Dynamics of Disability and Work in Canada: Why Old Disabilities Still Hunt Newly Healthy

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Employment beyond disability

Source: Galarneau and Radulescu, 2009
What do we know?

• A significant portion of population report disability

• Disabled participate much less in the labour market

• Effects felt beyond disability period
What don’t we know?

• Impact of state dependence

• Dynamics of disability
What don’t we know?

• Impact of state dependence
What don’t we know?

• **Impact of state dependence**

[Diagram showing the transition from "Out of work - not Disabled" to "Out of work - Disabled" over time.]
What don’t we know?

• Impact of state dependence
What don’t we know?

• Impact of state dependence

• Dynamics of disability
  – Majority of persons who ever report a work disability do so irregularly
Disability over time

- Always Disabled
- Never Disabled
- Irregular Disabled

Legend:
- MEN
- WOMEN
The Basic Idea

• Describe dynamics of disability and labour force
• Estimate the impact of disability while controlling for state dependence
• Policy simulation
Preview of Results

• Disability (past and current) is highly significant.
• So is past labour force participation.
• State dependence prolongs impact of disability.
• Work incentives may have positive impact.
Previous Work

• Harkness (1993); Maki (1993); Gruber (2000); Campolieti (2001)
• Au, Crossley, Schellhorn (2005)
Data

• National Population Health Survey
  – Longitudinal
  – 8 cycles
  – 1994/95 – 2007/08
  – Detailed health questionnaire
  – Limited employment information
Sample

- Aged 24-64
- Minimum 3 consecutive cycles
- 2847 men and 3551 women
- 18,614 and 23505 year-person observation
Labour Force Model

\[ y_{it}^* = \gamma y_{it-1} + \beta X_{it} + \delta_0 D_{it}^* + \delta_1 D_{it-1}^* + \alpha_i + \epsilon_{it} \]
Labour Force Model

\[ y_{it} = \gamma y_{it-1} + \beta x_{it} + \delta_0 y_{it}^* + \delta_1 y_{it-1}^* + \alpha_i + \epsilon_{it} \]

- Age, age^2, housesize, capital income, homeownership, married, kids, educ, immig, province, time dummies

- Labour force participation
a few Issues

• Random effects are too random

• Initial Conditions Problem

\[ t = 0 \quad \text{Data Starts} \quad y_t = f(y_{t-1}; \theta) \]
\[ = f(y_0; \theta) \]

Labour Force Model

\[ y_{it}^* = \gamma y_{it-1} + \beta X_{it} + \delta_0 D_{it}^* + \delta_1 D_{it-1}^* + \alpha_i + \epsilon_{it} \]

Estimated Model (Woodridge):

\[
\begin{align*}
Prob(y_{it} = 1) &= \Phi(y_{i,t-1} + \beta X_{it} + \delta_0 D_{it}^* + \delta_0 D_{it-1}^* + y_{i1} + \theta X_{i})
\end{align*}
\]
DISABILITY in the NPHS:

“Because of a long term physical or mental health condition, are you limited in the kind or amount of activity you can do at home/school or work?”
a few more Issues

\[ SAD_{it} = D_{it}^* + \eta_{it} \]

• 2 problems with self-assessed disability:
  – justification bias
  – measurement error

  – It may still work (Bound et al 1995, Oguzoglu 2012)
The Basic Idea Amended

• Describe dynamic nature of disability and labour force
• Estimate the impact of disability while controlling for state dependence and endogeneity of SAD
• Policy simulation
Self Assessed Disability

$$SAD_{it} = D^*_t + \eta_{it}$$

$$SAD_{it} = \beta Z_{it} + \nu_i + u_{it}$$
Joint Estimation

\[ y_{it}^* = \gamma y_{it-1} + \beta X_{it} + \delta_0 SAD_{it} + \delta_1 SAD_{it-1} + \alpha_i + \epsilon_{it} \]

\[ SAD_{it} = \beta Z_{it} + \nu_i - u_{it} \]

\[ BVN(\sigma_1, \sigma_2, \rho) \]
2 Step instead

\[ SAD_{it} = \beta Z_{it} + \nu_i + u_{it} \]

\[ y^*_{it} = y y_{it-1} + \beta X_{it} + \delta_0 \overline{SAD}_{it} + \delta_1 \overline{SAD}_{it-1} + \alpha_i + \epsilon_{it} \]
Results

- Descriptive Stats
- Model estimates...
- Simulations...
Labour Force Participation

The chart illustrates the labour force participation rates for men and women, differentiated by disability status. The x-axis represents the age groups, ranging from 0 to 100, while the y-axis indicates the percentage of the population in the labour force.}

- Men: The participation rate for disabled men is approximately 70%, and for non-disabled men, it is around 90%.
- Women: The participation rate for disabled women is approximately 60%, and for non-disabled women, it is around 80%.
Other Differences

• Health
• Age
• Education
• Number of kids
• Immigration status
# Health

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th></th>
<th>WOMEN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DISABLED</td>
<td>NOT DISABLED</td>
<td>DISABLED</td>
<td>NOT DISABLED</td>
</tr>
<tr>
<td>HUI3</td>
<td>0.75</td>
<td>0.94</td>
<td>0.72</td>
<td>0.93</td>
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<tr>
<td>resp</td>
<td>0.11</td>
<td>0.06</td>
<td>0.17</td>
<td>0.07</td>
</tr>
<tr>
<td>arth</td>
<td>0.31</td>
<td>0.07</td>
<td>0.43</td>
<td>0.11</td>
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<tr>
<td>bapr</td>
<td>0.37</td>
<td>0.11</td>
<td>0.39</td>
<td>0.11</td>
</tr>
<tr>
<td>blpr</td>
<td>0.19</td>
<td>0.08</td>
<td>0.18</td>
<td>0.09</td>
</tr>
<tr>
<td>mig</td>
<td>0.09</td>
<td>0.04</td>
<td>0.23</td>
<td>0.13</td>
</tr>
<tr>
<td>diab</td>
<td>0.09</td>
<td>0.03</td>
<td>0.06</td>
<td>0.02</td>
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<tr>
<td>hecon</td>
<td>0.1</td>
<td>0.02</td>
<td>0.07</td>
<td>0.01</td>
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<td>cancer</td>
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<td>0</td>
<td>0.03</td>
<td>0.01</td>
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<tr>
<td>vipro</td>
<td>0.04</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
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<tr>
<td>othercond</td>
<td>0.12</td>
<td>0.2</td>
<td>0.12</td>
<td>0.21</td>
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<tr>
<td>BMI2034</td>
<td>0.12</td>
<td>0.07</td>
<td>0.25</td>
<td>0.2</td>
</tr>
</tbody>
</table>
No/little difference

• House size,
• home ownership(?)
• capital income
• marital status(?)
• state of residence
## State Dependence

**Disabled at t**

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled at t-1</td>
<td>70.51</td>
<td>70.24</td>
</tr>
</tbody>
</table>

**Labour Force Participant at t**

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF Participant at t-1</td>
<td>95.47</td>
<td>91.72</td>
</tr>
</tbody>
</table>
Disability over time & Labour Force

![Bar chart showing disability status over time for men and women.](chart.png)
Dynamics of Disability and Work

• Regression Results
  – Static vs Dynamic
  – Exogenous vs Endogenous Disability
<table>
<thead>
<tr>
<th>Variables</th>
<th>Men Dynamic</th>
<th>Men Static</th>
<th>Men Dynamic</th>
<th>Men Static</th>
<th>Women Dynamic</th>
<th>Women Static</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>1.347***</td>
<td>(0.0022)</td>
<td>1.347***</td>
<td>(0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial LF</td>
<td>0.726***</td>
<td>(0.0033)</td>
<td>0.707***</td>
<td>(0.0017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabled&lt;sub&gt;t&lt;/sub&gt;</td>
<td>-0.765***</td>
<td>(0.0018)</td>
<td>-1.003***</td>
<td>(0.0021)</td>
<td>-0.404***</td>
<td>-0.507***</td>
</tr>
<tr>
<td>Disabled&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.358***</td>
<td>(0.0018)</td>
<td>-0.692***</td>
<td>(0.0020)</td>
<td>-0.0950***</td>
<td>-0.315***</td>
</tr>
<tr>
<td>Age</td>
<td>2.357***</td>
<td>(0.0153)</td>
<td>4.095***</td>
<td>(0.0186)</td>
<td>1.857***</td>
<td>2.844***</td>
</tr>
<tr>
<td>Age&lt;sup&gt;2&lt;/sup&gt;</td>
<td>-0.275***</td>
<td>(0.0012)</td>
<td>-0.479***</td>
<td>(0.0012)</td>
<td>-0.315***</td>
<td>-0.497***</td>
</tr>
</tbody>
</table>

*** p < 0.01
### Labour Force Models – Endogenous Disability

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dynamic</td>
<td>Static</td>
<td>Dynamic</td>
<td>Static</td>
</tr>
<tr>
<td>$L_{F_{t-1}}$</td>
<td>$1.367^{***}$</td>
<td>(0.0016)</td>
<td>$1.232^{***}$</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>Initial LF</td>
<td>$0.869^{***}$</td>
<td>(0.0025)</td>
<td>$0.725^{***}$</td>
<td>(0.0013)</td>
</tr>
<tr>
<td>Disabled$_t$</td>
<td>$-0.284^{***}$</td>
<td>(0.0008)</td>
<td>$-0.185^{***}$</td>
<td>(0.0007)</td>
</tr>
<tr>
<td>Disabled$_{t-1}$</td>
<td>$-0.115^{***}$</td>
<td>(0.0009)</td>
<td>$-0.0732^{***}$</td>
<td>(0.0007)</td>
</tr>
<tr>
<td>Age</td>
<td>$1.858^{***}$</td>
<td>(0.0079)</td>
<td>$1.939^{***}$</td>
<td>(0.0057)</td>
</tr>
<tr>
<td>$Age^2$</td>
<td>$-0.270^{***}$</td>
<td>(0.0008)</td>
<td>$-0.271^{***}$</td>
<td>(0.0006)</td>
</tr>
</tbody>
</table>
Simulation

• Long run effect of temporary disability
• Setup:
  – average person
  – disabled at t = 1
  – temporary disability
LF Response after Temporary Disability - Men
LF Response after Temporary Disability - Women
LF Response after Temporary Disability – Men

Endogenous Disability

-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
-0.000
0.000
0 1 2 3 4 5 6 7

Dynamic
Static
LF Response after Temporary Disability – Men

Endogenous Disability

0 1 2 3 4 5 6 7

Dynamic
Static
Policy Simulation

• A policy with work incentives
  – Temporary disability
  – Permanent disability
Figure 2 Labour Force Response to a Temporary Disability

MEN

WOMEN

Change in LF Participation

variable

- No.Policy

- Policy

time
Figure 3 Labour Force Response to a Permanent Disability

MEN

WOMEN

Change in LF Participation

variable

- No.Policy

- Policy

0.00

-0.05

-0.10

0.00

-0.05

-0.10

0

2

4

6

8

10

time
Conclusions

- Disability is not permanent for most
- Current and past disability significant
- Labour force attachment important
- Lack of labour market exposure prolongs employment impact
- Work incentives may have positive impact
THANKS
Prevalence of Disability

Labour Force Participation

Source: Oguzoglu 2014, NPHS 1-8
Toll on Disability Support Programs

Source: Lankin & Sheikh (2012)
AVERAGE PARTIAL EFFECTS

• Static Models
AVERAGE PARTIAL EFFECTS

- Dynamic Models