matches so all allocated marriages take place. Divorce is not possible (but is left for future work). We omit recursive descriptions of the single and married households' problems here due to their similarity to the value functions in section 3.1 above. The computational algorithm is described in the [forthcoming] computational appendix.

3.2.6 Calibration

From the above discussion, we have a total of only six parameters to calibrate in the basic model: $\alpha^g, g = \{f, m\}$, $\delta_{n,j}, j = \{\text{“}partial\text{”}, \text{“}severe\text{”}\}$, δ_l. Our corresponding targets are mean labour supply by gender and reported disability status. Calibration is achieved through a simple updating procedure. This straightforward approach of targeting levels allows us to conduct fairly pure tests the models' ability to predict *changes* in labour supply, income and wages from disability onset.

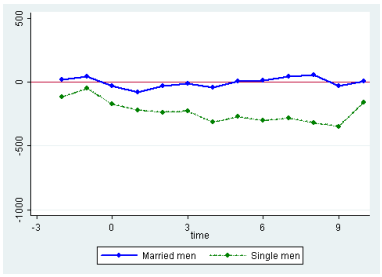
[22] We also experiment with extending the recovery state to three periods.

4 Results

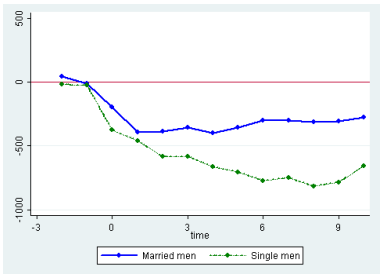
Our strategy in this section is to replicate the empirical strategy defined in section 2 using our simulated steady-state models: with and without human capital; with and without spousal time transfers. We consider both the "long-view" longitudinal effects of disability on own- and spousal- labour supplies, wages and income, and also the immediate reactions of labour supply to the different types of disability onset.

[Results forthcoming very soon.]

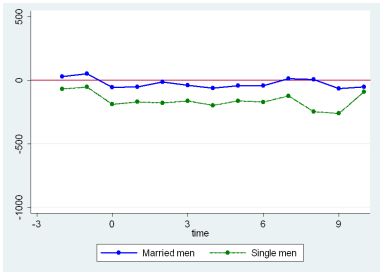
Figure 1: Labour supply responses for mild and severe disability onset by marital status: Men



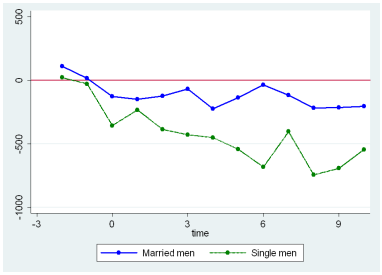
(a) Hours of work: Mild disability



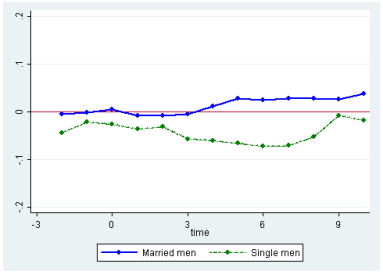
(b) Hours of work: Severe disability



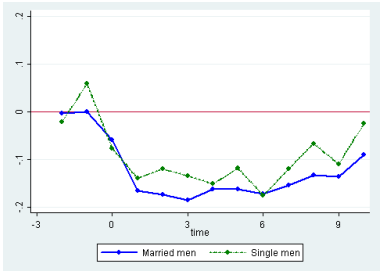
(c) Hours (intensive margin): Mild disability



(d) Hours (intensive margin): Severe disability

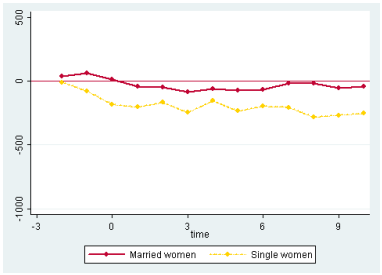


(e) Participation: Mild disability

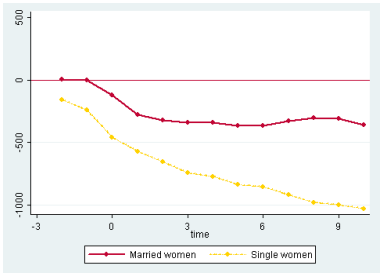


(f) Participation: Severe disability

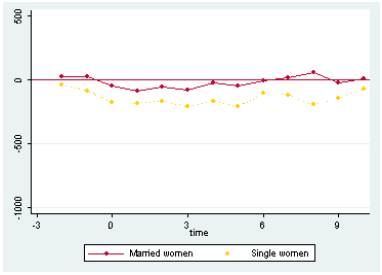
Figure 2: Labour supply responses for mild and severe disability onset by marital status: Women



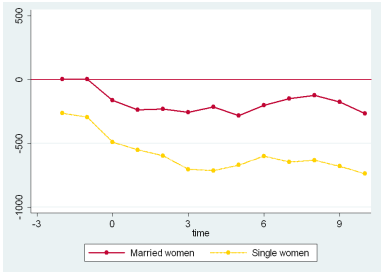
(a) Hours of work: Mild disability



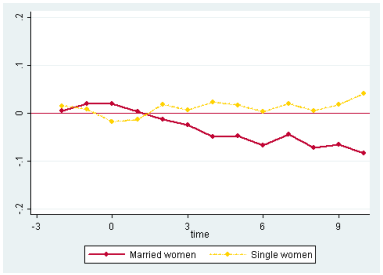
(b) Hours of work: Severe disability



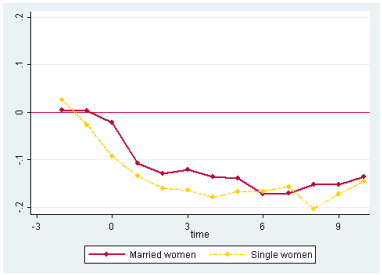
(c) Hours (intensive margin): Mild disability



(d) Hours (intensive margin): Severe disability

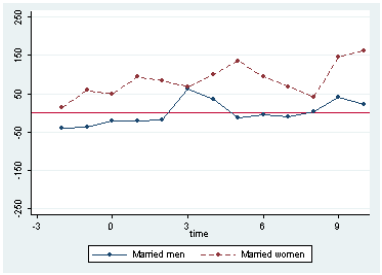


(e) Participation: Mild disability

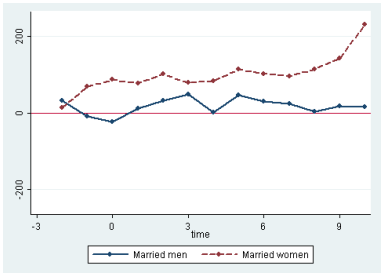


(f) Participation: Severe disability

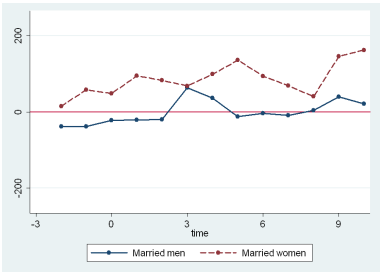
Figure 3: Spousal labour supply responses for mild and severe disability onset



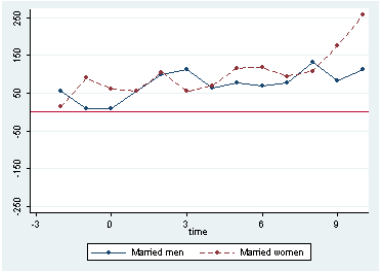
(a) Total hours: Mild disability



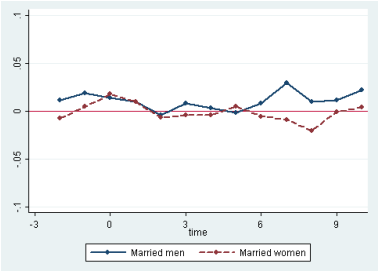
(b) Total hours: Severe disability



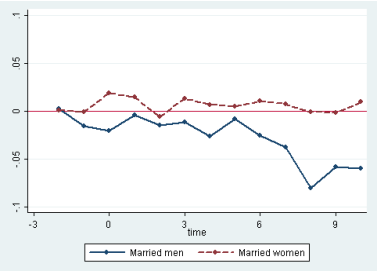
(c) Intensive hours: Mild disability



(d) Intensive hours: Severe disability

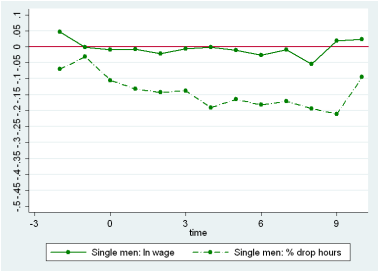


(e) Participation: Mild disability

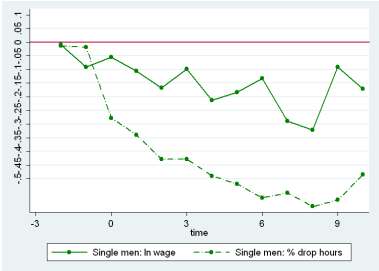


(f) Participation: Severe disability

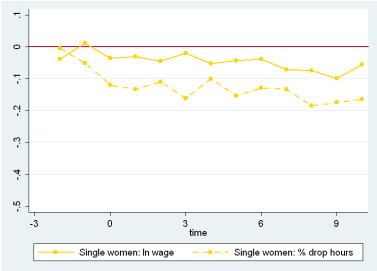
Figure 4: Singles: Ln hourly wages and hours



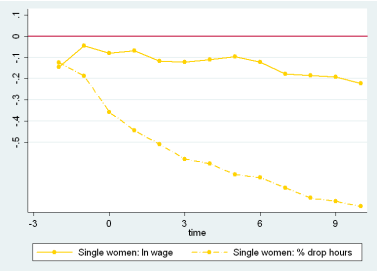
(a) Single men: Mild disability



(b) Single men: Severe disability

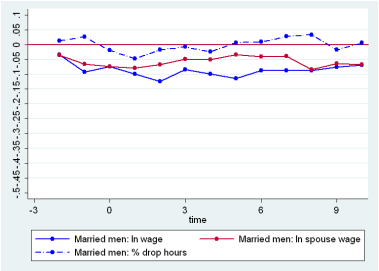


(c) Single women: Mild disability

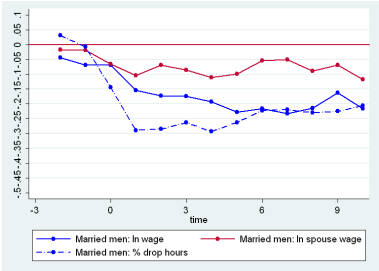


(d) Single women: Severe disability

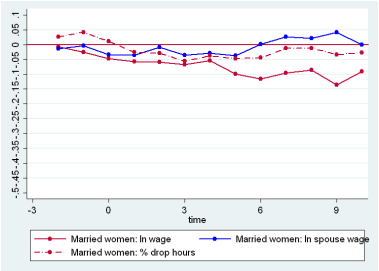
Figure 5: Marrieds: Ln hourly wages, ln spouse wages and own hours



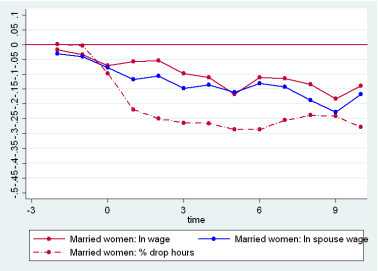
(a) Married men: Mild disability



(b) Married men: Severe disability

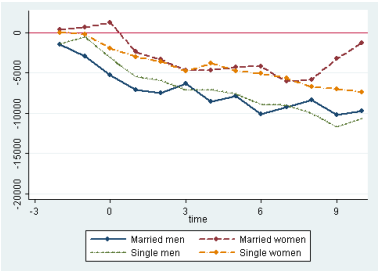


(c) Married women: Mild disability

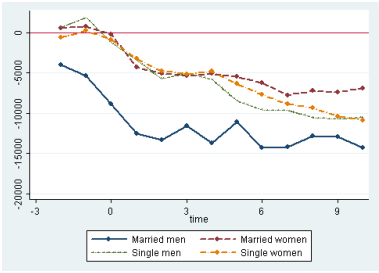


(d) Married women: Severe disability

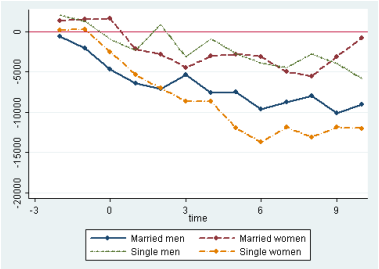
Figure 6: Total income effects of disability onset



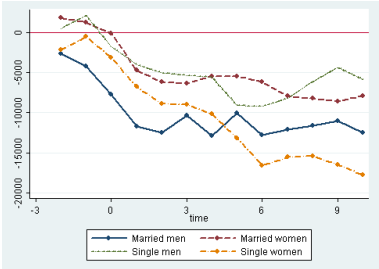
(a) Single head/Couple income: Mild disability



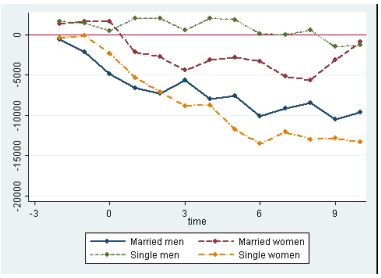
(b) Single head/Couple income: Severe disability



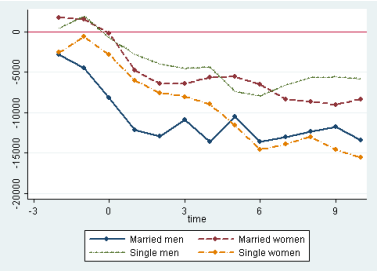
(c) Economic family income: Mild disability



(d) Economic family income: Severe disability

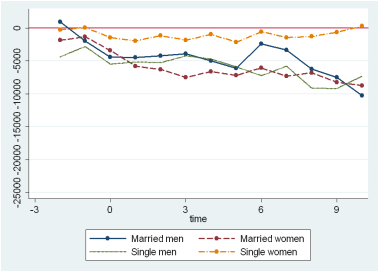


(e) Household income: Mild disability

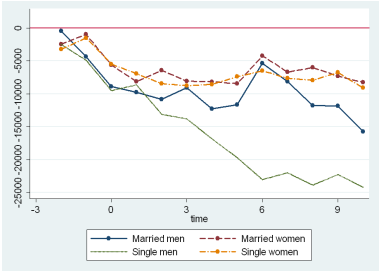


(f) Household income: Severe disability

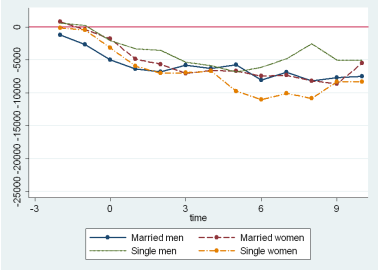
Figure 7: Total labour earnings effects of disability onset



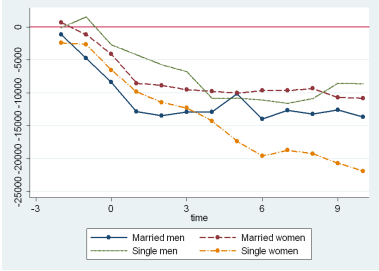
(a) Single head/Couple lab earnings: Mild disability



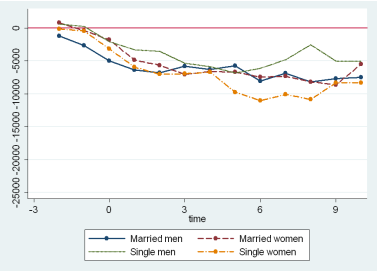
(b) Single head/Couple lab earnings: Severe disability



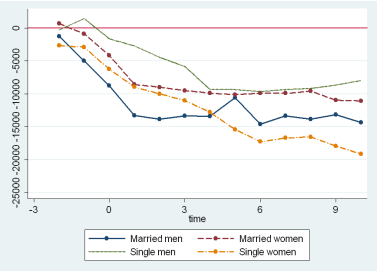
(c) Economic family lab earnings: Mild disability



(d) Economic family lab earnings: Severe disability

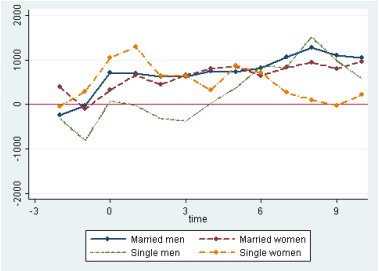


(e) Household lab earnings: Mild disability

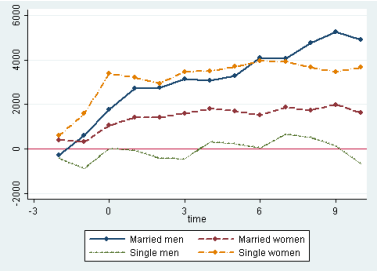


(f) Household lab earnings: Severe disability

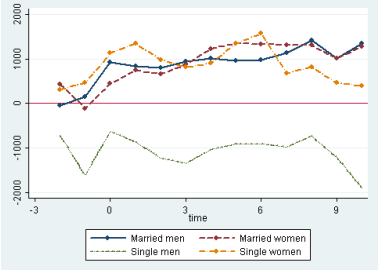
Figure 8: Total public and private transfer effects of disability onset



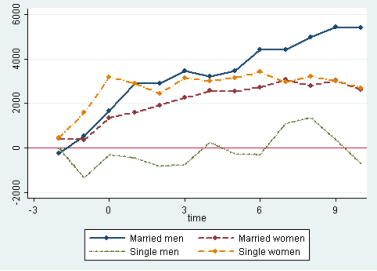
(a) Single head/Couple transfers: Mild disability



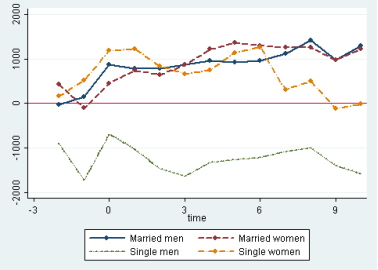
(b) Single head/Couple transfers: Severe disability



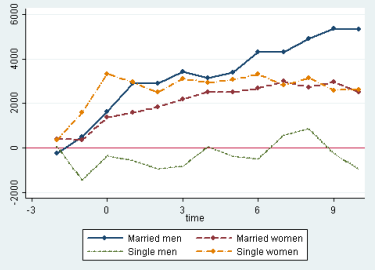
(c) Economic family transfers: Mild disability



(d) Economic family transfers: Severe disability

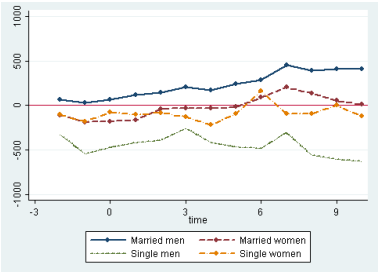


(e) Household transfers: Mild disability

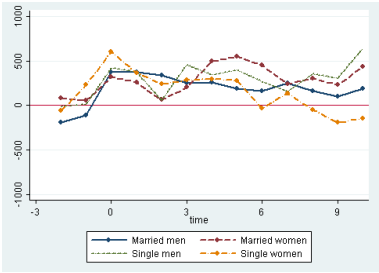


(f) Household transfers: Severe disability

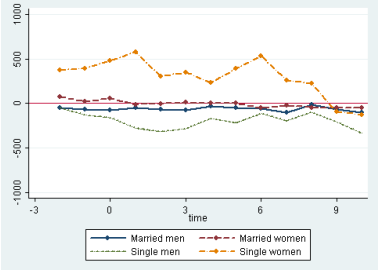
Figure 9: Sources of household transfer income and disability onset



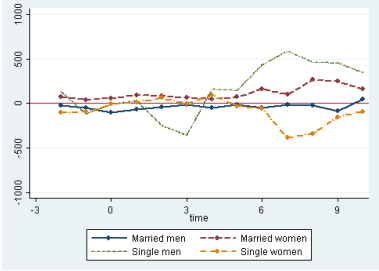
(a) CPP: Mild disability



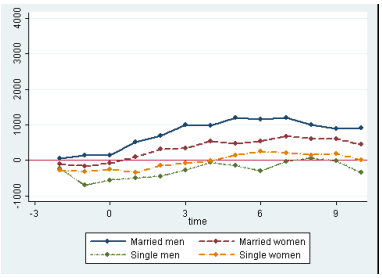
(b) Workers comp: Mild disability



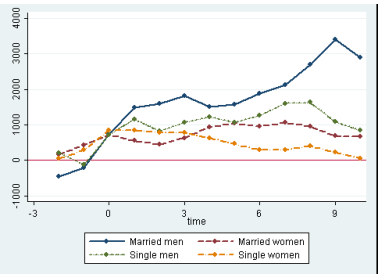
(c) Private support: Mild disability



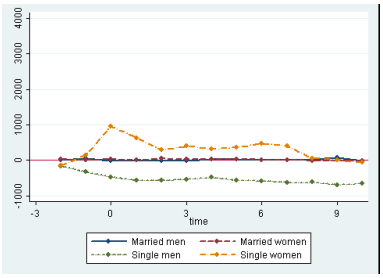
(d) Social asst: Mild disability



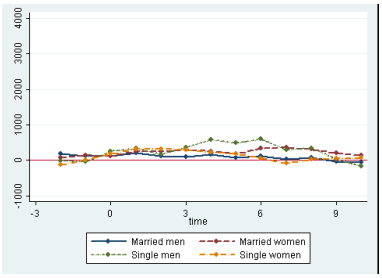
(e) CPP: Severe disability



(f) Workers comp: Severe disability



(g) Private support: Severe disability



(h) Social asst: Severe disability

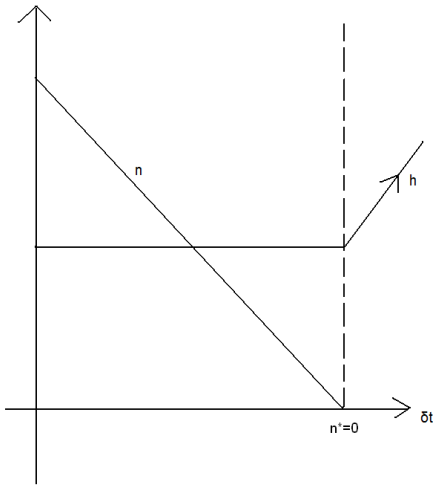


Figure 10: Leisure transfers and time-stealing disability

5 Data Appendix

5.1 Labour supply responses

Table 9: % Change in total hours relative to control group

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.074	-0.006	0.011	0.034
-1	-0.032	-0.056	0.023	0.053*
0	-0.11*	-0.129*	-0.017	0.014
1	-0.139*	-0.144*	-0.043*	-0.033
2	-0.151*	-0.118*	-0.016	-0.038
3	-0.145*	-0.174*	-0.007	-0.072*
4	-0.2*	-0.109*	-0.022	-0.049
5	-0.173*	-0.166*	0.006	-0.061*
6	-0.192*	-0.139*	0.008	-0.057
7	-0.18*	-0.145*	0.024	-0.016
8	-0.204*	-0.199*	0.03	-0.015
9	-0.221*	-0.189*	-0.016	-0.043
10	-0.1	-0.178*	0.005	-0.034
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.011	-0.112*	0.023	0.001
-1	-0.016	-0.17*	-0.006	-0.004
0	-0.24*	-0.324*	-0.106*	-0.105*
1	-0.293*	-0.404*	-0.211*	-0.237*
2	-0.371*	-0.462*	-0.208*	-0.269*
3	-0.371*	-0.525*	-0.192*	-0.286*
4	-0.423*	-0.545*	-0.214*	-0.287*
5	-0.449*	-0.592*	-0.191*	-0.309*
6	-0.493*	-0.604*	-0.162*	-0.309*
7	-0.477*	-0.648*	-0.16*	-0.276*
8	-0.52*	-0.692*	-0.168*	-0.258*
9	-0.5*	-0.706*	-0.164*	-0.262*
10	-0.419*	-0.728*	-0.15*	-0.301*

Table 10: % Change in intensive hours relative to control group

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.033	-0.023	0.015	0.016
-1	-0.026	-0.052	0.027	0.017
0	-0.09*	-0.109*	-0.029	-0.026
1	-0.081*	-0.114*	-0.028	-0.051*
2	-0.085*	-0.102*	-0.007	-0.032
3	-0.078	-0.13*	-0.021	-0.048
4	-0.094	-0.103*	-0.034	-0.011
5	-0.077	-0.13*	-0.023	-0.026
6	-0.082	-0.066	-0.024	-0.002
7	-0.059	-0.073	0.007	0.009
8	-0.118	-0.12	0.004	0.033
9	-0.124	-0.088	-0.035	-0.012
10	-0.043	-0.043	-0.029	0.008
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.01	-0.164*	0.059	0.001
-1	-0.014	-0.183*	0.009	0.002
0	-0.17*	-0.305*	-0.069*	-0.096*
1	-0.111*	-0.342*	-0.081*	-0.139*
2	-0.184*	-0.371*	-0.067	-0.135*
3	-0.204*	-0.437*	-0.038	-0.151*
4	-0.215*	-0.443*	-0.121*	-0.126*
5	-0.258*	-0.417*	-0.074	-0.165*
6	-0.325*	-0.373*	-0.02	-0.119*
7	-0.193	-0.401*	-0.064	-0.088
8	-0.354*	-0.393*	-0.117	-0.073
9	-0.33*	-0.423*	-0.116	-0.103
10	-0.259*	-0.459*	-0.11	-0.156*

Table 11: % Change in participation relative to control group

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.05*	0.018	-0.006	0.005
-1	-0.025	0.009	-0.002	0.025
0	-0.031	-0.021	0.005	0.025
1	-0.042	-0.017	-0.01	0.004
2	-0.036	0.021	-0.009	-0.017
3	-0.065*	0.007	-0.007	-0.032
4	-0.07*	0.027	0.013	-0.063*
5	-0.076*	0.02	0.03*	-0.063*
6	-0.083*	0.003	0.027	-0.087*
7	-0.082	0.023	0.03	-0.059*
8	-0.061	0.006	0.03	-0.094*
9	-0.009	0.02	0.029	-0.085*
10	-0.021	0.048	0.041*	-0.108*
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.024	0.032	-0.004	0.006
-1	0.067	-0.032	0.000	0.004
0	-0.087	-0.11*	-0.066*	-0.028
1	-0.159*	-0.159*	-0.187*	-0.139*
2	-0.137*	-0.190*	-0.196*	-0.169*
3	-0.154*	-0.195*	-0.21*	-0.156*
4	-0.173*	-0.213*	-0.182*	-0.177*
5	-0.135	-0.197*	-0.182*	-0.18*
6	-0.2*	-0.197*	-0.193*	-0.225*
7	-0.138	-0.186*	-0.175*	-0.222*
8	-0.076	-0.241*	-0.149*	-0.199*
9	-0.125	-0.204*	-0.153*	-0.198*
10	-0.029	-0.172*	-0.102*	-0.177*

Table 12: % Change in spouse total hours relative to control group

	Mild Disability		Severe Disability	
Years from onset	Married men	Married women	Married men	Married women
-2	-0.004	-0.006	0.028	0.008
-1	-0.013	0.024	-0.008	0.037
0	-0.005	0.037*	-0.018	0.047*
1	-0.013	0.047*	0.01	0.042
2	-0.029	0.029	0.027	0.055*
3	0.037	0.018	0.04	0.043
4	0.014	0.027	0.002	0.045
5	-0.009	0.048*	0.039	0.062*
6	0.011	0.026	0.025	0.055
7	0.025	0.011	0.021	0.052
8	0.008	0.009	0.004	0.062
9	0.046	0.065*	0.016	0.077*
10	0.069	0.064	0.013	0.124*

Table 13: % Change in spouse intensive hours relative to control group

	Mild Disability		Severe Disability	
Years from onset	Married men	Married women	Married men	Married women
-2	-0.023	0.008	0.031	0.011
-1	-0.022	0.032	0.01	0.035
0	-0.013	0.026	0.023	0.025
1	-0.012	0.051*	0.05	0.055
2	-0.011	0.045*	0.074*	0.076*
3	0.037	0.037	0.113*	0.039
4	0.021	0.053*	0.082*	0.046
5	-0.007	0.073*	0.087*	0.075*
6	-0.002	0.051*	0.092*	0.068
7	-0.005	0.037	0.119*	0.033
8	0.002	0.022	0.133*	0.004
9	0.023	0.079*	0.109	0.067
10	0.013	0.088*	0.137*	0.111*

Table 14: % Change in spouse participation relative to control group

	Mild Disability		Severe Disability	
Years from onset	Married men	Married women	Married men	Married women
-2	0.015	-0.008	0.003	0.001
-1	0.024	0.005	-0.02	-0.001
0	0.018	0.02	-0.027	0.021
1	0.013	0.011	-0.005	0.016
2	-0.006	-0.008	-0.019	-0.007
3	0.01	-0.005	-0.015	0.015
4	0.004	-0.005	-0.034	0.008
5	-0.002	0.005	-0.01	0.005
6	0.01	-0.006	-0.033	0.012
7	0.038	-0.01	-0.049	0.008
8	0.012	-0.023	-0.104*	-0.001
9	0.015	-0.001	-0.076*	-0.002
10	0.029	0.004	-0.078	0.011

5.2 Human capital and wages tables

Table 15: % Change in spouse wages relative to control group

	Mild Disability		Severe Disability	
Years from onset	Married men	Married women	Married men	Married women
-2	-0.014	-0.036	-0.017	-0.031
-1	-0.005	-0.066*	-0.02	-0.04
0	-0.034*	-0.073*	-0.066*	-0.077*
1	-0.035	-0.08*	-0.105*	-0.117*
2	-0.01	-0.067*	-0.07*	-0.106*
3	-0.036*	-0.049*	-0.085*	-0.148*
4	-0.03	-0.051*	-0.111*	-0.136*
5	-0.037	-0.033	-0.099*	-0.161*
6	0.001	-0.04	-0.054	-0.131*
7	0.025	-0.039	-0.051	-0.143*
8	0.02	-0.084*	-0.09*	-0.187*
9	0.042	-0.064*	-0.069	-0.228*
10	-0.001	-0.068*	-0.118*	-0.167*

5.3 Income, earnings and transfers tables

Table 16: Singles and couples: Proporitional change in total income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.047	0	-0.02	0.005
-1	-0.018	-0.008	-0.039	0.009
0	-0.105*	-0.064	-0.069*	0.017
1	-0.181*	-0.096*	-0.094*	-0.034
2	-0.197*	-0.115*	-0.099*	-0.047*
3	-0.236*	-0.153*	-0.083*	-0.066*
4	-0.235*	-0.122*	-0.113*	-0.066*
5	-0.252*	-0.153*	-0.104*	-0.06*
6	-0.295*	-0.163*	-0.134*	-0.059*
7	-0.298*	-0.181*	-0.122*	-0.085*
8	-0.332*	-0.217*	-0.11*	-0.082*
9	-0.387*	-0.224*	-0.135*	-0.046
10	-0.352*	-0.236*	-0.129*	-0.018
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.021	-0.021	-0.053	0.008
-1	0.061	0.007	-0.07*	0.01
0	-0.041	-0.029	-0.117*	-0.003
1	-0.113*	-0.105*	-0.165*	-0.06*
2	-0.19*	-0.152*	-0.175*	-0.072*
3	-0.168*	-0.165*	-0.152*	-0.076*
4	-0.192*	-0.153*	-0.181*	-0.072*
5	-0.281*	-0.204*	-0.147*	-0.077*
6	-0.317*	-0.246*	-0.188*	-0.088*
7	-0.319*	-0.285*	-0.188*	-0.109*
8	-0.349*	-0.299*	-0.169*	-0.102*
9	-0.355*	-0.333*	-0.17*	-0.104*
10	-0.348*	-0.348*	-0.189*	-0.097*

Table 17: Economic families: Proportional change in total income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.037	0.004	-0.008	0.017
-1	0.023	0.005	-0.025	0.019
0	-0.018	-0.051	-0.058*	0.02
1	-0.043	-0.11*	-0.079*	-0.027
2	0.016	-0.144*	-0.086*	-0.035
3	-0.058	-0.177*	-0.066*	-0.056*
4	-0.016	-0.178*	-0.093*	-0.038
5	-0.051	-0.246*	-0.091*	-0.035
6	-0.072	-0.282*	-0.118*	-0.039
7	-0.083	-0.243*	-0.106*	-0.062
8	-0.051	-0.268*	-0.098*	-0.069*
9	-0.073	-0.243*	-0.123*	-0.039
10	-0.108	-0.246*	-0.11*	-0.01
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.009	-0.045	-0.033	0.023
-1	0.04	-0.011	-0.051	0.016
0	-0.033	-0.064	-0.094*	-0.002
1	-0.074	-0.139*	-0.142*	-0.059*
2	-0.093	-0.182*	-0.152*	-0.077*
3	-0.099	-0.184*	-0.126*	-0.08*
4	-0.103	-0.209*	-0.157*	-0.068*
5	-0.168*	-0.27*	-0.122*	-0.068*
6	-0.17*	-0.34*	-0.156*	-0.077*
7	-0.152	-0.319*	-0.147*	-0.1*
8	-0.113	-0.316*	-0.141*	-0.103*
9	-0.081	-0.337*	-0.135*	-0.107*
10	-0.108	-0.365*	-0.152*	-0.099*

Table 18: Households: Proportional change in total income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.028	-0.008	-0.008	0.016
-1	0.024	-0.003	-0.026	0.019
0	0.008	-0.045	-0.059*	0.02
1	0.042	-0.103*	-0.08*	-0.027
2	0.06	-0.137*	-0.088*	-0.035
3	0.009	-0.17*	-0.069*	-0.055*
4	0.059	-0.169*	-0.097*	-0.04
5	0.032	-0.228*	-0.092*	-0.035
6	0.001	-0.261*	-0.123*	-0.041
7	-0.001	-0.233*	-0.112*	-0.065*
8	0.009	-0.251*	-0.103*	-0.07*
9	-0.027	-0.248*	-0.128*	-0.039
10	-0.023	-0.258*	-0.117*	-0.012
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.007	-0.05	-0.034	0.021
-1	0.033	-0.012	-0.054	0.019
0	-0.014	-0.055	-0.099*	-0.003
1	-0.049	-0.116*	-0.148*	-0.06*
2	-0.069	-0.146*	-0.157*	-0.08*
3	-0.079	-0.155*	-0.133*	-0.08*
4	-0.076	-0.174*	-0.165*	-0.07*
5	-0.129*	-0.224*	-0.128*	-0.07*
6	-0.138*	-0.281*	-0.165*	-0.081*
7	-0.115	-0.269*	-0.158*	-0.104*
8	-0.099	-0.251*	-0.15*	-0.108*
9	-0.097	-0.281*	-0.143*	-0.113*
10	-0.102	-0.301*	-0.163*	-0.104*

Table 19: Singles and couples: Proportional change in total labour earnings

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.153*	-0.011	0.013	-0.027
-1	-0.098*	0.002	-0.028	-0.019
0	-0.191*	-0.051	-0.062*	-0.05*
1	-0.18*	-0.07*	-0.062*	-0.084*
2	-0.184*	-0.041	-0.059*	-0.091*
3	-0.148*	-0.066	-0.055*	-0.109*
4	-0.164*	-0.034	-0.07*	-0.096*
5	-0.205*	-0.077	-0.086*	-0.104*
6	-0.253*	-0.02	-0.033	-0.088*
7	-0.202*	-0.052	-0.047	-0.106*
8	-0.318*	-0.047	-0.088*	-0.099*
9	-0.32*	-0.022	-0.105*	-0.119*
10	-0.255*	0.009	-0.144*	-0.127*
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.087	-0.116*	-0.007	-0.036
-1	-0.171*	-0.053	-0.061*	-0.014
0	-0.331*	-0.195*	-0.124*	-0.082*
1	-0.301*	-0.247*	-0.136*	-0.118*
2	-0.457*	-0.3*	-0.152*	-0.093*
3	-0.481*	-0.312*	-0.127*	-0.117*
4	-0.587*	-0.304*	-0.172*	-0.118*
5	-0.685*	-0.263*	-0.163*	-0.123*
6	-0.801*	-0.231*	-0.075	-0.061
7	-0.765*	-0.271*	-0.114*	-0.097*
8	-0.831*	-0.282*	-0.164*	-0.087*
9	-0.775*	-0.241*	-0.165*	-0.106*
10	-0.842*	-0.323*	-0.22*	-0.12*

Table 20: Economic families: Proporitional change in total labour earnings

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.014	-0.004	-0.019	0.013
-1	0.005	-0.013	-0.041	-0.007
0	-0.05	-0.089*	-0.077*	-0.029
1	-0.08	-0.166*	-0.099*	-0.08*
2	-0.086	-0.197*	-0.106*	-0.092*
3	-0.129*	-0.195*	-0.09*	-0.115*
4	-0.142*	-0.187*	-0.098*	-0.108*
5	-0.165*	-0.273*	-0.089*	-0.109*
6	-0.148	-0.308*	-0.125*	-0.122*
7	-0.117	-0.282*	-0.107*	-0.12*
8	-0.062	-0.303*	-0.127*	-0.134*
9	-0.121	-0.233*	-0.119*	-0.141*
10	-0.122	-0.233*	-0.116*	-0.09
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.003	-0.067	-0.018	0.011
-1	0.037	-0.074	-0.074	-0.019
0	-0.065	-0.183*	-0.13*	-0.067*
1	-0.102	-0.275*	-0.199*	-0.14*
2	-0.138*	-0.32*	-0.209*	-0.145*
3	-0.164*	-0.344*	-0.2*	-0.156*
4	-0.262*	-0.399*	-0.2*	-0.16*
5	-0.261*	-0.485*	-0.158*	-0.164*
6	-0.268*	-0.548*	-0.217*	-0.158*
7	-0.28*	-0.523*	-0.196*	-0.158*
8	-0.263*	-0.538*	-0.205*	-0.153*
9	-0.206	-0.578*	-0.195*	-0.175*
10	-0.208	-0.612*	-0.211*	-0.177*

Table 21: Households: Proportional change in total labour earnings

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.014	-0.004	-0.019	0.013
-1	0.005	-0.013	-0.041	-0.007
0	-0.05	-0.089*	-0.077*	-0.029
1	-0.08	-0.166*	-0.099*	-0.08*
2	-0.086	-0.197*	-0.106*	-0.092*
3	-0.129*	-0.195*	-0.09*	-0.115*
4	-0.142*	-0.187*	-0.098*	-0.108*
5	-0.165*	-0.273*	-0.089*	-0.109*
6	-0.148	-0.308*	-0.125*	-0.122*
7	-0.117	-0.282*	-0.107*	-0.12*
8	-0.062	-0.303*	-0.127*	-0.134*
9	-0.121	-0.233*	-0.119*	-0.141*
10	-0.122	-0.233*	-0.116*	-0.09
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.007	-0.075	-0.02	0.011
-1	0.034	-0.082	-0.077*	-0.014
0	-0.04	-0.175*	-0.136*	-0.068*
1	-0.066	-0.251*	-0.206*	-0.14*
2	-0.108	-0.28*	-0.215*	-0.147*
3	-0.142	-0.308*	-0.207*	-0.155*
4	-0.226*	-0.358*	-0.208*	-0.162*
5	-0.226*	-0.432*	-0.164*	-0.165*
6	-0.233*	-0.483*	-0.226*	-0.162*
7	-0.226*	-0.467*	-0.207*	-0.162*
8	-0.222*	-0.463*	-0.215*	-0.157*
9	-0.209	-0.501*	-0.204*	-0.179*
10	-0.193	-0.534*	-0.223*	-0.181*

Table 22: Singles and couples: Proporitional change in total transfer income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.139	-0.004	-0.108	0.1
-1	-0.373*	0.118	-0.041	-0.007
0	0.241	0.441*	0.252*	0.14*
1	0.204	0.497*	0.263*	0.195*
2	-0.039	0.312*	0.229*	0.109
3	0.03	0.316*	0.2*	0.18*
4	0.239	0.208	0.22*	0.267*
5	0.448	0.389*	0.209*	0.29*
6	0.683*	0.31*	0.221*	0.226*
7	0.625*	0.235	0.3*	0.221*
8	1.024*	0.17	0.329*	0.255*
9	0.744*	0.117	0.264*	0.211*
10	0.546	0.203	0.252*	0.289*
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.141	0.168	-0.181	0.105
-1	-0.469	0.515*	0.086	0.138
0	0.247	1.13*	0.596*	0.334*
1	0.389	1.108*	1.02*	0.398*
2	0.097	1.05*	1.051*	0.374*
3	0.208	1.198*	1.197*	0.438*
4	0.625	1.156*	1.101*	0.534*
5	0.548	1.187*	1.167*	0.536*
6	0.497	1.246*	1.419*	0.477*
7	0.958	1.255*	1.462*	0.566*
8	0.773	1.211*	1.763*	0.504*
9	0.53	1.141*	2.052*	0.521*
10	0.136	1.167*	1.818*	0.439*

Table 23: Economic families: Proportional change in total transfer income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.133	0.045	-0.05	0.086
-1	-0.294*	0.108	0.007	-0.009
0	-0.04	0.284*	0.259*	0.127*
1	-0.092	0.298*	0.243*	0.168*
2	-0.217	0.227*	0.229*	0.12*
3	-0.168	0.21*	0.237*	0.178*
4	-0.132	0.228*	0.254*	0.286*
5	-0.099	0.305*	0.228*	0.317*
6	-0.124	0.296*	0.229*	0.296*
7	-0.164	0.189	0.279*	0.26*
8	-0.092	0.185	0.316*	0.268*
9	-0.203	0.111	0.223*	0.207*
10	-0.328	0.113	0.307*	0.285*
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.035	0.075	-0.139	0.097
-1	-0.267	0.306*	0.06	0.13*
0	0.073	0.652*	0.48*	0.349*
1	0.128	0.611*	0.873*	0.361*
2	-0.003	0.523*	0.902*	0.394*
3	0.054	0.644*	1.056*	0.481*
4	0.264	0.6*	0.947*	0.587*
5	0.141	0.603*	1.007*	0.597*
6	0.171	0.621*	1.255*	0.615*
7	0.486	0.557*	1.304*	0.688*
8	0.54	0.618*	1.537*	0.628*
9	0.261	0.561*	1.77*	0.623*
10	0.019	0.49*	1.653*	0.548*

Table 24: Households: Proportional change in total transfer income

Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.156	0.015	-0.044	0.084
-1	-0.294*	0.117	0.005	-0.009
0	-0.046	0.277*	0.248*	0.128*
1	-0.112	0.247*	0.232*	0.165*
2	-0.241*	0.167*	0.222*	0.117*
3	-0.203	0.146	0.221*	0.177*
4	-0.169	0.161	0.24*	0.283*
5	-0.148	0.22*	0.221*	0.317*
6	-0.163	0.19	0.222*	0.288*
7	-0.159	0.068	0.272*	0.248*
8	-0.111	0.07	0.313*	0.258*
9	-0.188	-0.048	0.213*	0.199*
10	-0.161	-0.025	0.295*	0.274*
Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.046	0.06	-0.137	0.092
-1	-0.269	0.294*	0.057	0.132*
0	0.062	0.646*	0.47*	0.346*
1	0.101	0.589*	0.869*	0.353*
2	-0.021	0.506*	0.891*	0.379*
3	0.041	0.604*	1.042*	0.468*
4	0.219	0.549*	0.927*	0.574*
5	0.117	0.546*	0.987*	0.586*
6	0.131	0.557*	1.229*	0.601*
7	0.371	0.482*	1.28*	0.671*
8	0.428	0.55*	1.512*	0.609*
9	0.143	0.436*	1.744*	0.603*
10	-0.022	0.417	1.629*	0.524*

Table 25: CPP as share of mean CPP income for control group

Households: Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.246*	-0.081	0.058	-0.074
-1	-0.409*	-0.143	0.025	-0.128*
0	-0.353*	-0.061	0.057	-0.124*
1	-0.314*	-0.083	0.106	-0.113*
2	-0.294*	-0.064	0.129	-0.028
3	-0.193	-0.101	0.188*	-0.02
4	-0.313*	-0.171	0.155	-0.024
5	-0.35*	-0.074	0.223*	-0.013
6	-0.361	0.13	0.263*	0.061
7	-0.228	-0.075	0.419*	0.14
8	-0.419	-0.074	0.361*	0.094
9	-0.454	0.001	0.372*	0.037
10	-0.472	-0.097	0.371*	0.006
Households: Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.178	-0.22	0.058	-0.076
-1	-0.527*	-0.255	0.126	-0.109
0	-0.416*	-0.193	0.135	-0.056
1	-0.375	-0.269	0.474*	0.065
2	-0.336	-0.12	0.637*	0.218*
3	-0.204	-0.063	0.921*	0.227*
4	-0.046	-0.015	0.893*	0.369*
5	-0.116	0.114	1.091*	0.322*
6	-0.226	0.192	1.051*	0.369*
7	-0.023	0.17	1.108*	0.465*
8	0.045	0.117	0.916*	0.416*
9	-0.017	0.148	0.817*	0.414*
10	-0.266	0.01	0.845*	0.303*

Table 26: Workers compensation as share of mean wc income for control group

Households: Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.052	-0.227	-1.114	0.259
-1	0.06	0.855	-0.665	0.175
0	2.01*	2.234*	2.165*	1.036*
1	1.786	1.349*	2.205*	0.842*
2	0.275	0.895	1.977*	0.2
3	2.166	1.037	1.446*	0.66
4	1.632	1.094	1.491*	1.607*
5	1.89	1.026	1.093	1.793*
6	1.271	-0.127	0.959	1.467*
7	0.748	0.502	1.478	0.795
8	1.682	-0.175	0.94	0.982
9	1.456	-0.717	0.56	0.748
10	3.054	-0.533	1.076	1.404*
Households: Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.999	0.156	-2.706*	0.545
-1	-0.584	1.094	-1.258	1.425*
0	3.44*	3.109*	4.286*	2.351*
1	5.528*	3.153*	8.695*	1.793*
2	3.905*	2.87*	9.382*	1.453*
3	5.079*	2.87*	10.608*	2.07*
4	5.821*	2.316*	8.841*	3.075*
5	5.076*	1.7	9.243*	3.392*
6	6.016*	1.051	10.975*	3.095*
7	7.643*	1.106	12.424*	3.484*
8	7.761*	1.477	15.819*	3.094*
9	5.158	0.819	19.939*	2.224*
10	3.991	0.231	16.883*	2.162*

Table 27: Private support payments as share of mean for control group

Households: Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.495	0.426*	-0.537	0.767*
-1	-1.232	0.454*	-0.706	0.27
0	-1.528	0.55*	-0.795*	0.605
1	-2.623*	0.665*	-0.563	-0.129
2	-3.002*	0.35	-0.722	-0.024
3	-2.678*	0.404	-0.803	0.087
4	-1.587	0.267	-0.34	0.067
5	-2.058	0.451	-0.537	0.038
6	-1.072	0.611*	-0.661	-0.575
7	-1.848	0.3	-1.175*	-0.236
8	-0.932	0.256	-0.113	-0.495
9	-1.967	-0.108	-0.699	-0.535
10	-3.158	-0.144	-1.113	-0.553
Households: Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-1.514	-0.164	0.118	0.327
-1	-3.133*	0.173	0.607	0.116
0	-4.48*	1.112*	-0.219	0.301
1	-5.314*	0.73	0.021	0.097
2	-5.381*	0.339	-0.124	0.538
3	-5.051*	0.465	-0.037	0.268
4	-4.566*	0.357	0.313	0.339
5	-5.342*	0.418	0.301	0.386
6	-5.457*	0.55	0.074	0.177
7	-5.874*	0.471	0.195	0.204
8	-5.844*	0.069	0.375	-0.094
9	-6.543*	0.007	0.732	-0.007
10	-6.133*	-0.068	-0.177	-0.221

Table 28: Social assistence as share of mean for control group

Households: Mild Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	0.332	-0.138	-0.125	0.381
-1	-0.292	-0.13	-0.279	0.209
0	-0.028	-0.012	-0.607*	0.31
1	0.076	0.019	-0.395	0.497*
2	-0.612	0.085	-0.249	0.429
3	-0.887*	-0.004	-0.105	0.336
4	0.392	0.128	-0.303	0.259
5	0.362	-0.04	-0.102	0.367
6	1.073*	-0.076	-0.282	0.863*
7	1.455*	-0.53	-0.076	0.537
8	1.146	-0.464	-0.12	1.392*
9	1.122	-0.207	-0.512	1.297*
10	0.856	-0.122	0.302	0.866
Households: Severe Disability				
Years from onset	Single men	Single women	Married men	Married women
-2	-0.019	-0.18	1.155*	0.399
-1	-0.105	0.016	0.738	0.711*
0	0.636	0.24	0.706	0.64
1	0.817	0.427	1.286*	1.314*
2	0.414	0.435	0.717	1.274*
3	0.893	0.403	0.642	1.567*
4	1.444	0.3	0.954	1.318*
5	1.195	0.243	0.474	0.959*
6	1.473	0.084	0.747	1.784*
7	0.724	-0.119	0.207	1.862*
8	0.863	0.037	0.493	1.643*
9	0.096	0.073	-0.26	1.039*
10	-0.413	0.089	-0.361	0.684

6 Compuational Appendix

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