Eliciting preferences for long-term care insurance in Thailand: a discrete choice experiment

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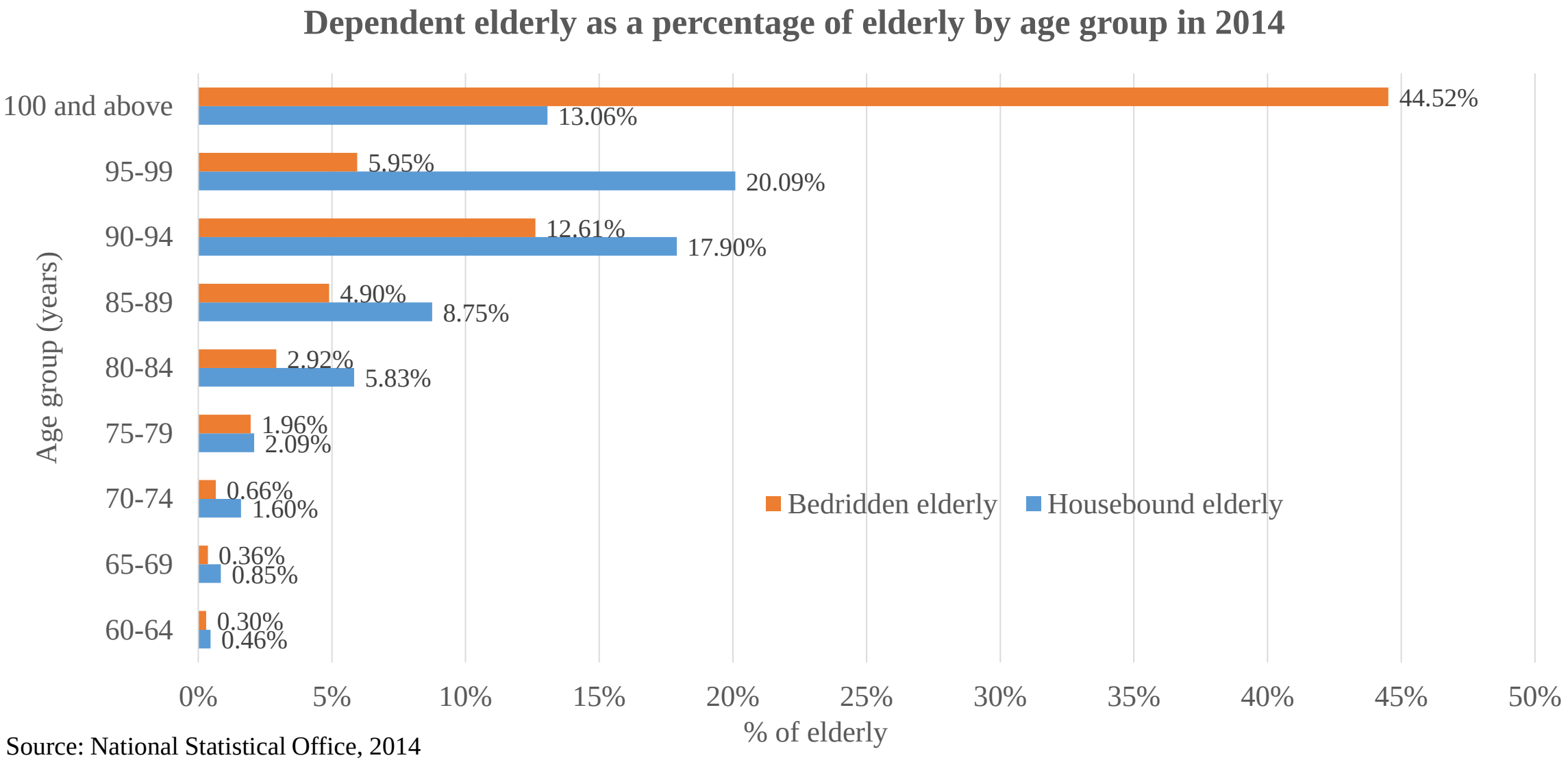
Dependent elderly as a percentage of elderly by age group



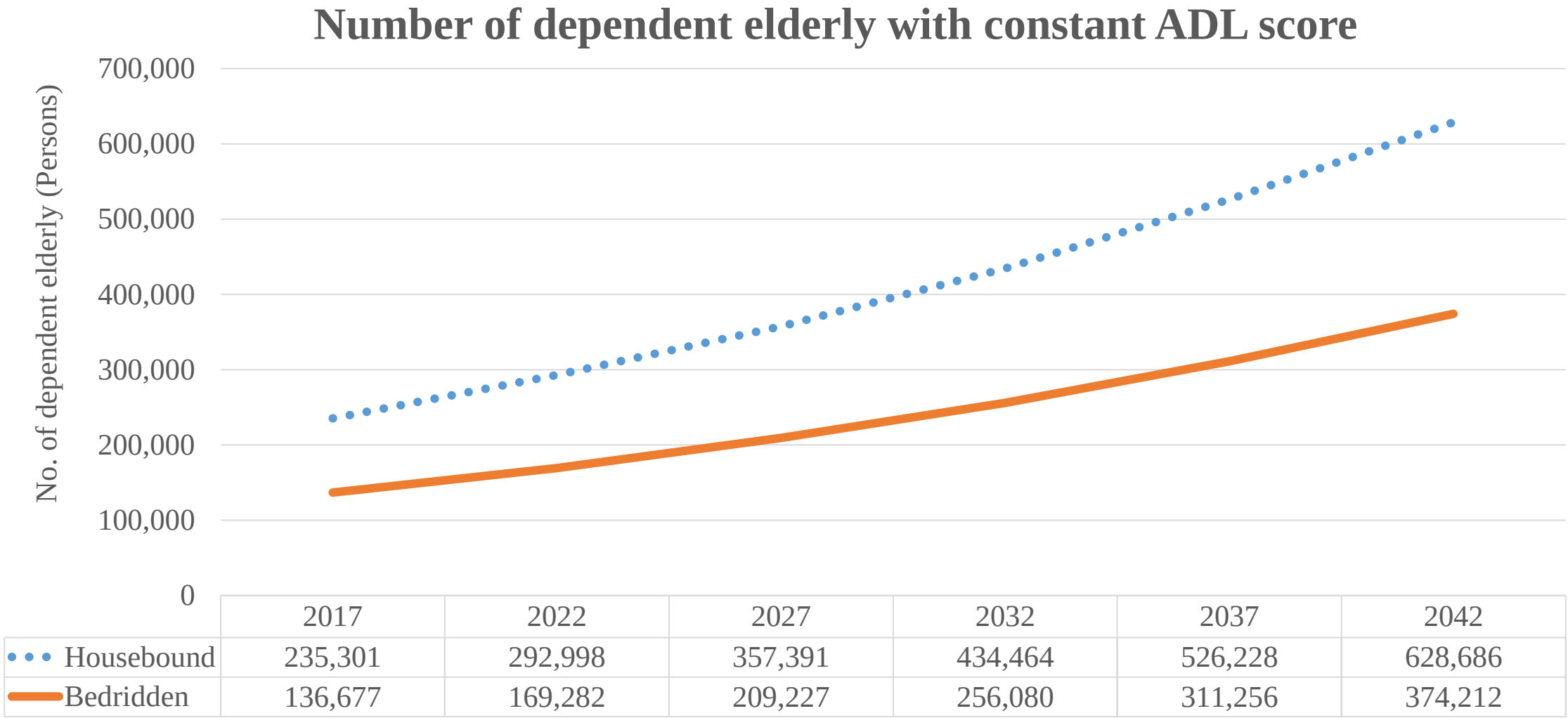
Source: National Statistical Office, 2014

Dependent elderly and relationship with caregiver

Relationship with caregiver	Male		Female	
	Bedridden	Housebound	Bedridden	Housebound
No caregiver (self-care)	5%	17%	7%	21%
Spouse	41%	38%	7%	7%
Son	5%	10%	7%	12%
Daughter	31%	25%	50%	44%
Son or daughter in law	7%	5%	8%	5%
Grandchildren	2%	2%	4%	3%
Relatives	5%	3%	9%	5%
Paid caregiver	3%	0%	5%	3%
Others	2%	0%	3%	1%
Total	100%	100%	100%	100%

Source: National Statistical Office, 2014

Estimated number of dependent elderly



	2017	2022	2027	2032	2037	2042
Housebound	235,301	292,998	357,391	434,464	526,228	628,686
Bedridden	136,677	169,282	209,227	256,080	311,256	374,212

Source: Chandoevwit and Vajragupta, 2017

Motivation & Objective

Motivation

- Increasing number of dependent elderly. Some are left uncared for.
- Women are informal caregivers.
- Job opportunities for women have improved.
- Demographic transition makes it more difficult to rely on informal caregivers.

Objectives

- To elicit the preferences for LTCI in Thailand using a discrete choice experiment.
- To estimate the willingness to pay for LTCI.

Attribute in DCE

- 3-focus group discussion with care manager, volunteer caregiver, working-age and old-age population
- Costs of care are from a research (Chandoevwit and Vajragupta, 2017).

Attribute	Level
Provide home care products and assisted devices	Yes / No
Provide care manager visit: a) once a month for housebound elderly b) twice a month for bedridden elderly	Yes / No
Government shares some percentage of the caregiver cost	0 / 25% / 50%
Provide daycare service for the elderly	Yes / No
Annual premium (Thai Baht per year)	300 / 500 / 1000 / 2000

Discrete Choice Experiment: DCE

Choice set in DCE

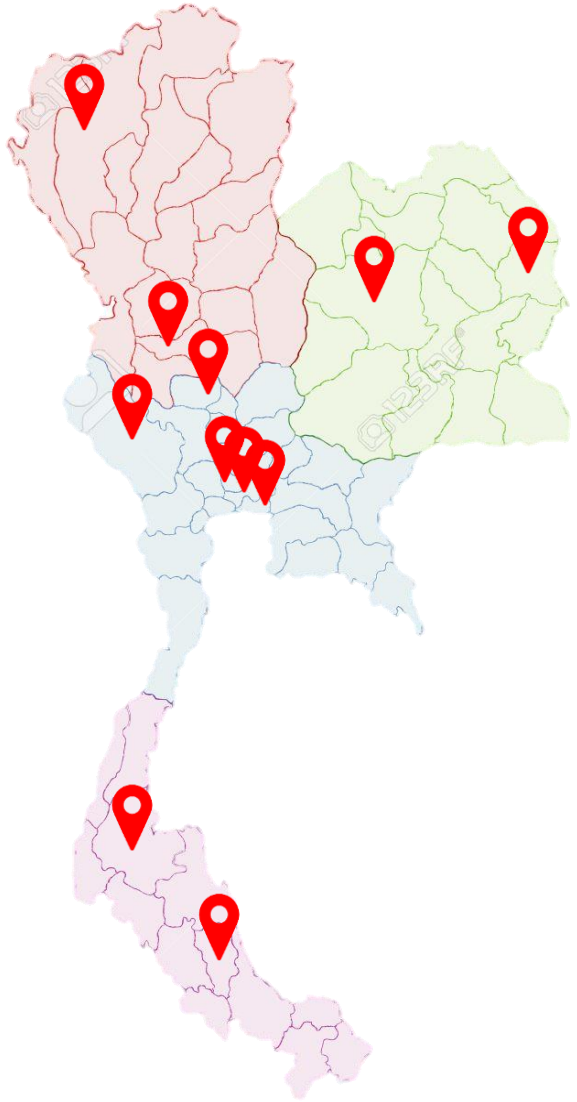
- There are 96 possible alternatives.
- There are 2 sets of questions: A and B.
- Each question set contains 16 choices, which divided into 8 choice sets, using D-efficient design (Charlsson and Martinsson, 2003).
- Each respondent was asked to choose from 8 choice set.
- Each choice set has 3 alternatives (1, 2, and status quo).

Example of a choice Set

ชุดคำถาม A2

คุณลักษณะ	ทางเลือก 1	ทางเลือก 2	ทางเลือก 3
วัสดุและอุปกรณ์ที่จำเป็น 	ไม่มี	มี	ไม่เลือก ทั้ง 1 และ 2
ทีมบุคลากรสาธารณสุขเยี่ยมบ้านให้คำแนะนำติดตามสุขภาพ 1 ครั้ง/เดือนสำหรับผู้สูงอายุติดบ้าน 2 ครั้ง/เดือนสำหรับผู้สูงอายุติดเตียง	มี	ไม่มี	
รัฐช่วยจ่ายบางส่วนของค่าผู้ดูแล	0 บาท	25% ของค่าผู้ดูแล หรือ 20,250 บาท/ปี กรณีติดบ้าน 45,000 บาท/ปี กรณีติดเตียง	
บริการด้านสังคมในศูนย์ดูแลผู้สูงอายุ 	ไม่มี	มี	
เบี้ยประกัน	1,000 บาท ต่อปี	2,000 บาท ต่อปี	
ดิฉัน/ผม เลือก	☐	☐	☐

Study sample



- Sampling frame from Thailand National Statistic Office
- 5 areas/regions:
  - Bangkok, Nonthaburi and Samut Prakarn
  - Chiang Mai and Nakhonsawan
  - Khon Kaen and Mukdaharn
  - Kanchanaburi and Chainat
  - Surat Thani and Pattalung
- Use Three-stage stratified random sampling method
  - Districts
  - Enumeration areas
  - Households
- 2,021 samples in 43 enumeration areas are interviewed during October-December 2017.

Sample characteristics

Socio-economic characteristics	N	%	Population %*
Total	2,021	100	100
Gender			
Female	1,366	67.59	47.48
Male	655	32.41	52.52
Age			
25-35 years old	496	24.54	25.34
36-45 years old	554	27.41	29.78
46-60 years old	971	48.05	44.87
Education			
Primary or lower	871	43.10	50.07
Lower secondary	329	16.28	14.40
Upper secondary	343	16.97	11.72
Diploma / vocational	109	5.39	3.66
University degree	369	18.25	20.15

Source: * National Statistical Office, 2015

Socio-economic characteristics	N	%	Population %*
Sector of employment			
No job	207	10.24	11.37
Agriculture	744	36.81	28.33
Manufacturing	109	5.39	21.02
Services	961	47.55	39.27
Land ownership > 500,000 Baht	606	29.99	37.26
Household with dependent elderly	88	4.35	n.a.

	Mean (SD)	Mean (SD)*
Household size	3.88 (1.70)	3.09 (1.54)
Household annual income (THB)	260,183 (274,007)	239,472 (209,516)
Household annual income (USD)	7,596 (8,000)	6,991 (6,117)

Econometric approach

- An econometric approach based on characteristic theory of value (Lancaster, 1966) and random utility theory (McFadden, 1974).
- An individual's utility function has two parts: a deterministic, V_{ijs} , and a random component, ε_{ijs}.

$$U_{ijs} = V_{ijs} + \varepsilon_{ijs} \qquad (1)$$

- Individual i chooses alternative j if it provides the highest utility in comparison with all other alternatives in the choice set s.

$$P_{ijs} = Prob\left(U_{ijs} - U_{iks} > 0\right) \forall k \neq j \qquad (2)$$

- The random component (ε_{ijs}) is assumed to be independent and identical distribution (IID) with Type 1 extreme-value (Gumbel) distribution.

$$P_{ijs} = \frac{\exp(\lambda V_{ijs})}{\sum_k^J \exp(\lambda V_{iks})} \qquad (3)$$

where λ is the scale parameter (inverse of the standard deviation of the error term).

Econometric approach: Preference space

- Estimate Equation (3) using conditional logit (CL) where λ is normalized to unity. Test IIA property using Hausman-McFadden test.
- Estimate Equation (3) using nested logit (NL). Reject the IIA property, if $\lambda \neq 1$.

Econometric approach: WTP space

- Assume a linear specification of the observable indirect utility function (V_{ijs}), Equation (1).

$$U_{ijs} = \alpha_i p_{ijs} + \beta_i' x_{ijs} + \varepsilon_{ijs} \qquad (4)$$

where p_{ijs} is a proxy of price, x_{ijs} is non-monetary attributes of alternative *j*, and α_i and β_i are individual-specific coefficients for price and other attributes.

- An individual's WTP for a unit change in a given attribute = $\beta_i / |\alpha_i|$
- WTP can be estimated directly by re-formulating Equation (4).

- We assume that ε_{ijs} can be different across individual, where $\mathrm{Var}(\varepsilon_{ijs}) = \lambda_i^2 \pi^2 / 6$ (Train and Weeks, 2005).

Econometric approach: WTP space

- Equation (4) divided by an individual-specific scale parameter, λ_i. This does not affect behavior, but results in a new error term with fixed variance (Train and Weeks, 2005).

$$U_{ijs} = \frac{\alpha_i}{\lambda_i} p_{ijs} + \left(\frac{\beta_i}{\lambda_i}\right)' x_{ijs} + \varepsilon_{ijs} \qquad (5)$$

where ε_{ijs} is IID type one extreme value with variance $\pi^2/6$.

$$U_{ijs} = b_i p_{ijs} + c_i' x_{ijs} + \varepsilon_{ijs} \qquad (6)$$

- Equation (6) is a model in preference space.
- Using the ratio of attribute parameter to the parameter on price, utility can be rewritten as

$$U_{ijs} = b_i p_{ijs} + (b_i \gamma_i)' x_{ijs} + \varepsilon_{ijs} \qquad (7)$$

where $\gamma_i = \frac{c_i}{b_i}$

Train and week (2005) called Equation (7) utility in WTP space.

Econometric approach: WTP space

- Given an exponential transformation of the scale parameter, the coefficient for price is a log-normal distribution.
- Defining the parameter γ_i as the normal distribution, the WTPs were derived using a generalized multinomial logit model (G-MNL-II) defined in Fiebig et al. (2010).
- The model captured both taste heterogeneity and scale heterogeneity.
- In this study, we assumed no correlation between coefficients and estimated parameter using maximum simulated likelihood (Gu et al., 2013).

Results

	Conditional Logit		Nested Logit		Generalized Multinomial Logit	
	Coefficient	Std.err	Coefficient	Std.err	Coefficient	Std.err
Mean						
Material	1.0907**	0.0197	1.2655**	0.0667	10.9769**	0.3261
CM_Visit	0.7419**	0.0185	0.8579**	0.0471	8.5136**	0.2923
CG_Subsidy	1.8645**	0.0542	2.1383**	0.1154	20.1864**	0.7688
Daycare	0.3499**	0.0185	0.4120**	0.0313	3.1715**	0.1903
Premium[1]	-0.0867**	0.0024	-0.0992**	0.0052	-1.5721**	0.0380
SD						
Material					11.1982**	0.3494
CM_Visit					-9.4300**	0.3207
CG_Subsidy					-27.8241**	0.9070
Daycare					-4.6619**	0.2455
Premium						
Constant1			(base)			
Constant2			-0.0445	0.0246		
Constant3			0.2616*	0.1028		
Hausman test	47.45**					
dissimilarity parameters Tau			1.1899**	0.0668		
LR test for IIA: tau=1 Chi square			8.64**			
N	48456		48456		48456	
AIC	28985.71		28982.89		23457.29	
BIC	29029.65		29061.99		23545.17	

Note: Level of significance: * p<0.05 ** p<0.01 [1]Unit: 100 THB per year.

Mean WTP by model specification

	CL[1]		NL[1]		G-MNL	
	WTP	95% CI	WTP	95% CI	WTP	95% CI
Material	1258	1201-1318	1276	1201-1352	1098	1034-1162
CM_Visit	856	807-910	865	805-932	851	794-909
CG_Subsidy	2150	2035-2278	2156	1999-2328	2019	1868-2169
Daycare	403	362-445	415	363-468	317	280-354

Note: [1] using the Krinsky-Robb (parametric bootstrap) method. The lower and upper limits of a 95% confidence interval are given by the 26th and 97.5th sorted estimates of WTP (Lancsar et al., 2017)

Mean WTP by age group, area, income and physical activity

	Material	CM_Visit	CG_Subsidy	Daycare
By age group				
Age 20-35	1,247	1,039	2,167	398
Age 36-45	1,222	988	2,167	284
Age 46-60	966	721	1,996	299
By area				
Urban	1,110	888	2,150	321
Rural	1,100	827	1,934	313
By income level				
Low	1,024	724	2,202	339
High	1,246	970	1,870	341
By exercise (having an exercise for at least 30 minutes last week)				
Yes	668	711	1,927	228
No	1,502	993	2,265	422

Discussion and conclusion

- Thai people were willing to pay for public provision of the LTCI program.
- The population weighted their preferences differently to the attributes of the LTC services.
- However, universality and comprehensive coverage was the key success for public LTCI (Yong and Saito, 2012).
- We recommend that public provision of a LTCI program be universal and a unified premium rate, not exceed 4000 THB per year, be charged among the working-age population.

Thank you for your attention