DISCUSSION PAPER SERIES

IZA DP No. 2867

Dynamics of Work Limitation and Work in Australia

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June 2007

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

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Discussion Paper No. 2867
June 2007

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IZA Discussion Paper No. 2867
June 2007

ABSTRACT

Dynamics of Work Limitation and Work in Australia*

This paper examines the impact of self-reported work limitation on the labour force participation of the Australian working age population. Five consecutive waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey are used to investigate this relationship. A two-equation dynamic panel data model demonstrates that persistence and unobserved heterogeneity play an important role in the work limitation reporting and its effect on labour force participation. Unobserved factors that jointly drive work limitation and participation are also shown to be crucial, especially for women.

JEL Classification: J28, I12, C81

Keywords: work limitations, labour force participation, dynamic panel probit, maximum simulated likelihood

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* We are grateful to Carlos Flores and Oscar Mitnik for their constructive suggestions. We also would like to thank Eric French, participants at the Annual Meeting of the Society of Labor Economics, in the Applied Microeconomics Workshop at the University of Miami, and at Florida International University's Department of Economics' Seminar for helpful discussions.

1. INTRODUCTION

Work limitations are important drivers of employment decisions. Only 48% of disabled Australians with work limitations participate in the labour force, compared with 72% of those who do not have a work limitation (Year Book Australia, 2006). The *ceteris paribus* effect of work limitation, however, is difficult to measure. First, both employment and work limitations are moving targets. Determinants of one's capacity to work are often not constant while conditions causing work limitations also vary across time. Disabling conditions can improve or worsen, completely disappear or new onsets can create new limitations. Second, persistence in employment can mask or overemphasize the real impact of a work limitation. For example, a disabled person's failure in the search for jobs may be due to previous search failures rather than to the disabling conditions themselves. Like disabilities, out-of-employment spells can erode acquired skills and suspend acquisition of new ones. Even if periods of unemployment do not cause human capital loss, lapses in recent employment history may give a 'bad signal' to employers. As a result, past employment status of a work-limited individual can directly affect her future employment. If this persistence is not controlled for, the impact of the current work limitation can be exaggerated. Third, some permanent unobservable factors can influence the labour market outcomes and the prevalence of work disability together. In that case, correlation between unobservables renders work limitation endogenous to employment and biases its effect on participation.

This paper investigates the effect of work limitations on labour force participation in the presence of persistence, unobserved heterogeneity and joint determination of participation and work limitation reporting. I focus on these issues for the Australian working age population using a comprehensive panel data source, the Household, Income and Labour Dynamics in Australia Survey (HILDA). The effect of disability on the probability of participation is analysed using a model that allows state dependence and unobserved heterogeneity. The correlation between unobserved heterogeneity that may shape participation and work limitation simultaneously is controlled by estimating the disability and participation equations jointly. The model includes a lag disability variable to analyse the direct effect of work limitation on future participation outcomes.

There is considerable international evidence on the adverse impact of work limitations on labour force behaviour (Stern (1989), Burkhauser and Bound (1991), Currie and Madrian (1999), Bound et al (1999), Campolieti (2002))[1]. Recently, models that control for the persistence in employment also find strong association between work limitations and being out of work (Lindeboom and Kerkhofs (2002), Gannon (2004), Kapteyn et al (2007)). Australian studies on the link of work disability and employment are scarce and existing work often relies on cross sectional evidence (Brazenor (2002), Wilkins (2004)). One exception is Cai (2007), who estimates a simultaneous panel data model to investigate the endogeneity of work limitation. The dynamic relationship of work limitation and work, however, has not been investigated for Australia.

This paper is organized as follows: section 2 presents the data and describes the dynamic association of work limitation and labour force participation in the sample,

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There is also substantial literature against this ‘evidence’, pointing out to the problems due to endogeneity and measurement error. Bound and Burkhauser (1999) give an extensive survey of this literature section 3 introduces the econometric models, section 4 discusses the results. Section 5 concludes.

2. DATA

The data used for this paper come from the first five waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Details of this survey are documented in Watson and Wooden (2002). In the first wave, 7,683 households representing 66 percent of all in-scope households were interviewed, generating a sample of 15,127 persons who were 15 years old or older and eligible for interviews, of whom 13,969 were successfully interviewed. Subsequent interviews for later waves were conducted one year apart. In addition to the data collected through personal interviews, each person completing a personal interview was also given a self-completion questionnaire to be returned upon completion by mail or handed back to the interviewer at a subsequent visit to the household. The HILDA attrition rates for waves 2, 3 and 4 were 13.2 percent, 9.6 percent and 8.4 percent respectively, which is not much higher than other longitudinal surveys. The proportion of Wave 4 respondents who were successfully interviewed in Wave 5 is 94.4%.

The HILDA survey contains detailed information on each individual's labour market activities and history. Socio-demographic characteristics of the respondents and information indicating health status also recorded. In each wave, respondents are asked the following question to assess if they have a long-term health condition:

"…do you have any long-term health condition, impairment or disability that restricts you in your everyday activities, and has lasted or is likely to last, for 6 months or more?"

While the preceding question is asked, specific examples of the "long-term health conditions" were shown on a card. These include, among many others, limited use of fingers or arms, or problems with eyesight that could not be corrected with glasses or contact lenses. Respondents who indicate that they have a long term condition are further asked if this condition is work limiting. The work disability variable that is used in this paper is derived from following HILDA question:

"Does your condition limit the type of work or the amount of work you can do?"

This question is asked in each wave. In the self-completed questionnaire, the Short Form 36 health status questions (SF-36) are asked. This detailed information on individuals' general well-being is used to construct eight health indices. For example, the Physical Functioning Index summarises respondents' answers to questions on physical limitations, such as walking up the stairs, lifting or carrying groceries. The index value ranges from 0 to 100, with 100 indicating perfect physical condition.[2]

[2] See Ware et al., (2000) for the construction and interpretation of the index.

2.1. Sample Selection and Summary Statistics

The sample used contains men between 24 and 64 years of age and women between 24 and 60 years of age at the time of the interview. Young people in full time study, older people who are eligible for Old Age Pension (age 65 for men and age 60 for women) and anyone with missing data points are excluded from the analysis. The final sample consists of a balanced sample of 2,200 male and 2,368 female respondents that were observed throughout five waves of HILDA.

Table 1 summarises demographic characteristics of the sample used in this paper. On average, people with work limitations tend to be older, less educated and in worse physical condition than people who do not report a work limitation. Moreover, people with self-reported work limitations live outside of major cities more often and a larger percentage of them are single. The country of birth does not appear to be different across samples.

In order to present the time variant nature of the work disability reports, I follow Kapteyn et al (2006) and present the patterns that work limitation is reported throughout the sample window, in Table 2. In the first row, individuals who have never reported a work limitation during the five waves are represented. The last row represents respondents who have always reported a work limitation. The row that is labelled as "Consistent Onset" includes individuals who report work disability after every wave that they have initially reported a work limitation. All the remaining individuals in the sample are labelled as "Irregular". This sample consists of people who report no work limitation after reporting a work disability in the previous wave. According to Table 2, 71% of men and 73% of women sample never reports a work disability whereas about 8% of men and 5.5% of women always do. People who report irregular patterns of work limitation are a substantial portion of the sample. About 18% of men and women exhibit an irregular pattern of limitation. Given that a big majority of individuals who ever report a work disability do so irregularly, it is important to model the year-to-year changes in work limitation status[3].

Table 3 illustrates the association between work limitation and labour force participation patterns. The first column of Table 4 consists of individuals who never participated in the labour force during the period analysed. Respondents whose labour force status changes from one wave to the next are reported in the second column (labelled as Irregular). Individuals who exited the workforce permanently (at least during the five waves of HILDA) are labelled as "Consistent Exit" in the third column. The last column of Table 4 shows individuals who were not participants during all five waves.

According to Table 3, 80 % of the male sample was participating in the labour force during all five waves, compared to 56% of women. Women are more likely to exhibit irregular employment patterns than men and more likely to be out of employment (and not searching for it) during all of five waves. Table 4 emphasizes the dynamic relationship between participation patterns and patterns that work limitations are reported. Among men who have never reported a work limitation, 90% were always participants. However, only 15% of men that always reported a work limitation were working or looking for work during the entire 5 year period. The econometric models of

[3] Kapteyn et al (2006) report similar findings using Health and Retirement Survey.

the next sections shall control for this dynamic relationship between work and work limitations.

Finally, the effect of persistence in participation is demonstrated in Table 4. Labour force participation rates conditional on participating in the last wave are reported along unconditional rates for comparison. Unconditional rates show strong negative association between work limitation reports and labour force activity. Only 52.2% of men and 44.4% of women that report a work limitation participate in the labour force. The discrepancies between people with and without work limitations reduce considerably when past participation is controlled for. Among people who were participant in the last wave, 94.4% of men and 74.3% of women with a self-reported work limitation participate in the labour force compared to 98.2% of men and 92.7% of women who do not report a work limitation.

3. MODEL SPECIFICATION

The probability of labour force participation for individual *i* at wave *t* can be modelled by following dynamic probit model:

$$
\begin{aligned}
y^*_{it} &= \gamma y_{i,t-1} + X'_{it}\beta_1 + \delta_1 D_{it} + \delta_2 D_{i,t-1} + \alpha_i + \varepsilon_{it} \\
y_{it} &= 1[y^*_{it} > 0]
\end{aligned}
\tag{1}
$$

Where y_{it} is a dummy variable that is equal to one when the individual is a labour force participant, x_{it} is a kx1 vector of individual characteristic and D_{it} is the work limitation dummy. Here, I allow a direct effect of past work disability by adding a lagged term (D_{it-1}). In model (1), the unobserved heterogeneity α_i is assumed to be distributed normally with mean zero and variance σ_α^2. The random disturbance term ε_{it} is assumed to be distributed standard normal.

The presence of state dependence in the form of a lagged dependent variable y_{it-1} introduces what is called an "initial conditions problem" due to our lack of knowledge of the data generating process governing the initial participation outcome. In this paper, the approach by Heckman (1981) is used to address the initial condition problem where the initial participation choice is approximated by a linear reduced form equation;

$$
\begin{aligned}
y^*_{i1} &= x'_{i1}\pi + \theta\alpha_i + \varepsilon_{i1} \\
y_{i1} &= 1[y^*_{i1} > 0]
\end{aligned}
\tag{2}
$$

Where x_{i1} contains information from the first wave and ε_{i1} is the standard normally distributed error term. Heckman (1981) suggests that a cross sectional probit model as in (2) and the dynamic equation (1) for periods $t > 2$ can be jointly estimated by Full Information Maximum Likelihood (FIML) to obtain consistent estimates. An individual's contribution to the likelihood function can be determined by:

$$L_i = \int_{-\infty}^{\infty} \Phi\left[\left(x'_{i1}\pi + \theta\alpha_i\right)(2y_{i1} - 1)\right] \times \left\{\prod_{t=2}^{T} \Phi\left[\left(\gamma y_{it-1} + x'_{it}\beta + \delta_1 D_{it} + \delta_2 D_{i,t-1} + \alpha_i\right)(2y_{it} - 1)\right]\right\} \times \phi(\alpha) d\alpha \quad (3)$$

Where $\Phi(\cdot)$ is the normal cumulative density function (CDF), and $\phi(\alpha)$ is the normal density function of α_i .

A problem with (3) is that the individual effects are assumed to be uncorrelated with the right hand side variables. In order to control for the correlation between α_i and x_{it} , I follow Mundlak (1978) by assuming following functional form: $\alpha_i = \overline{x}_i{}' a + \nu_i$ where $v_i \sim iidN(0, \sigma_\nu)$ and $\overline{x}_i$ is the time averages of all time varying exogenous variables. This approach simply indicates that $\overline{x}_i$ will be included in Equation (1) as an additional regressor.

3.1 A Two-Equation Dynamic Panel Data Model:

Equation (1) does not take into account unobserved individual characteristics that can simultaneously drive labour force participation and work limitation reporting. Unobserved individual characteristics that make an individual more likely to be a nonparticipant may also make them more likely to report a work limitation. If a significant correlation exists between unobserved components of these two outcomes, the estimates of δ_1 and δ_2 will be biased due to endogeneity of the work limitation measures. One remedy is to model the correlation between unobserved heterogeneity in a two-equation setup.

The model that is presented below is a variant of the three equation model used in Kapteyn et. al (2006). Unlike Kapteyn et al (2006), I model the correlation between unobserved heterogeneity and exogenous variables as in Mundlak (1978). Another difference is that my focus is on labour force participation of the entire working age population whereas Kapteyn et al (2006) analyse the joint effect of pain and disability on paid employment of older people in the U.S.

In this alternative model, the participation equation in (1) is estimated jointly with the following work disability reporting equation.

$$\begin{aligned} D^*_{it} &= \gamma_1 D_{i,t-1} + x'_{it}\beta_2 + \eta_i + u_{it} \\ D_{it} &= 1[D^*_{it} > 0] \end{aligned} \qquad (4)$$

Where D_{it} is one if respondent *i* reports a work limitation at period *t*. x_{it} are the demographic characteristics, η_i is the random effects and u_{it} is the time variant disturbance term that is standard normally distributed.

In order to model joint determination of participation and work disability reporting, Equations (1) and (4) are assumed to be linked via random effects. α_i and η_i are assumed to come from a bivariate normal distribution with covariance matrix, Σ of the following form:

$$\Sigma = \begin{bmatrix} \sigma^2_{\alpha} & \sigma_{\alpha}\sigma_{\eta}\rho \\ \sigma_{\alpha}\sigma_{\eta}\rho & \sigma^2_{\eta} \end{bmatrix} \qquad (5)$$

For the participation and work disability equations, the initial conditions are modelled as in Heckman (1981). The initial condition equations include the same set of variables as their dynamic counterparts (1) and (4), excluding the lagged variables. The random effects in these equations satisfy the same distributional assumptions as (α_i, η_i). To freely correlate unobserved heterogeneity in the dynamic and initial equations, arbitrary linear combinations of α_i and η_i are included in the equations for wave 1. The initial participation equation can be written as follows:

$$\begin{aligned} y^*_{i1} &= X'_{i1}\pi_1 + \delta_0 D_{i1} + \theta_1\alpha_i + \theta_2\eta_i + \varepsilon_{i1} \\ y_{i1} &= 1[y^*_{i1} > 0] \end{aligned} \qquad (6)$$

Similarly, the initial work disability is captured by

$$D^*_{i1} = X'_{i1}\pi_2 + \theta_3\alpha_i + \theta_4\eta_i + \nu_{i1}$$
$$D_{i1} = 1[D^*_{i1} > 0] \tag{7}$$

Standard normally distributed error terms ε_{i1} and ν_{i1} are assumed to be uncorrelated with each other and anything else in the model. No restriction is imposed on the relationship between the parameters of the initial level equations and the parameters of the main equations.

The likelihood contribution for a given individual can be written as the expected value of the log likelihood contribution conditional on the random effects[4].

$$\begin{aligned} L_i = &\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \Phi\left[\left(x'_{i1}\pi + \delta_0 D_{i1} + \theta_1\alpha_i + \theta_2\eta_i\right)(2y_{i1}-1)\right] \\ &\times\Phi\left[\left(x'_{i1}\pi_2 + \theta_3\alpha_i + \theta_4\eta_i\right)(2D_{i1}-1)\right]\times\left\{\prod_{t=2}^{T}\Phi\left[\left(\gamma D_{it-1} + x'_{it}\beta_2 + \eta_i\right)(2y_{it}-1)\right]\right\} \\ &\times\left\{\prod_{t=2}^{T}\Phi\left[\left(\gamma y_{it-1} + \delta_1 D_{it} + \delta_2 D_{it-1} + x'_{it}\beta_1 + \alpha_i\right)(2y_{it}-1)\right]\right\}\times\phi_2\left(\alpha,\eta\right)d\alpha\ d\eta \end{aligned} \tag{8}$$

Where $\phi_2(\alpha,\eta)$ is the bivariate normal density function of α_i and η_i.

To estimate the parameters of (1), (4), (6), (7) and the elements of Σ , (8) is optimised using Maximum Simulated Likelihood with 20 Halton draws[5].

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[4] All models include time averages of time variant regressor. $\overline{x}_i$ is suppressed for ease of representation

[5]The results were not significantly different when 50 draws were used. For details on the estimation see Kapteyn et al (2006). Train (2003) provides a detailed discussion on Halton draws.

The models' explanatory variables are a set of dummy variables indicating the report of a work limitation (both current and past), lagged labour force participation, level of education, marital and dependent children status, country of birth and location of residence. Additionally, the model is quadratic in age and includes the SF-36 physical conditioning index. Table 5 presents a brief definition of the variables.

4. RESULTS

Table 6 presents the results from dynamic two-equation model[6]. I report estimated coefficients from the dynamic participation equation in segment A. Most of the control variables have the expected sign. Higher education and being in better physical condition increase the likelihood of participation for both samples. Men who reside in a major city are more likely to participate. For women, having been born in Australia is associated with higher participation, whereas having young children is associated with lower participation.

For both men and women the lagged participation variable is highly significant. People who are currently labour force participants are more likely to be in the labour force in the next period than individuals who are not currently in the labour force. After controlling for the persistence in the work decisions, the self-reported work limitation in the current period still significantly increases the probability of being out of labour force. The lagged disability is not significant in either of the samples. This does not mean that lagged disability has no effect on participation; the effect of past disability is

[6] Results from initial level equations are available upon request

indirect and works through the lagged participation variable. Another interpretation is due to Bound et al (1999). According to regression results, there is no significant difference in participation rates between an individual who became work-limited in the current period and a comparable individual who has been work-limited for two periods. This finding suggests that a deteriorating work capacity is not significantly worse than having a more permanent work limitation.

The results from the dynamic disability equation are presented in segment B of Table 6. The results show that disability reporting is highly persistent for both samples. Reporting a work limitation in a given period substantially increases the probability of a work limitation being reported in the next period. This persistence is higher for women. Only a few of the control variables are significant. For both men and women, poorer physical condition is associated with higher rates of work limitation reporting. Older men are more likely to report a work disability. Being born in Australia or being married increase the probability of limitation reporting. Women who reside in major cities are less likely to report a limitation. Having young children seems to be reducing the prevalence of work limitation for women; however this effect is statistically insignificant.

Segment C of Table 6 presents the estimated parameters of the Σ matrix. Men and women differ in terms of the role that unobserved heterogeneity plays. After controlling for persistence in employment, the unobserved effects do not significantly contribute to the participation decision for men. However, the random effects play an important role in the reporting of work limitations. The implied standard deviation of the random effect in the work limitation equation is significant and explains about 56% of the unsystematic variation in disability reporting. The correlation between the two random effects has the expected sign but it is very small and statistically insignificant. This means that a single equation model can consistently estimate dynamic labour force participation for men. For women unobserved heterogeneity has a substantial impact on the probability of employment. More than half of the variation due to unobserved factors in the participation choices is captured by the random effects. The unobserved heterogeneity plays an important role in the prevalence of work limitation reporting as well. The 52% of the unsystematic variation in the work limitation equation can be explained by the unobserved heterogeneity. For women, I found a strong and significant correlation between unobserved effects of participation and work disability equations. This suggests that constant personal unobserved characteristics that make women participate less often also increase their likelihood to report a work limitation. This makes report of work limitation endogenous in the participation equation for women, a fact that is taken into account in the estimations.

In order to demonstrate the impact of the correlation between random effects of the two outcomes, I estimate a single equation model of participation as in Equation (1). The results are presented in Table 7. As expected, for men, coefficients of the single equation model are virtually identical to their two-equation counterparts. However, for women, disability estimates of the single equation are larger and highly significant compared to the two-equation estimates. This suggests that, for women, a significant portion of the adverse effect of work limitations is due to permanent unobservable heterogeneity that impact work and work limitation simultaneously.

Table 8 presents the Average Partial Effects (APE)[7] for the variables of interest in the participation equations. The effects are evaluated at the individual averages of the explanatory variables. Results re-emphasise discrepancies across gender and model specifications. Overall, the men's participation decisions exhibit higher persistence than the women's. For men, the two-equation model suggests that being employed or looking for work in one period increases the probability of participation in the next period by 52%, whereas reporting a work limitation reduces the current likelihood of participation by 9%. As expected, single-equation values for these estimates are virtually identical to two-equation model estimates. For women, the average partial effects are very dissimilar across models. The single equation model for women under estimates the persistence of their labour force participation. Due to negative correlation between unobservable individual characteristics, the adverse effect of work limitation is exaggerated in the single equation model. The single equation estimate suggests an 8% reduction in the probability of participation due to a current report of work limitation. The effect of past limitation is also large, at about 5.5%. In the two-equation model, the drop in the participation probability due to a current report of a work limitation is 3.5%. We do not observe a significant effect of a past work limitation in this model. The results suggest that there would be a substantial bias in the partial effects of work disability if a significant correlation between unobservables is ignored. The adverse effect of reporting work limitation in two consecutive waves is overestimated by 10% in the single equation model.

[7] See Wooldridge (2005) for details on APE.

5. CONCLUSION

In this paper, I utilize a two-equation dynamic panel data model to analyse the effect of work limitations on the labour force participation. The model controls for time invariant unobserved factors that influence prevalence of work limitations and labour for participation jointly. The persistence in the participation and the work limitations, and endogeneity of initial conditions are also accounted for. It is shown that persistence plays a crucial role in the way people make participation choices and the way they report work limitations. People who report limitations in one period are very likely to report one in the next period. Similarly, current employment status is a driving factor of future employment. People employed or looking for employment in the current period, are much more likely to be active in the labour force in the next period than persons that are currently nonparticipant.

Choices of participation and work limitation reporting are also shown to be altered by unobserved heterogeneity. For women, unobserved determinants of both outcomes are shown to be significantly related to unobserved individual characteristics. These factors are demonstrated to be significantly correlated across equations. A single equation model demonstrates that ignoring this correlation can seriously overestimate the impact of work limitations on labour force participation. The estimates for men indicate that the unobserved individual factors play a significant role only for the work disability equation and the correlation between two random effects is insignificant. For men, the participation outcome is mainly driven by persistence in employment.

However, lower participation rate of work limited individuals can not be explained solely by persistence and unobserved heterogeneity. In this paper, I show that the effect of self-reported work limitation, net of persistence of labour force participation and unobserved heterogeneity, is still highly significant. A current report of work limitation is strongly associated with being out of the labour force. Given the dynamic nature of work disability, a lag effect of work limitation is then investigated. The two-equation model shows no significant impact of past limitations on current participation. This finding should be interpreted with caution. An insignificant lag effect does not mean that past limitation has no adverse effect, but that this effect is indirect and works through lagged participation status. Simply put, current limitation can still lower future propensity of participation via persistency channels by lowering current participation.

The results of this analysis have shown both a direct and indirect negative effect of self-reported work disability on labour force participation: being work-limited in the current period makes an individual less likely to participate in the labour force and being out of the work force makes an individual less likely to be a participant in the future. Since the partial effect of past participation is shown to be a much more important driver of current status than work limitation, an important implication of these results is that, regardless of how individuals became nonparticipants, it is difficult for them to get back into the labour force. Policies that aim at keeping disabled individuals in the work force one way or another, might address some of these problems.

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Table 1: Mean of Demographic Characteristics, Work Limited vs Not Work Limited

	MEN		WOMEN	
	Work Limited	Not Work Limited	Work Limited	Not Work Limited
Age	48.61	43.53	45.19	41.55
Education*				
B.A or higher	0.13	0.27	0.20	0.28
Marital Status & Children*				
Married or De facto	0.70	0.80	0.63	0.78
Youngest children is 0-4 yrs old	0.11	0.19	0.08	0.21
Youngest children is 5-15 yrs old	0.21	0.32	0.26	0.42
Lives in a major city*	0.48	0.63	0.58	0.62
Born in Australia*	0.75	0.77	0.78	0.77
Physical Functioning Index (0-100)	62.36	91.67	62.47	90.54
LF Participant*	0.52	0.94	0.49	0.77
Obs.	1795	9205	1661	10184

Note: Above estimates are obtained from a pooled sample of 5 waves of HILDA

* indicates a dummy variable

Table 2. Work-Limitation Patterns (%)

Work limitation Reported During 5 Years	**MEN**	**WOMEN**
Never	71.05	73.7
Irregular	18.14	17.94
Consistent Onset	3.23	2.83
Always	7.59	5.53

Table 3.Association between Work limitation and Participation Patterns (%)

	MEN			
	Labour Force Participation Pattern			
	Never	*Irregular*	*Consistent Exit*	*Always*
Limitation Pattern				
Never	1.86	4.86	2.56	90.72
Irregular	7.77	13.53	12.28	66.42
Consistent Onset	14.08	14.08	2.82	69.01
Always	47.9	21.56	15.57	14.97
Total	6.82	8	5.32	79.86
	WOMEN			
	Labour Force Participation Pattern			
	Never	*Irregular*	*Consistent Exit*	*Always*
Limitation Pattern				
Never	9.45	22.05	6.07	62.43
Irregular	21.65	23.06	11.29	44
Consistent Onset	11.94	34.33	4.48	49.25
Always	46.56	21.37	10.69	21.37
Total	13.76	22.54	7.22	56.48

Table 4. Labour Force Participation Rates (%)

	Work Limited		Not Work Limited	
	Unconditional	*Conditional*	*Unconditional*	*Conditional*
Men	52.2	82.8	94.4	98.2
Women	44.4	83.4	74.3	92.7

Note: Conditional outcomes are conditional on participating in the labour force in the last wave

Table 5: Variable Definitions

Variable	**Definition.**
CONST	*Constant*
LF	*=1 if Labour force participant*
DISAB	*=1 if Have a work limitation*
LLF	*Lagged participation*
LDISAB	*Lagged work limitation*
BACHEP	*=1 if highest completed degree is B.A. or higher*
MARR	*=1 if Married or in a de facto relationship.*
CITY	*=1 if Lives in a major city*
AUST	*=1 if Born in Australia*
AGE	*(Current age -25)/10*
AGE2	*AGE squared*
KID04	*=1 if Youngest child is btw 0-4 yrs old*
KID514	*=1 if Youngest child is btw 5-14 yrs old*
PHIND	*SF-36 Physical functioning index /10 (continuous 0-10)*

Table 6. FIML Estimates of Dynamic Two-Equation Model

A.	Participation Equation, Waves 2-5			
	MEN		WOMEN	
	Parameters.	*S.E*	*Parameters.*	*S.E*
CONST	-1.1416 [a]	0.264	-1.861 [a]	0.2708
LLF	2.2088 [a]	0.0506	1.1355 [a]	0.0656
DISAB	-0.8141 [a]	0.076	-0.1833 [b]	0.0833
LDISAB	-0.0291	0.0767	-0.0417	0.087
AGE	0.4887	0.8284	1.8987 [a]	0.4326
AGE2	-0.1452	0.1611	-0.409 [a]	0.1187
AUS	0.0453	0.0675	0.1701 [b]	0.0705
CITY	0.4574 [b]	0.2183	0.065	0.1718
MARR	0.0151	0.2524	-0.0781	0.1281
K04	0.0319	0.2445	-0.5495 [a]	0.0967
K514	0.0125	0.2623	-0.1584	0.1111
BACHP	3.0314 [a]	0.5959	1.1215 [a]	0.4166
PINDX	0.0568 [b]	0.024	0.0506 [a]	0.0178
B.	**Disability Equation, Waves 2-5**			
	Parameters.	*S.E*	*Parameters.*	*S.E*
CONST	4.3146 [a]	0.4255	2.2491 [a]	0.2228
LDISAB	0.445 [a]	0.0876	1.0593 [a]	0.0614
AGE	1.8588 [a]	0.6463	0.5729	0.6086
AGE2	-0.0874	0.1358	0.0681	0.1468
AUS	0.0103	0.1062	0.1921 [a]	0.0615
CITY	0.2905	0.2563	-0.1243	0.2714
MARR	0.1223	0.2205	0.3552 [b]	0.1711
K04	0.0061	0.2069	-0.1713	0.1802
K514	-0.1878	0.1551	-0.1792	0.1457
BACHP	-0.6472	1.0934	-0.1691	1.1403
PINDX	-0.1841 [a]	0.0219	-0.1599 [a]	0.0178
C.	*Auxiliary Parameters*			
σ_α	0.0140	0.0320	1.0785 [a]	0.0837
σ_η	1.2772 [a]	0.0977	1.1031 [a]	0.0614
ρ	-0.0138	0.0346	-0.4189 [a]	0.0521
Mean Log-Likelihood		-0.4448	-0.581519	
Number of Individuals		2200	2369	

Note: a,b,c indicates significance at 1%, 5% and 10%. The results from initial level equations are available from the author upon request Models include time averages of all time variant variables.

Table 7. FIML Estimates from Single Equation Participation Model, Wave 2-5

A.	MEN		WOMEN	
	Parameters.	*S.E*	*Parameters.*	*S.E*
CONST	-1.1429 [a]	0.2552	2.5797 [a]	1.9130
LLF	2.2089 [a]	0.0495	1.0551 [a]	0.0690
DISAB	-0.8139 [a]	0.0735	-0.4154 [a]	0.0851
LDISAB	-0.0289	0.0739	-0.2860 [a]	0.0881
AGE	0.4932	0.8139	0.2329 [a]	0.0430
AGE2	-0.1463	0.1585	-0.0048 [a]	0.0011
AUS	0.0454	0.0667	0.3330 [a]	0.0842
CITY	0.4573 [b]	0.2160	-0.0105	0.1801
MARR	0.0156	0.2472	-0.1360	0.1465
K04	0.0283	0.2311	-0.5861 [a]	0.1063
K514	0.0133	0.2586	-0.1946	0.1156
BACHP	3.0256 [a]	0.5843	0.5717 [a]	0.4994
PINDX	0.0568 [b]	0.0232	0.0490 [a]	0.0196
B.		*Auxiliary Parameters*		
σ_α	0.0138 [c]	0.0316	1.2427 [a]	0.0912
θ	-0.0482	0.0502	1.4694 [a]	0.1080
Mean Log-likelihood	-0.1688		-0.3456	
Number of Individuals	2200		2369	

Note: see Table 7.

Table 8. Average Partial Effects on Labour Force Participation

	MEN	
	Two-Equation Model	Single -Equation Model
LLF	0.5296	0.5297
DISAB	-0.0991	-0.0991
LDISAB	-0.0026	-0.0026
	WOMEN	
	Two-Equation Model	Single -Equation Model
LLF	0.269	0.2157
DISAB	-0.0349	-0.0799
LDISAB	-0.0077	-0.0556

Note: Effects are evaluated at individual averages of explanatory variables.