Activities of Daily Living (ADLs)

1. Walking: getting around the home or outside
2.

Instrumental ADLs (IADLs)

Who May Need LTC?

1. Age: LTC risk tends to increase with age
2. Gender: Women are at higher risk than men because they tend to outlive their partners
3. Marital status: Single people are more likely than married people to need PAID care
4. Lifestyle. Poor diet and poor exercise habits can increase LTC risk
5. Health and family history also a ect LTC risk

Model Assumptions: Quality of Care

1. LTC providers o er services of di ering quality
2. Quality is captured by a publicly known parameter
3. Higher values of denote better \quality" of service
4. A 5-star rating system (like hotels) exists, i.e., 1 5
5. Average quality is = 3
6. Retirees stick with a type- LTC care provider in all states
7. Higher quality , higher costs
8. No moral hazard issues

Types of Retirees

1. Retirees range from very healthy to very sick
2. Each retiree has a hidden health parameter, > 0
3. High risk retirees have low values of and are in good health
4. Low risk retirees have high values of and are in poor health
5. Retirees experience random health shocks
6. Retirees morbidity and mortality follow multi-state Markov process

1. Assume retiree type and quality of care a ect transition intensities.
2. $^{ij}_{[x]+t}$ = standard force of transition from state i to state j
3. Suppose we are given a xed quality of care   in LTC market, then retirees with higher levels of   (i.e., less healthy individuals):
    1. More likely to transition a higher level of care (to get sicker); and
    2. Less likely to transition a lower level of care (i.e., to get better)

   than retirees with lower levels of   (i.e., healthier individuals), i.e.,

$$\frac{@}{@}\ {}^{ij}_{[x]+t}(\ ;\ ) \begin{cases} \ \ 0 & \text{for } i = 1;2;\dots;7 \text{ and } j \quad i+1 \\ \ \ 0 & \text{for } i = 2;\dots;7 \text{ and } j \quad i \quad 1 \\ \text{unde ned} & \text{for } i = j; i = 1;2;\dots;7 \end{cases} \quad (1)$$

A Key Innovation: Quality of Care

1. Given a retiree type
2. Clients of LTC providers with higher levels of

1. Occupancy probabilities ${}_t p^{\overline{ii}}_{[x]+s}(\; ; \;)$ are given by:

$$ {}_t p^{\overline{ii}}_{[x]+s}(\; ; \;) = \exp \int_0^t {}^{i}_{[x]+s+r}(\; ; \;) dr \tag{8} $$

$$ \frac{d}{dt} {}_t p^{ij}_{[x]+s}(\; ; \;) = \sum_{\substack{k=1 \\ k \neq j}}^{8} {}_t p^{ij}_{[x]+s}(\; ; \;) \; {}^{ij}_{[x]+t+s}(\; ; \;) $$

$$ {}_t p^{ij}_{[x]+s}(\; ; \;) \; {}^{j}_{[x]+t+s}(\; ; \;) \tag{9} $$

for $i, j \in \{1, 2, 3, 4, 5, 6, 7, 8\}$.

Key Equations for Health and Longevity

$$ {}^{ikj}_{[x]}(s;t;\ ;\ ) = {}_{t-s}p^{ik}_{[x]}(\ ;\ )\ {}^{kj}_{[x]+t-s}(\ ;\ )\ {}_{s}p^{\overline{jj}}_{[x]+t-s}(\ ;\ ) \quad (10)$$

$$ e_i^{(j)}(x;\ ;\ ) = \int_0^{1} {}_t p^{ij}_{[x]}(\ ;\ )dt \quad (11)$$

$$ e_i^{(j8)}(x;\ ;\ ) = \int_0^{1}\int_0^{1} \sum_{\substack{k=1\\ k\neq j}}^{7} s\ {}^{ikj}_{[x]}(s;t;\ ;\ )\ {}^{j8}_{[x]+t}(\ ;\ )ds\,dt \quad (12)$$

$$ p^{ij8}_{[x]}(\ ;\ ) = \int_0^{1} {}_t p^{ij}_{[x]}(\ ;\ )\ {}^{j8}_{[x]+t}(\ ;\ )dt. \quad (13)$$

1. $e_i^{(j)}$ = Expected time spent in state j, $e^{(j8)}$ = Expected time spent in state j just before death, and $p^{ij8}_{[x]}$ = Probability of dying in state j.

Transition Intensities (Rates) Used

1. Robinson (1996, Table 3) rates are for females age 75-85.
2. Robinson's rates used to de ne $^{ij}_{[65]+t}$ in Table 1 below:

Table 1: Constant Transition Intensities (Rates) $^{ij}_{[65]+t}$ for t 0

	State j
i	

Table 2: Complete Expectation of Life Starting in State 1, $e_1(65; \; ; \;)$ for Di erent Values of and

	= 1	= 2	= 3	= 4	= 5	= 6
1.0	18.806	8.554	5.630	4.222	3.378	2.815
2.0	21.239	9.336	6.100	4.548	3.630	3.025
3.0	24.804	10.394	6.724	4.996	3.981	3.311
4.0	29.841	11.880	7.580	5.605	4.456	3.702
5.0	36.443	13.994	8.767	6.439	5.103	4.233
Quality	17.637	5.440	3.137	2.217	1.725	1.418
% Change	0.938	0.636	0.557	0.525	0.511	0.504

Notes: Quality = $e_1(65; 5; \;)$ $e_1(65; 1; \;)$

Notes: % Quality = Quality $= e_1(65; 1; \;)$

Figure: Life Expectancies in Years, $e_1(65; \; ; \;)$

Figure:

Figure: Probability of Dying in State j, $p^{j8}_{[65]}(\; ; \quad)$