Looking for Private Information in Self-Assessed Health

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Motivation

- A trend is currently observed away from defined benefit (DB) pensions and towards defined contribution (DC) pensions. This transition may alter worker's exposure to **longevity risk**

- Potential financial difficulties could be avoided by annuitizing wealth:
  - Individuals in DC pensions annuitize their pension wealth at retirement
  - Individuals in DB pensions effectively lock into an annuity when they join the firm

- Take-up of private annuities is surprisingly low. One reason could be that **adverse selection** makes such markets inefficient (Mitchell et al. 1997, Milevski 1998, Finkelstein et al. 2002 and 2004)

Motivation

- Traditionally, the presence of adverse selection is inferred from the prices or quantities in the annuity markets
- We follow the alternative, and complementary strategy of trying to determine directly whether individuals actually have private information about health and longevity
- Poterba (2001): mortality differences between annuitants and non-annuitants might arise if there were correlations between the characteristics of annuity purchasers and longevity

Motivation

- Annuitant purchasers need not be aware of these correlations
- For example, annuitants tend to be wealthy and have incomes; these factors are plausibly correlated both with annuity demand and with health and longevity
- Hence, while differences in the longevity of annuitants/non-annuitants establishes that there is selection into annuitant status, it does not establish that this selection arises because of individuals acting on private information

Motivation

- *Consider the following case*
  - Individuals **have more private information** about their health or expected longevity at **age 65** than at age 35
  - A switch from DB to DC pension arrangements takes place

The market for annuities at age 65 will suffer from more adverse selection than the market for annuities that are locked in at age 35, making it more difficult for individuals to insure longevity risk

(Brugiavini (1993) develops some of these ideas in a formal theoretical model)

- The presumption is that individuals have more private information about their health at older ages. Is this the case?

Research Objectives

- Does self-assessed health status (SAH) contain information about **future** mortality and morbidity, beyond the types of information that would typically be observable by a seller in an annuity or insurance market?

- To the extent that SAH does have predictive power for future health shocks, how does that predictive power vary with age?

Sneak Peek at the Results

- SAH is a predictor of future health conditions
- The effect of SAH increases with age
- Potential consequence of those findings:

  The market for annuities at older ages could suffer from more adverse selection than the market for annuities that are locked in at younger ages

Previous Studies

- Smith et al (2000), Hurd and McGarry (2002) use U.S. Health and Retirement Survey
  - health shocks and certain health conditions affect negatively the longevity expectations
  - subjective survival probabilities predict actual survival

- Mossey and Shapiro (1982), Okun et al (1984), McCallum (1994), Idler and Kasl (1995) find that self-rated health predicts survival and morbidity

- Idler and Benyamini (1997): globally, self-assessed health is an independent predictor of mortality

Previous Studies

- Burstrom and Fredlund (2001) use Swedish Survey of Living Conditions (SSLC) for the period from 1975 to 1997, linked to Sweden's National Causes of Death Statistics (NCDS)
  - Cox proportional hazards framework
  - Find that the **mortality rate ratios** for persons reporting **bad health** compared to individuals reporting good health are **high among younger ages** but exhibit a **declining trend with age**

- Van Doorslaer and Gerdtham (2003): SSCL conducted from 1980 through 1986, once again linked to the NCDS
  - Cox proportional hazards framework
  - Find that "*the effect of SAH on mortality risk* ***declines with age***"

Dataset

- Canadian National Population Health Survey (NPHS)
- NPHS is biennial and ongoing:
  - The first cycle collected data for 1994-95
  - The most recently released cycle, Cycle 5, contains data for 2002-03
- We utilize the health file in the household component of NPHS
  - Contains demographic, socio-economic and comprehensive health-related information about the longitudinal respondent

Sample

- We model mortality and morbidity between Cycles 1 and 5 as functions of Cycle 1 information

- Mortality modelling:
  - Sample size of 9004 respondents (4516 male and 4488 female), age 20 to 64 in Cycle 1
  - 340 are deceased by Cycle 5

- Morbidity modelling
  - Sample size of 7439 respondents (3326 males and 4113 females).

- We analyze males and females separately

Variable of Primary Interest

- **Self-assessed health** (SAH)
- Question:

  "In general, how would you describe your health?"

- Answers:

  "*Excellent*", "*Very Good*", "*Good*", "*Fair*" and "*Poor*"

Health Outcome Variables

- **Mortality**
  - Flags all deceased individuals in the period between Cycles 1 and 5
  - Deaths in the NPHS are confirmed against the Canadian Vital Statistic Database

- **Morbidity:** current prevalence

  Conditions that potentially increase the probability of death:
  - "Major" conditions
  - "Medium" conditions
  - "Activity restriction"

Health Outcome Variables

- Major condition:
  - Respondent has heart disease, cancer, and/or stroke (similar to the definition in Smith 1999)
- Medium condition:
  - Respondent has diabetes and/or hypertension (these are significant risk factors for major conditions)
- Activity restriction:
  - Respondent who because of a physical or mental condition or a health problem is limited (handicapped and/or long-term limited -- limited in the past 6 months) in the kind or amount of activity s/he can perform

Control Variables

- Pre-existing health conditions
  - Major, medium conditions and activity restrictions
  - Minor conditions (any health condition but major or medium)
- Risk factors
  - Body mass index and indicators of smoking and drinking
- Socio-economic and geographic characteristics
  - Age, household income, education, marital status, labour force status, mother tongue, region of residence in Canada

Estimation Strategy and Methodology

- Divide the data into different age groups:

  20-34, 35-49, 50-64

- Within each group, estimate econometric models of the form:

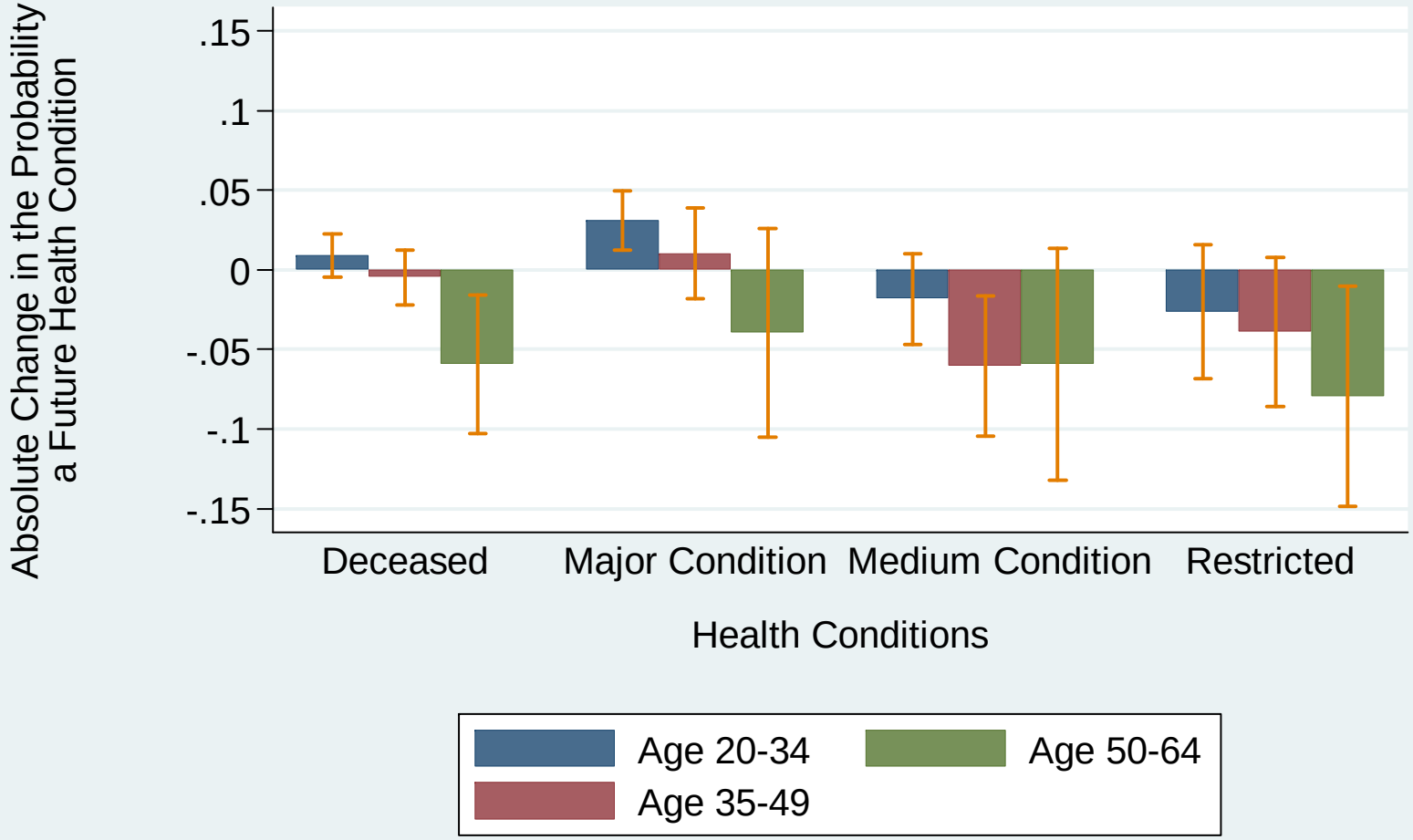
$$prob(y_{t+k}^{j} = 1) = f_A(SAH_t, Z_t, y_t^1, ..., y_t^j, ...y_t^J)$$

- To determine whether private information about health accumulates with age, we compare estimates of the effect of SAH in models of this type estimated for different age groups

RESULTS

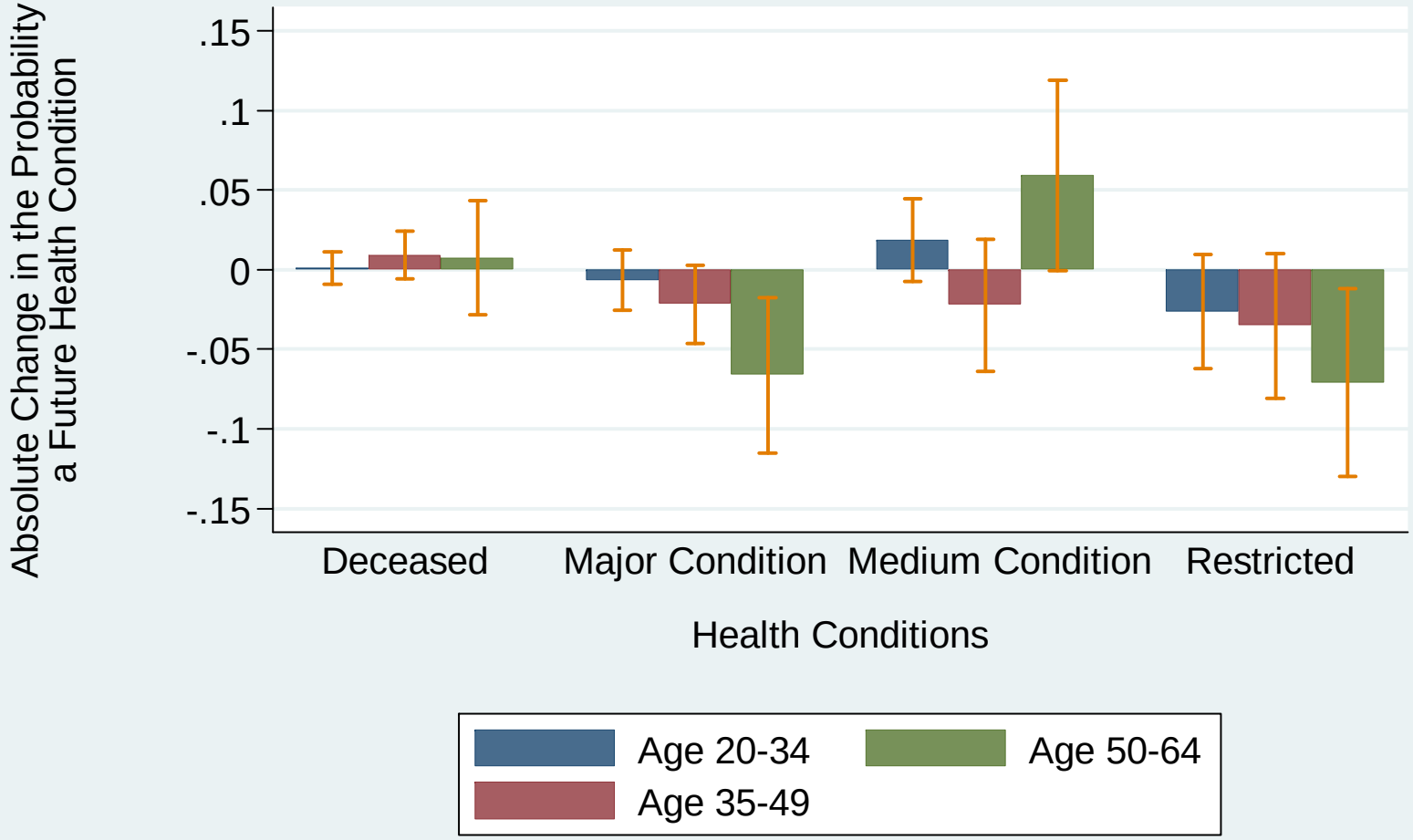
Marginal Effects of Excellent/Very Good SAH

by Age Groups and Health Conditions, Male Sample



Marginal Effects of Excellent/Very Good SAH

by Age Groups and Health Conditions, Female Sample



Results Revisited

- SAH is a predictor for future health conditions
- SAH contains private information which increases with age
- Consequences

  The market for annuities at older ages could potentially suffer from more adverse selection than the market for annuities that are locked in at younger ages

Further Directions

- Economic importance of our findings
- Do changes in SAH predict future diagnoses, and how does that relationship varies with age?
- What leads to innovations in SAH? Is it changes in socioeconomic variables, diagnosed conditions and/or other individual or social factors?