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Demographic Change and Consumption Pattern in Thailand

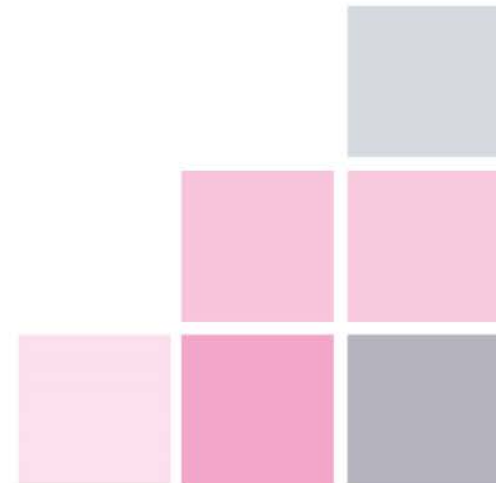**INFORUM World Conference 22th, Alexandria VA September 2014**

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Thailand

Outline

1. **Background: Aging Society in Thailand**

2. **Data: The Socio-Economic Survey (SES)**

3. **Estimation: Demographic Factors**

4. **Results**

5. **Further Works**
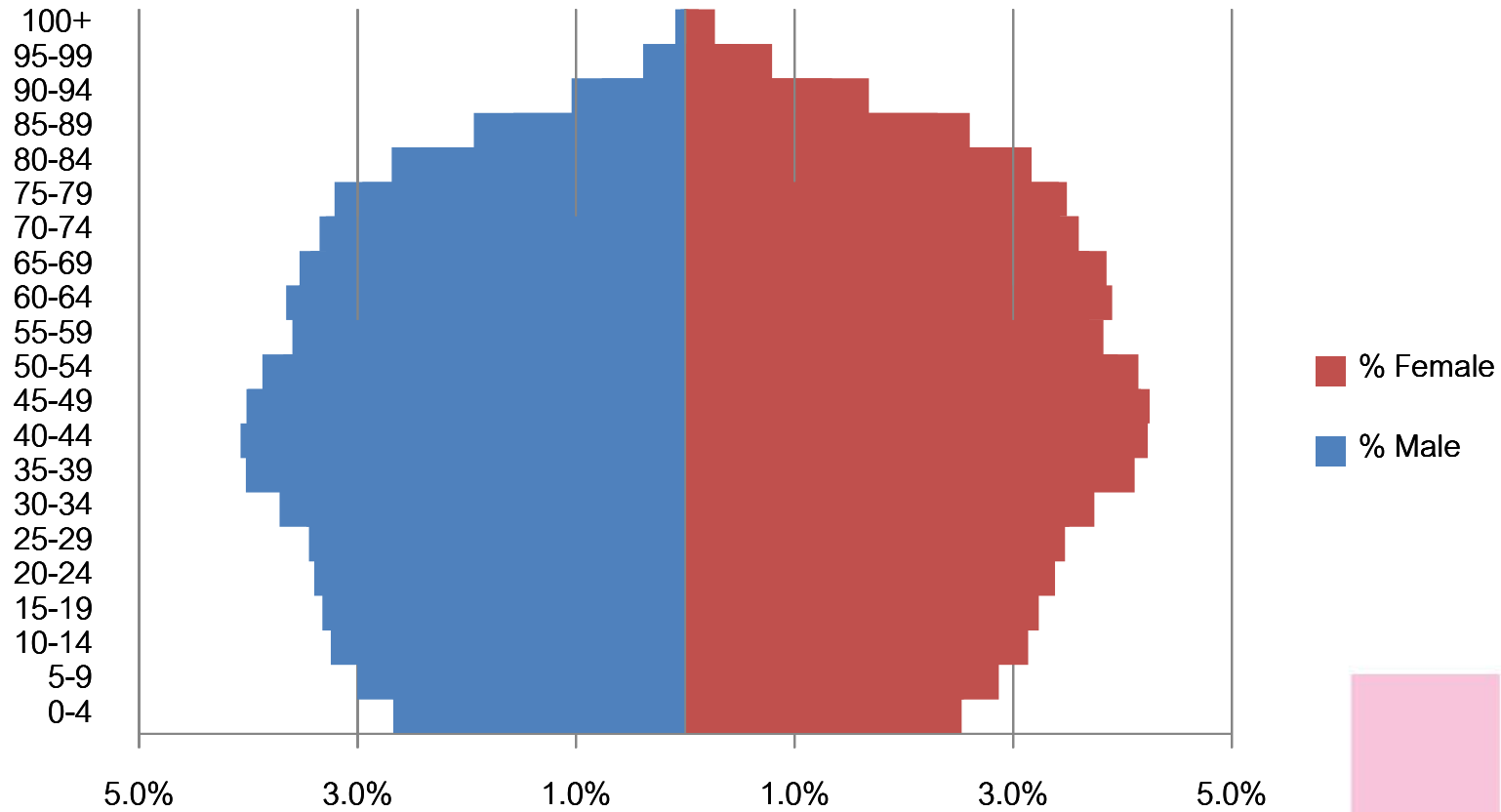
Aging Society in Thailand

- **Thailand has now become the economy that consists of elderly people more than 10 percent since 2004.**

- **This situation is projected to be '*continuing*'.**

- **The study of the 'Aging Society' and its impacts on the Thai economy is very important for policymakers.**

- **In fact, the problem is very *severe*. Thailand ages very quickly.**

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2020

% Female

% Male
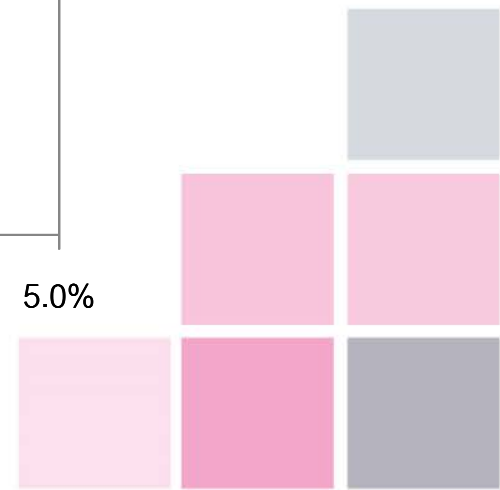
Aging Society in Thailand

■ **Reasons behind this:**

– **Very successful family planning in Thailand:**

- **During 1972 – 1995, population growth rate fell from 3.3 to 1.2 percent**

- **Average number of children per woman declined from 5.8 to 2.2**

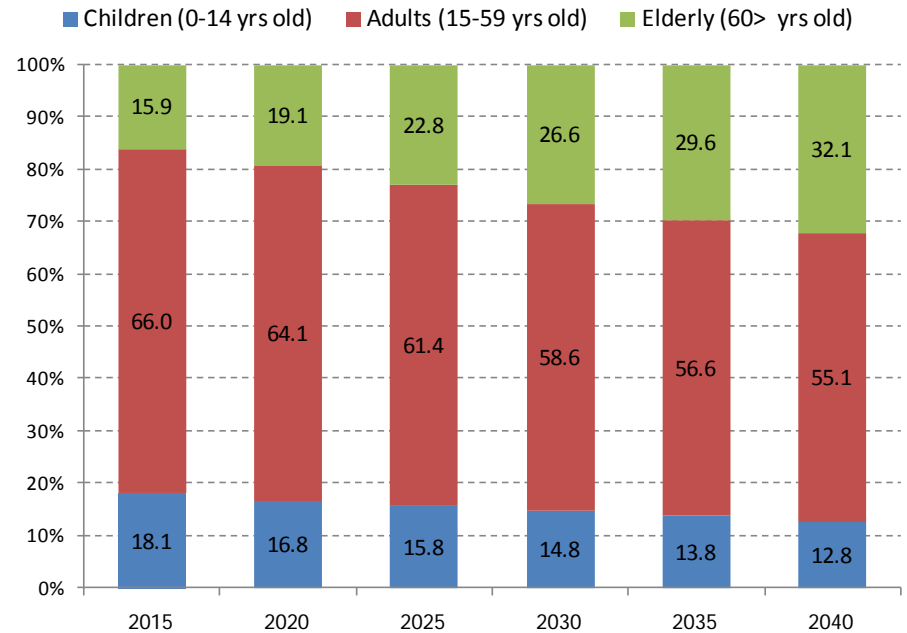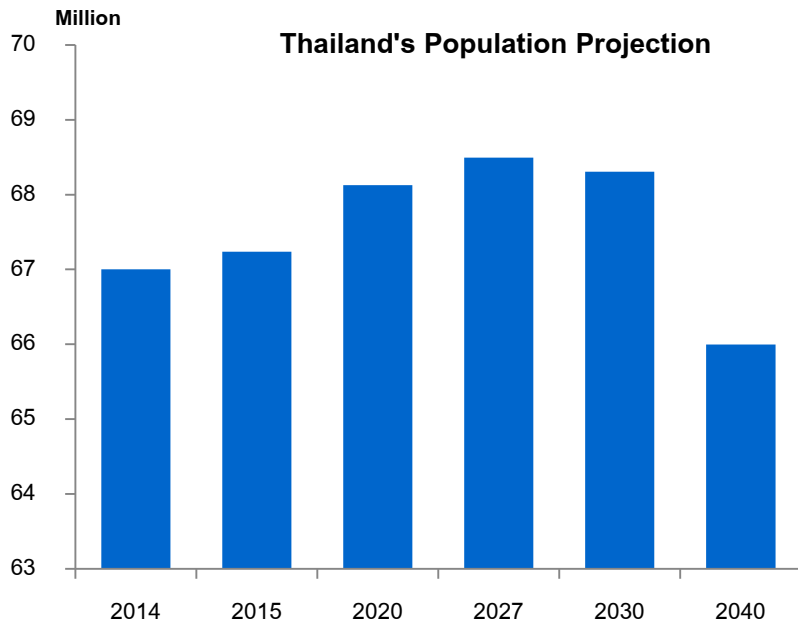– **Universal Coverage (UC) in Thailand since 2001:**

- **For male, life expectancy increases from 67 to 71 during 2000 – 2012**

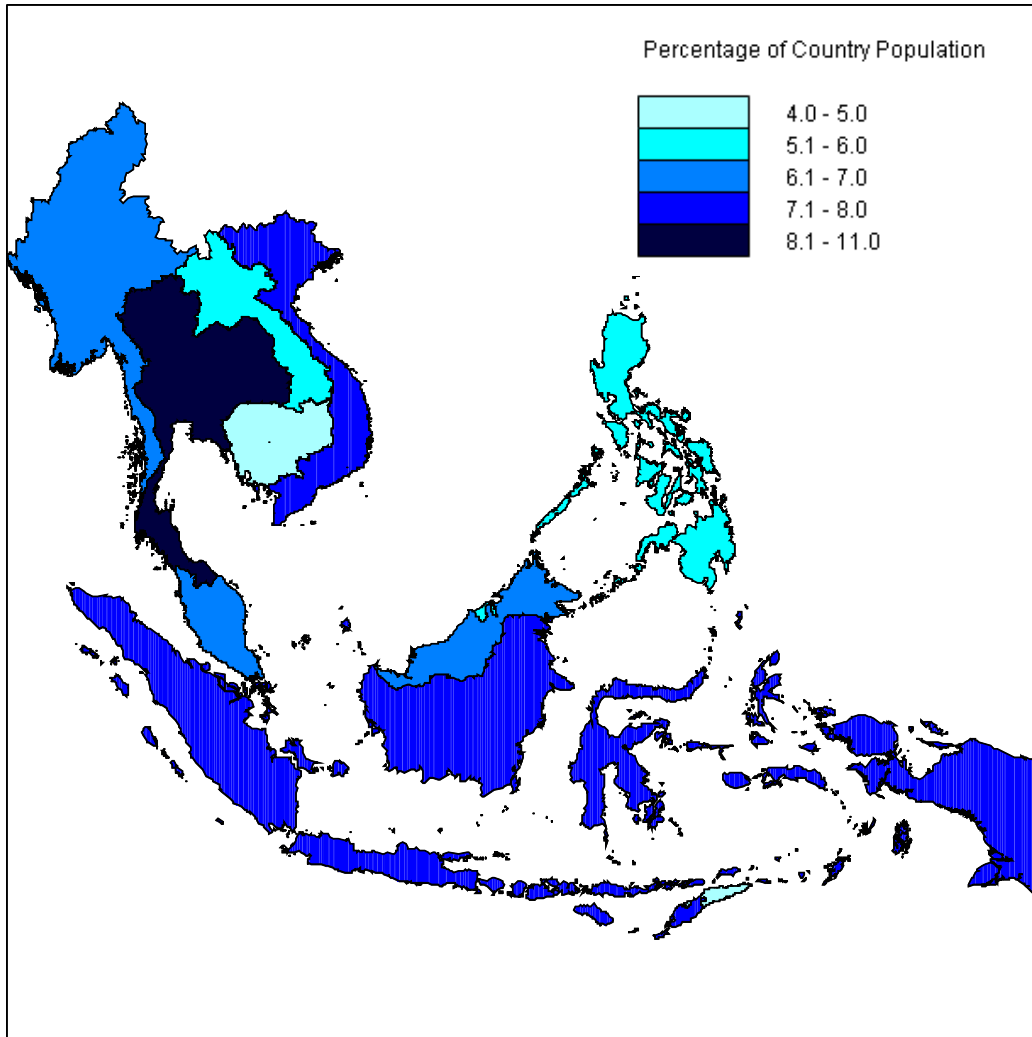- **For female, life expectancy increases from 75 to 78 during 2000 – 2012**

Aging Society in Thailand

- **It has been projected that Thai population will actually start to '*decline*' in 2027. Population in 2040 will be just below now.**

Thailand's Population Projection (Million)

Children (0-14 yrs old) | Adults (15-59 yrs old) | Elderly (60> yrs old)

Sources: NESDB

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Percentage of Country Population

- 4.0 - 5.0
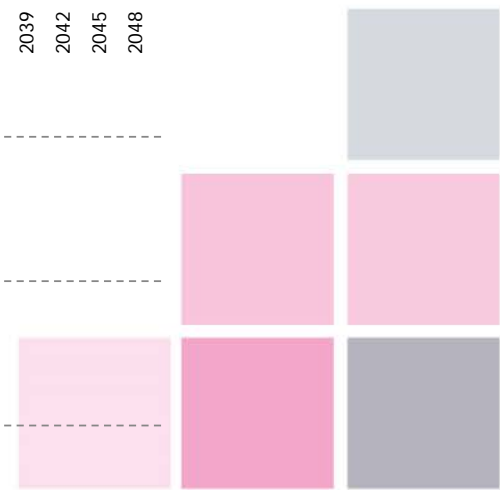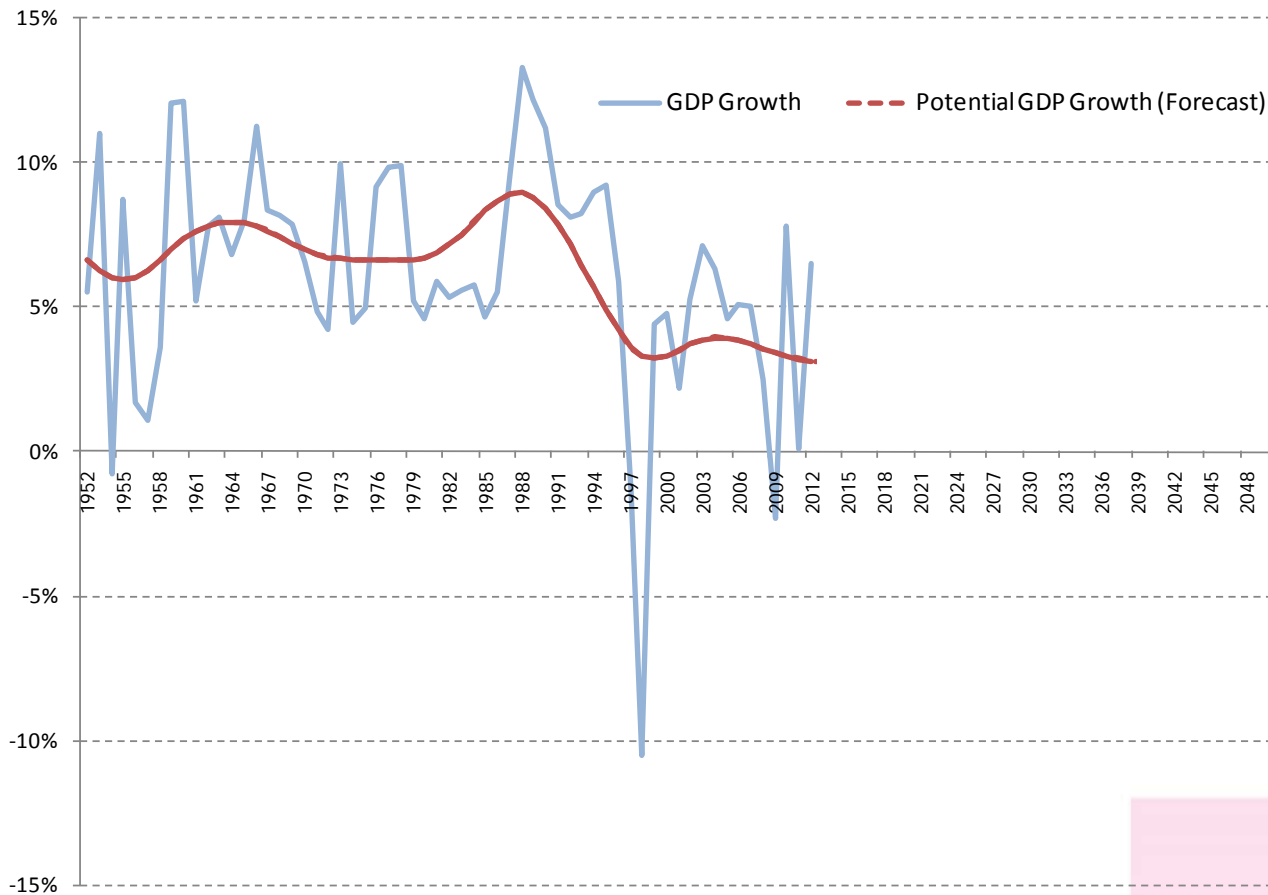- 5.1 - 6.0
- 6.1 - 7.0
- 7.1 - 8.0
- 8.1 - 11.0

- Number of aging population in SE Asia:

  2002 = 39.5 mil. people

  2050 = 175.8 mil. people

- Proportion of aging population in SE Asia:

  2002 = 7%

  2050 = 22%

- Map shows proportion of aging population in 2000

Consequences of Aging Economy in Thailand
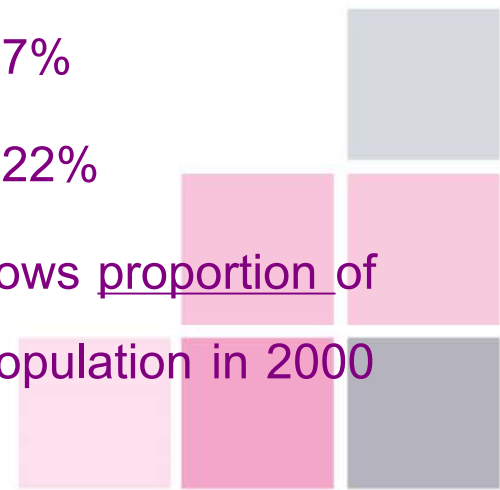
Sources: NESDB, Ariyasajakorn and

Consequences of Aging Economy in Thailand

- **Studies suggest that aging society in Thailand may cut down its long-run potential growth as much as 1.0 – 1.6% per year**

  - **Ariyasajjakorn and Manprasert (2013), and Bisonyabut (2013)**

- **The problem: we are getting old before getting rich.**

  - **Thailand became aging economy before advancing to developed country**

  - **Lack of factors of production and not yet advance in technological progress might lead Thailand fall into '*middle income trap*'**

- **Policy suggestion involves retirement extension, increase investment, improve human capital, enhance technology**

  - **Labor productivity must increase around 30% in order to maintain current growth**

  - **Retirement extension merely delays (10 years) problem, but sustainable growth only achieved by technology improvement**

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Interindustry Model and the Objective of this Paper

- **Interindustry framework**

  - **Supply side: changes in population structure, labor forces, pattern of production and sectoral activities**

  - **Demand side: changes in consumption pattern**

  - **International trade**

- **TIDY Model (Thai Interindustry DYnamic Model)**

  - **26x26 sectors with Thailand's input-output tables until 2000**

  - **INTERDYME with optimization**

- **The objective of this paper is to focus on the biggest demand component: private consumption, where taking into account population and demographic effects**

  - **Follow works by Bardazzi and Barnabani (2001), Bardazzi (2002), and Ding (2006)**

Data: The Socio-Economic Survey (SES)

- **The SES is a cross-section survey of household data conducted by Thailand's National Statistical Office (NSO).**

  - **Every other year during 1986 – 2006**

  - **Every year from 2007**

- **The data have rich information on household socio-economic data**

  - **sources of income**

  - **consumption by categories**

 - **other household characteristics such as type of residence, area of residence, characteristics of household member**
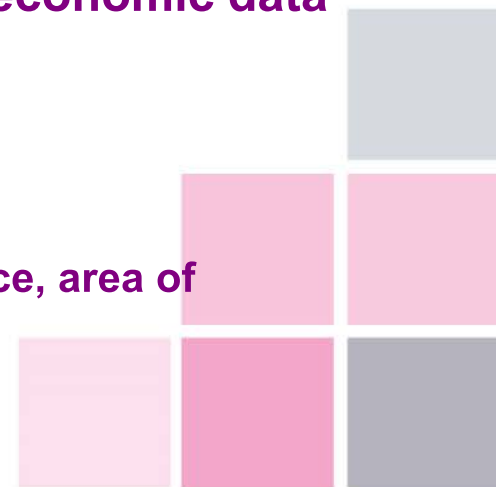
The Socio-Economic Survey (SES) 2011

Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bangkok	1965050	9.8	9.8	9.8
	Central	4907932	24.6	24.6	34.4
	North	3929871	19.7	19.7	54.1
	Northeast	6469751	32.4	32.4	86.5
	South	2699825	13.5	13.5	100.0
	Total	19972430	100.0	100.0	

Family Size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2758822	13.8	13.8	13.8
	2	5060259	25.3	25.3	39.1
	3	4690465	23.5	23.5	62.6
	4	3714999	18.6	18.6	81.2
	5	2102423	10.5	10.5	91.8
	6	1030309	5.2	5.2	96.9
	7	421271	2.1	2.1	99.0
	8	114655	.6	.6	99.6
	9	50227	.3	.3	99.9
	10	14720	.1	.1	99.9
	11	7850	.0	.0	100.0
	12	4490	.0	.0	100.0
	13	1080	.0	.0	100.0
	15	860	.0	.0	100.0
	Total	19972430	100.0	100.0	

Age of Household Head

Cases weighted by A52
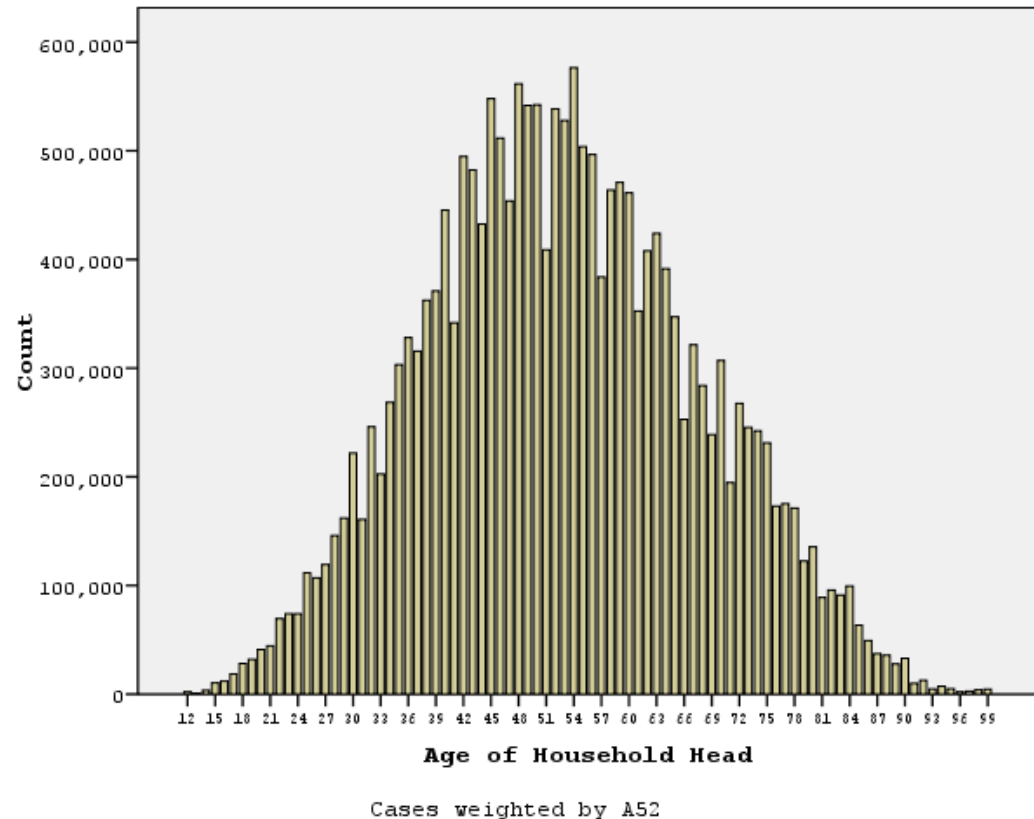
The Socio-Economic Survey (SES) 2011

	Major Category	Consumption by Region					
		Bangkok	South	Central	Northeast	North	Thailand
1	Food	5.7%	11.2%	10.6%	12.3%	12.3%	10.4%
2	Beverages	0.5%	0.8%	1.1%	0.8%	0.9%	0.8%
3	Tobacco	0.1%	0.3%	0.3%	0.2%	0.2%	0.2%
4	Cloth & Footwear	6.0%	7.4%	5.8%	5.8%	6.2%	6.2%
5	House and Utilities	23.5%	17.4%	19.4%	15.2%	15.5%	18.3%
6	Education	4.7%	2.2%	2.5%	1.9%	2.4%	2.7%
7	Health	8.5%	7.2%	7.5%	7.5%	8.1%	7.7%
8	Transportation & Communication	35.2%	41.7%	38.0%	41.0%	38.5%	38.9%
9	Recreation	9.3%	6.3%	8.2%	5.8%	6.8%	7.3%
10	Others	6.5%	5.6%	6.7%	9.4%	9.0%	7.5%
	Total Consumption Baht/Month	17,628	10,463	9,422	6,792	6,605	8,963

The Socio-Economic Survey (SES) 2011

Average Consumption per Person by Family Size
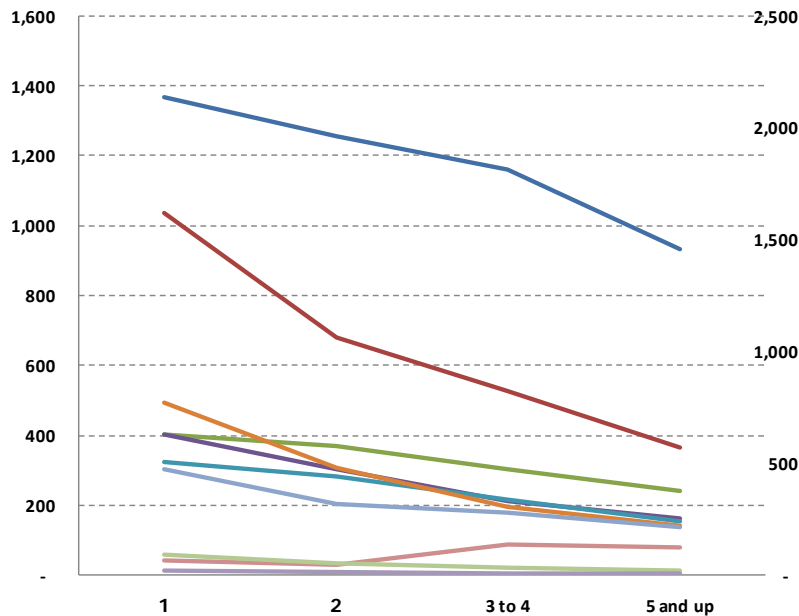
Consumption by Age of Household Head

Legend: House & Utilities, Food, Health, Others, Recreation, Cloth & Footwear, Education, Beverages, Tobacco, Transport & Comm (RHS)
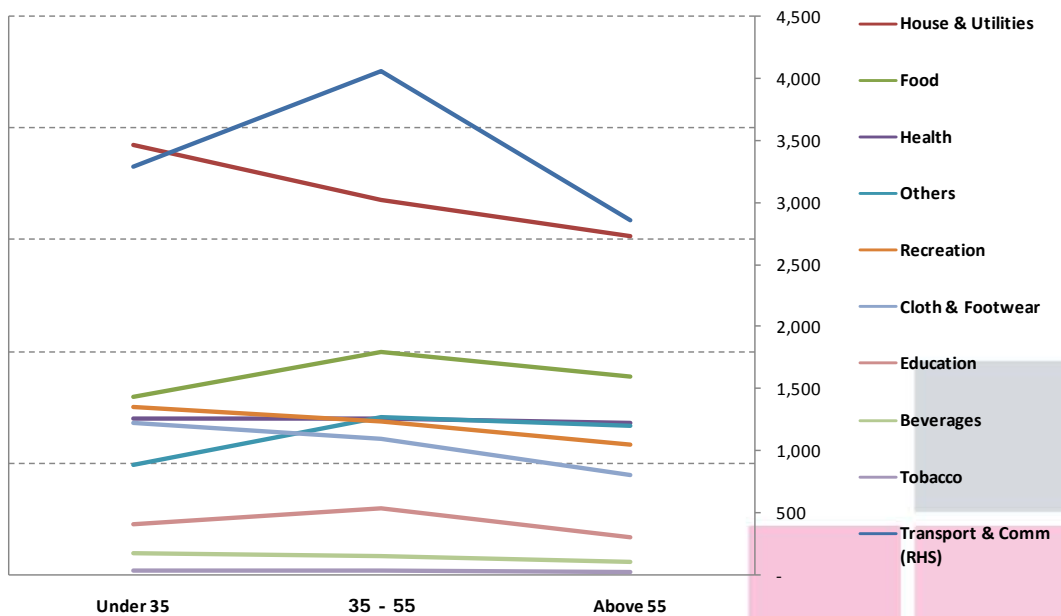
The Socio-Economic Survey (SES) 2011

Average Consumption per Person by Income Bracket
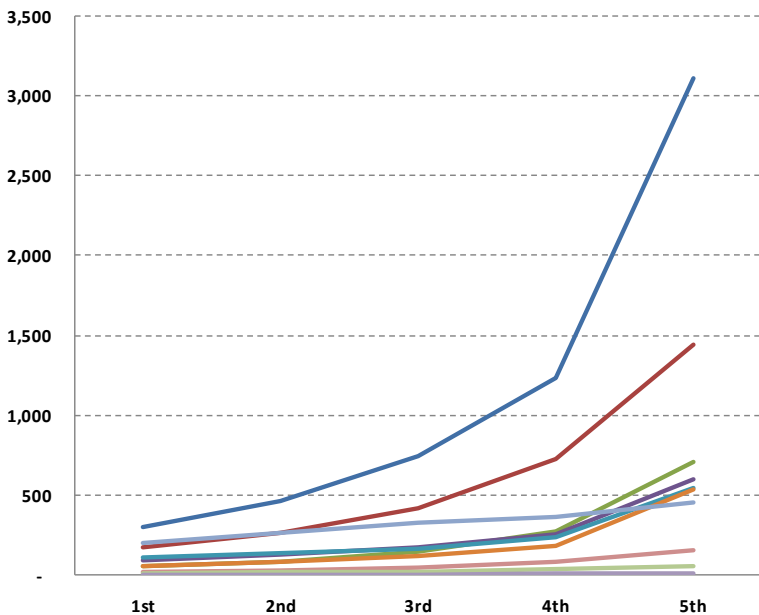
Consumption by Education of Household Head

Legend: House & Utilities, Recreation, Health, Cloth & Footwear, Others, Food, Education, Beverages, Tobacco, Transport & Comm (RHS)
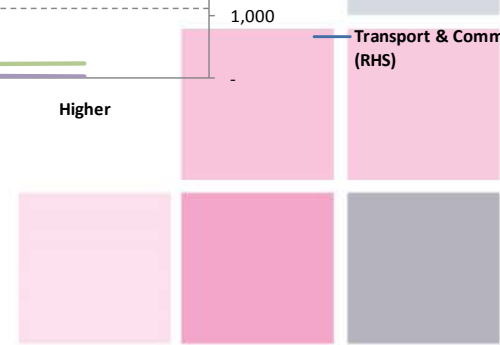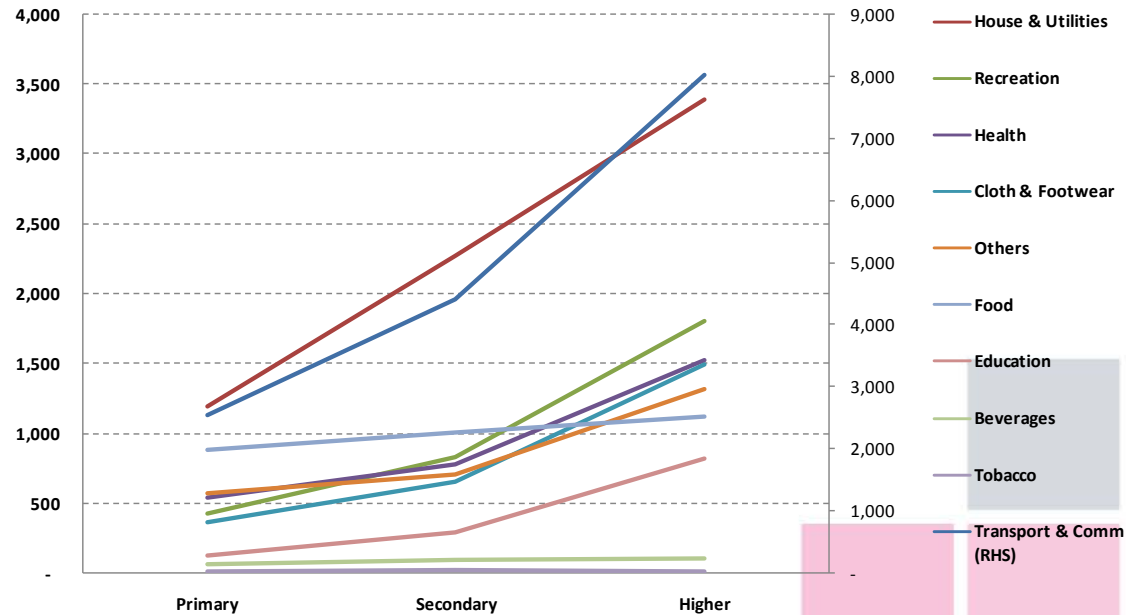
Estimation of Thai Household Consumption

- **Follow three-step work in consumption estimations**

    1. **Cross-section estimation of demographic effects**

    2. **Estimation of cohort effects**

    3. **Time-series aggregation and PADS estimation**

- **The focus here is to carry out the cross-section estimation**

    – **Using SES in 2011**

    – **Follow Bardazzi and Barnabani (2001), Ding (2006)**

Estimation Equation

$$C_i^h = \left(b_{i0} + \sum_j b_{ij} Y_j^h + \sum_k d_{ik} D_k^h \right) \left(\sum_g w_{ig} n_g^h \right) + u_i$$

C_i^h = household *h*'s consumption of good *i*

Y_j^h = amount of household *h*'s per capita income within *j*[th] income bracket

D_k^h = the *k*[th] demographic dummy variable in household *h*, represented by a zero-one

n_g^h = number of family members in age group *g* in household *h*

u_i = disturbance term with assumption of independently and identically distributed across households for the same product *i*

b_{io}, b_{ij}'s, d_{ik}'s, and w_{ig}'s are coefficients to be estimated, they represent marginal propensity to consume in each income bracket, demographic effects, and Adult Equivalency Weights (AEW), respectively.

Independent Variables

- **Income variables:**

  - **Each income bracket contains 1/5 of total households**

    - B_1 = 1,950 B_2 = 3,288 B_3 = 5,300 B_4 = 9,167 B_5 = Infinite

- **Demographic factors**

  - **Region: Bangkok, <u>Central</u>, North, South, East, Northeast**

  - **Family size: 1, 2, <u>3 and 4</u>, 5 and above**

  - **Age of head: under 35, <u>35 – 55</u>, above 55**

  - **Education of head: primary, <u>secondary</u>, higher**

  - **Number of income earners: 0, 1, <u>2</u>, more than 2**

- **Age groups (9 groups)**

  - **0 – 5, 6 – 15, 16 – 21, 22 – 30, <u>31 – 40</u>, 41 – 50, 51 – 60, 61 – 70, and 66 – 99**
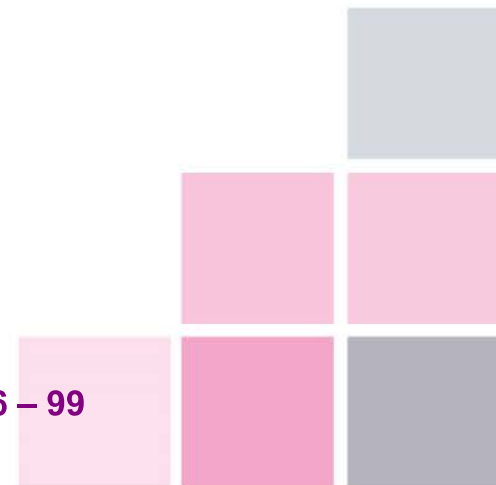
Zero Entries on Consumption Data

Percentage of Zero Observation

#	Item	%	#	Item	%
1	Grains and cereals	18.2%	17	Fuel	17.6%
2	Meat and poultry	16.4%	18	Furnitures and textiles	90.9%
3	Fishes and seafood	22.6%	19	Households equipment and maintenance	4.4%
4	Milk, cheese and eggs	22.3%	20	Education	60.2%
5	Oil and fat	19.4%	21	Personal supplies	3.3%
6	Fruits and nuts	33.0%	22	Medical and health care	44.2%
7	Vegetables	15.6%	23	Vehicles purchase	80.8%
8	Sugar and sweets	17.6%	24	Vehicle maintenance and gasoline	16.1%
9	Prepared food and condiments	2.7%	25	Public transportation	78.7%
10	Non-alcoholic beverages	22.0%	26	Communication	7.8%
11	Alcoholic beverages	88.8%	27	Recreation equipment	93.8%
12	Tobacco	76.8%	28	Travelling and restaurants	40.4%
13	Footwears	76.9%	29	Newspapers, magazines and books	86.0%
14	Clothing	52.2%	30	Sports, toys, pets, plants, admission fees	33.5%
15	Other personal effects	45.0%	31	Insurance premiums	12.4%
16	Housing and Water	17.8%	32	Ceremony and career membership	92.1%
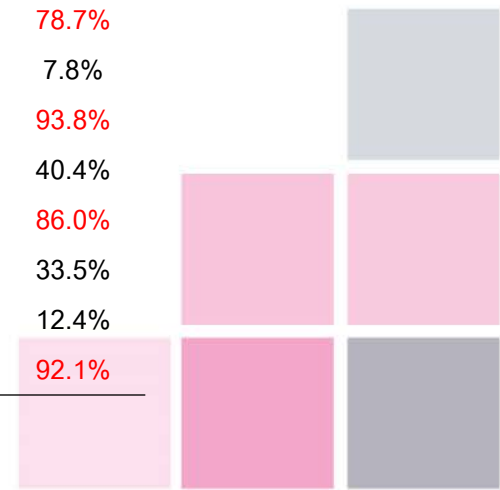
Estimation

- **According to Ding (2006), choices of estimation this nonlinear equation could be carried out with**

    - **Nonlinear least square (NLS)**

    - **Nonlinear probability model (Probit)**

        - **Decision to buy and the amount to spend are separated**

    - **Tobit model**

        - **Decision to buy and the amount to spend are decided simultaneously**

- **Here we used 1) simple NLS and 2) Tobit model**

Results NLS: Demographic Effects

#	Item	Region				Family Size			Age of Head		Education		Number of Earners		
		Bangkok	North	South	NEast	1	2	5 up	< 35	> 55	Primary	Higher	0	1	> 2
1	Grains and cereals	(-)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(-)
2	Meat and poultry	(-)	(+)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(+)	(-)
3	Fishes and seafood	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(-)
4	Milk, cheese and eggs	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(+)	(-)	(+)	(+)	(+)	(+)
5	Oil and fat	(-)	(-)	(+)	(-)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(+)	(-)
6	Fruits and nuts	(-)	(-)	(+)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(+)	(+)	(+)	(-)
7	Vegetables	(-)	(+)	(-)	(-)	(-)	(+)	(-)	(-)	(-)	(+)	(-)	(+)	(+)	(-)
8	Sugar and sweets	(-)	(-)	(+)	(-)	(+)	(+)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(-)
9	Prepared food and condiments	(+)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(+)	(+)	(+)	(-)
10	Non-alcoholic beverages	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(+)	(+)	(+)	(-)
11	Alcoholic beverages	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
12	Tobacco	(-)	(-)	(+)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(-)	(-)	(+)	(+)
13	Footwears	(+)	(+)	(+)	(-)	(+)	(-)	(-)	(+)	(-)	(-)	(+)	(-)	(-)	(-)
14	Clothing	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(+)	(+)	(-)	(+)	(-)	(+)	(-)
15	Other personal effects	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(-)	(+)	(-)
16	Housing and Water	(+)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(-)	(+)	(+)	(-)
17	Fuel	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
18	Furnitures and textiles	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(-)	(-)	(-)
19	Households equipment & maintenance	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(-)	(-)	(-)	(-)
20	Education	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
21	Personal supplies	(+)	(-)	(-)	(-)	(+)	(-)	(-)	(+)	(+)	(-)	(+)	(+)	(+)	(-)
22	Medical and health care	(+)	(+)	(+)	(-)	(-)	(+)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)
23	Vehicles purchase	(-)	(+)	(+)	(+)	(-)	(-)	(+)	(-)	(-)	(-)	(+)	(-)	(-)	(-)
24	Vehicle maintanance and gasoline	(-)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(-)
25	Public transportation	(+)	(-)	(-)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
26	Communication	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
27	Recreation equipment	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
28	Travelling and restaurants	(+)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(-)	(-)
29	Newspapers, magazines and books	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
30	Sports, toys, pets, plants, admis fees	(+)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(-)	(+)	(+)	(+)	(-)
31	Insurance premiums	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(-)	(+)	(-)	(-)	(+)
32	Ceremony and career membership	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(-)	(+)	(+)
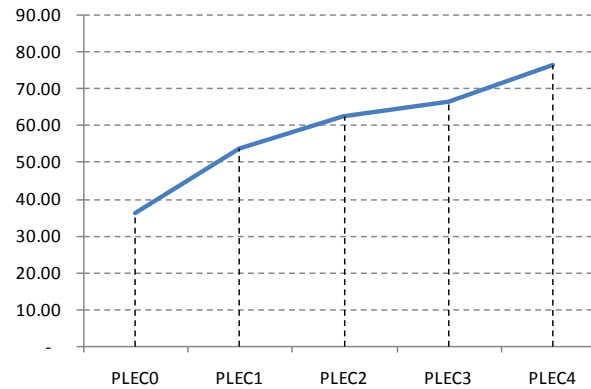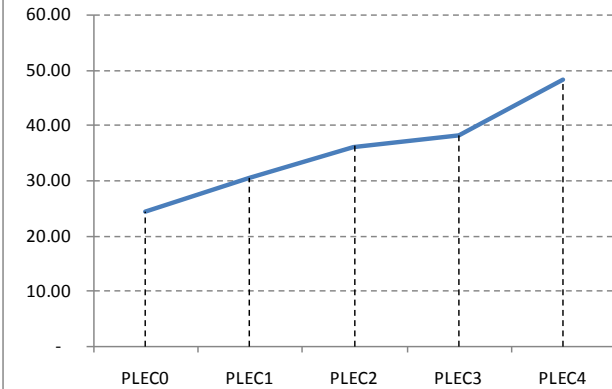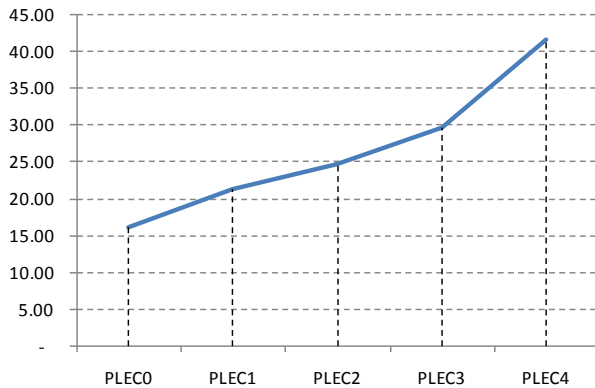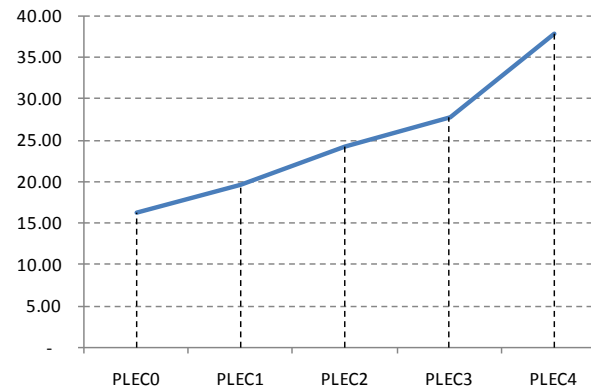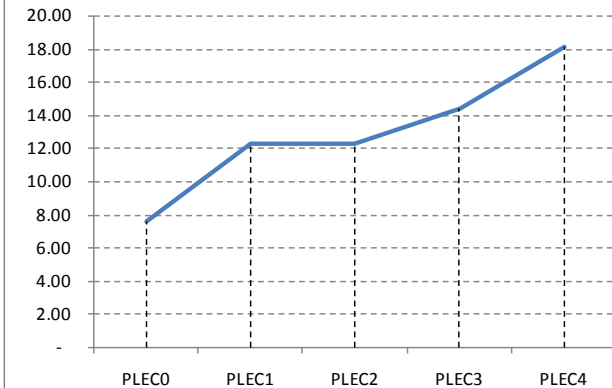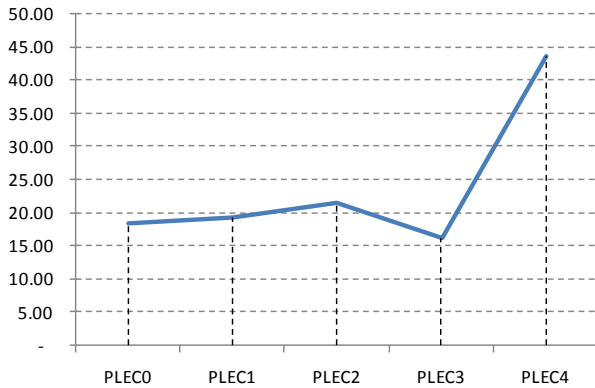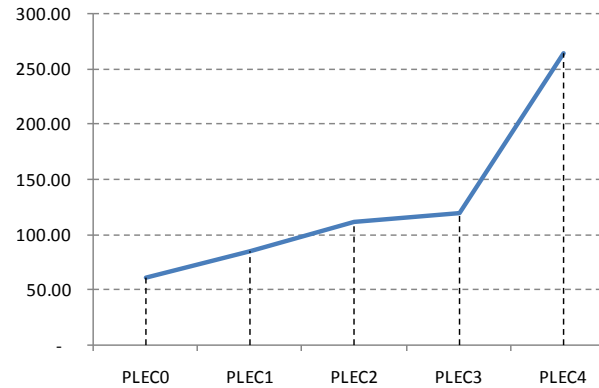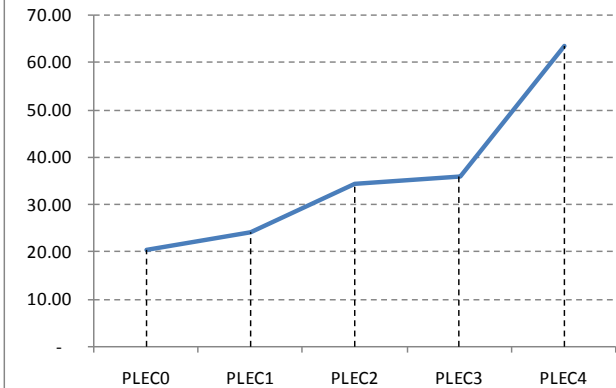
Results NLS: Engel Curves (selected products)
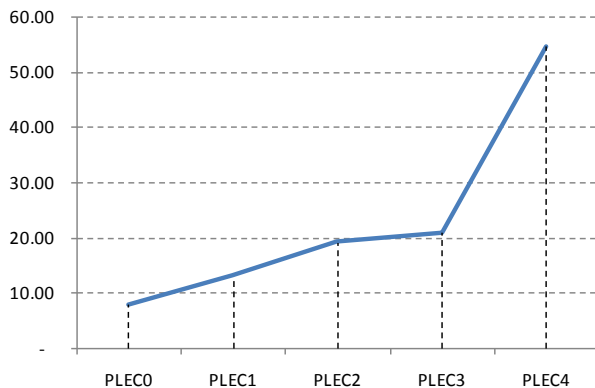
Results NLS: Engel Curves (selected products)
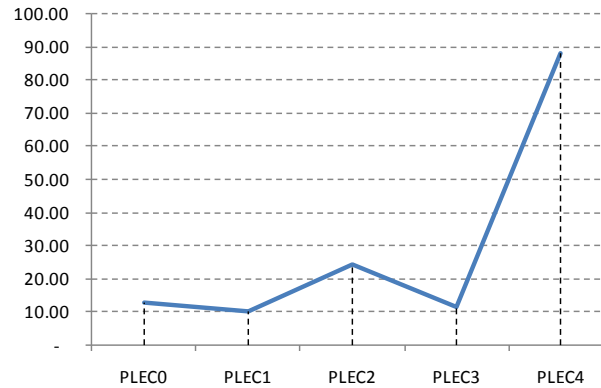
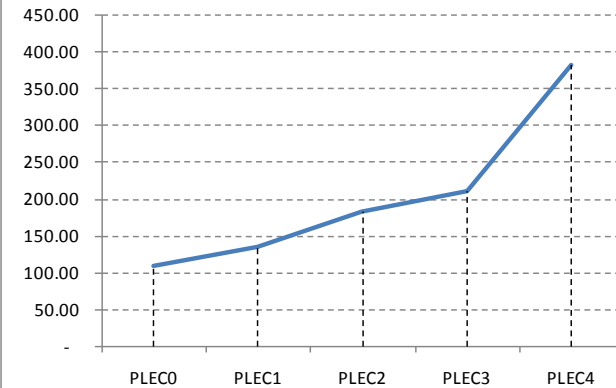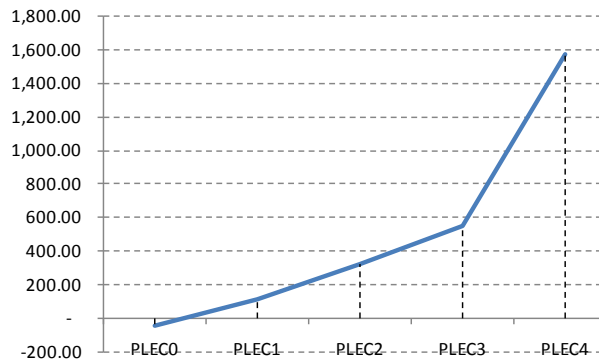# Results NLS: Engel Curves (selected products)
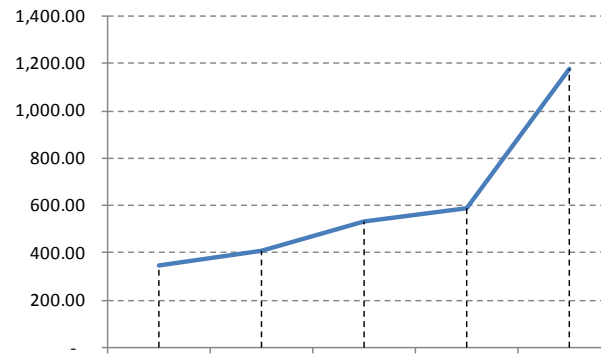

20. Education
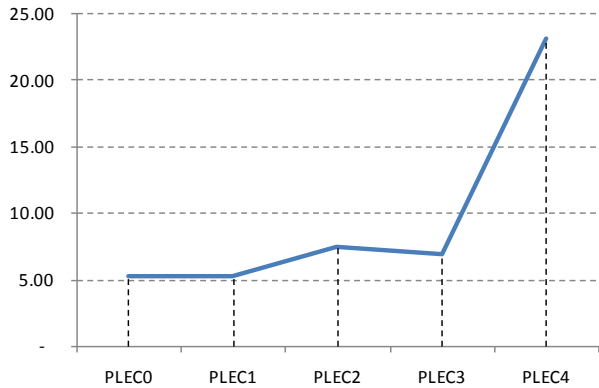
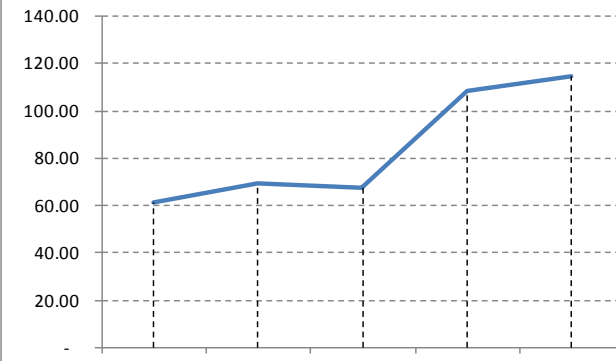**22. Medical and health care**

26. Communication

23. Vehicles purchase

24. Vehicle maintanance and gasoline

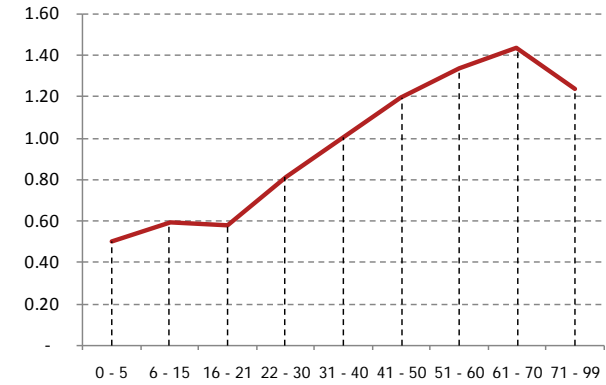**25. Public transportation**

Results NLS: Adult Equivalency Weights

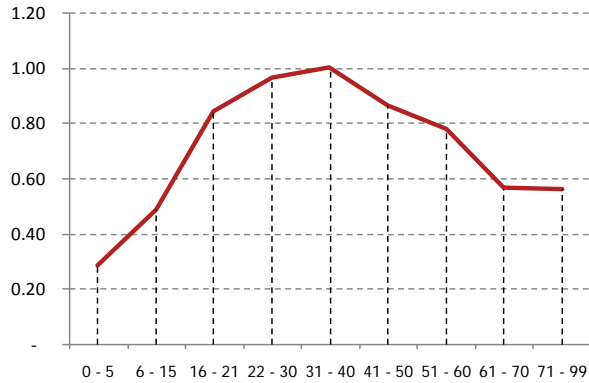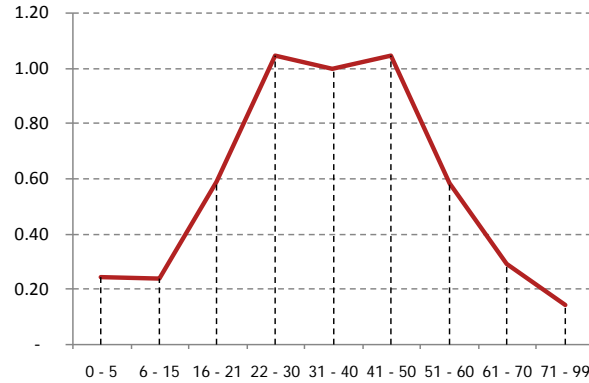# Results NLS: Adult Equivalency Weights

10. Non-alcoholic beverages

11. Alcoholic beverages

12. Tobacco

13. Footwears
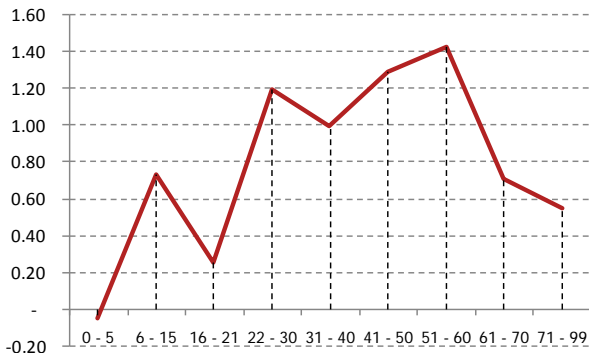
14. Clothing
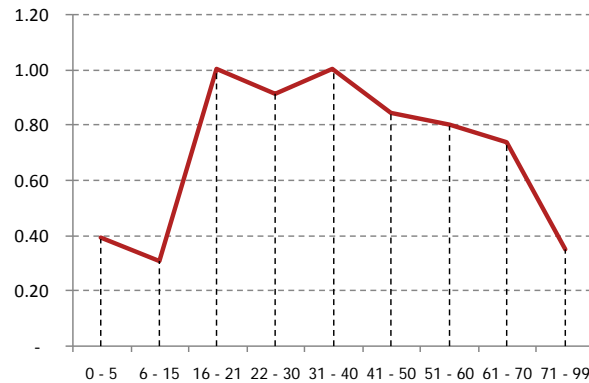
15. Other personal effects

Results NLS: Adult Equivalency Weights

Results NLS: Adult Equivalency Weights

23. Vehicles purchase

24. Vehicle maintanance and gasoline

25. Public transportation

26. Communication

28. Travelling and restaurants
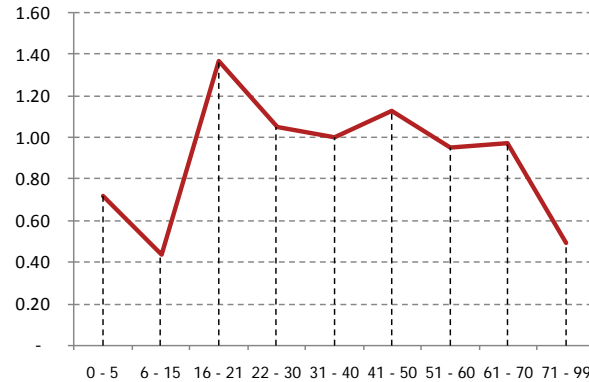
30. Sports, toys, pets, plants, admission fees
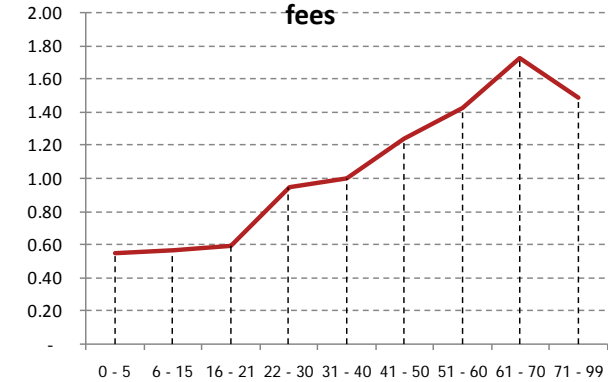
Result Comparisons: Nonlinear LS and Tobit

13. Footwears — NLS
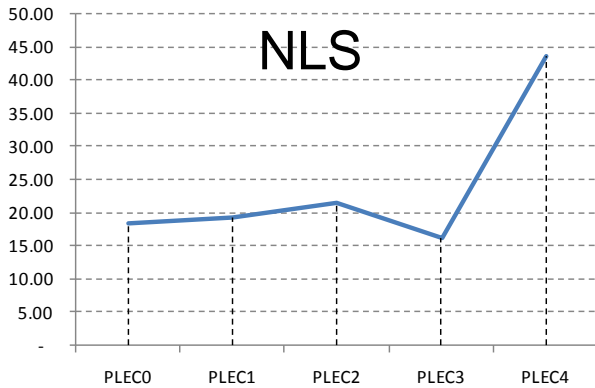
14. Clothing
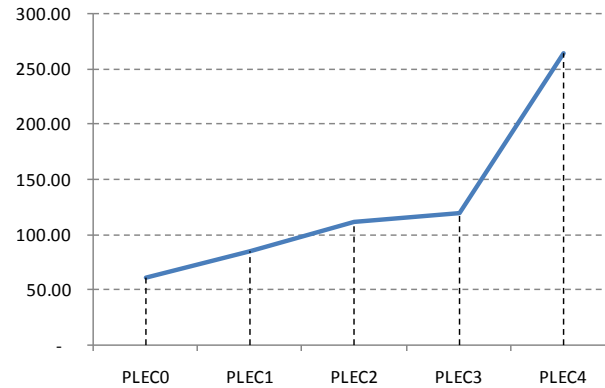
15. Other personal effects
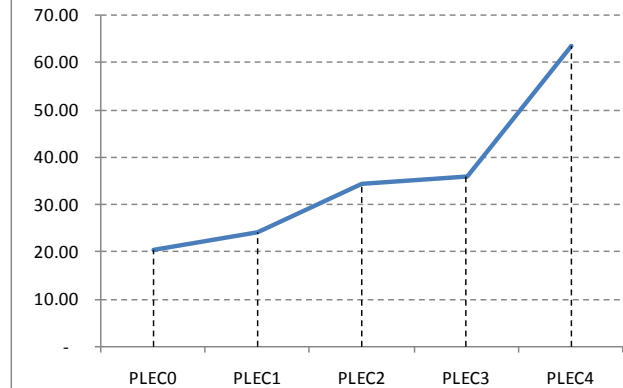
13. Footwears — Tobit
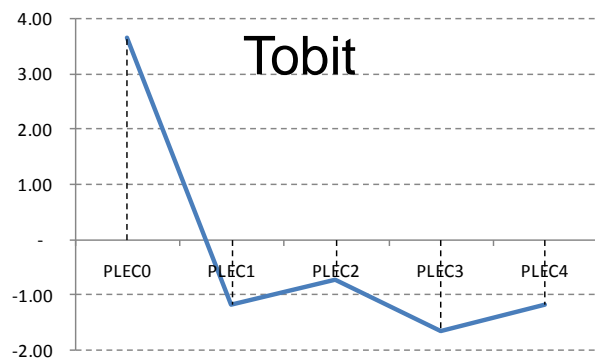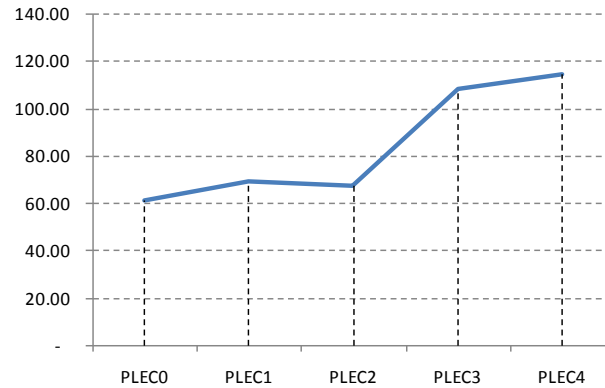
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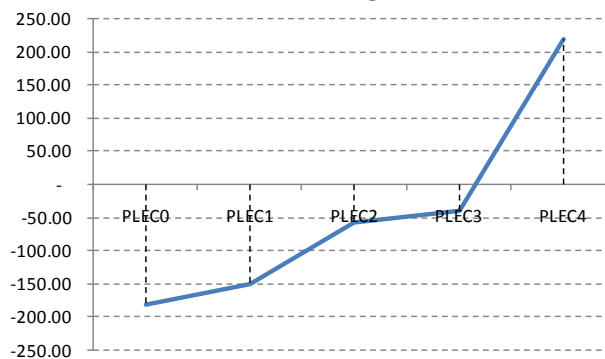
15. Other personal effects
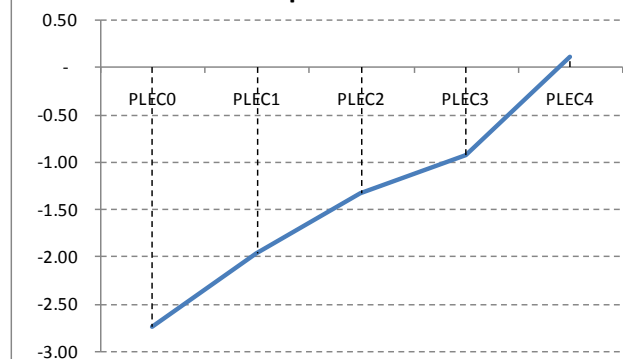
Result Comparisons: Nonlinear LS and Tobit
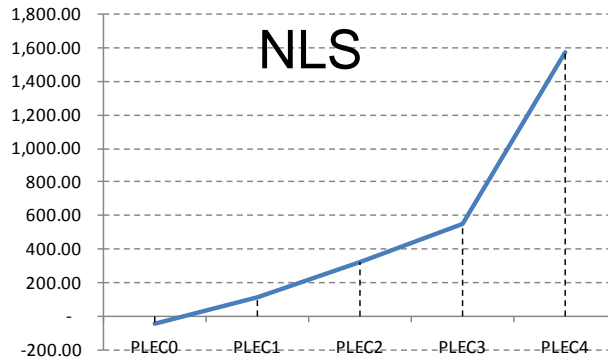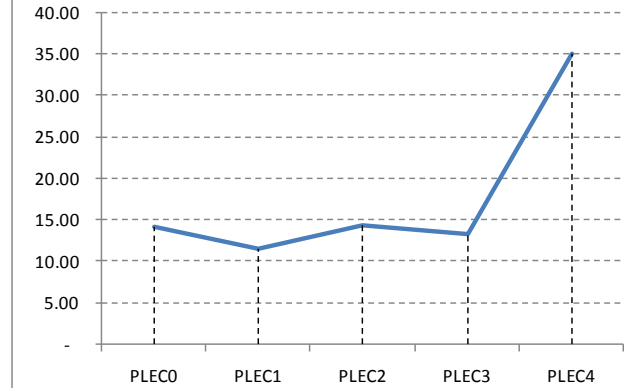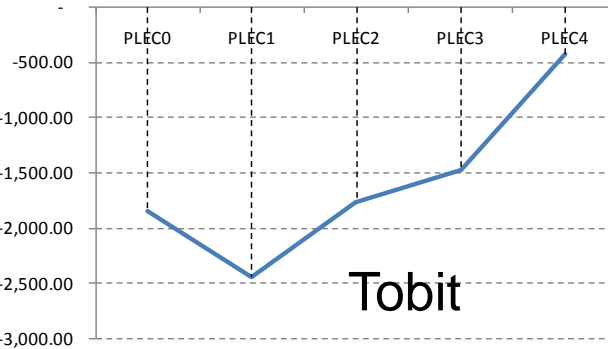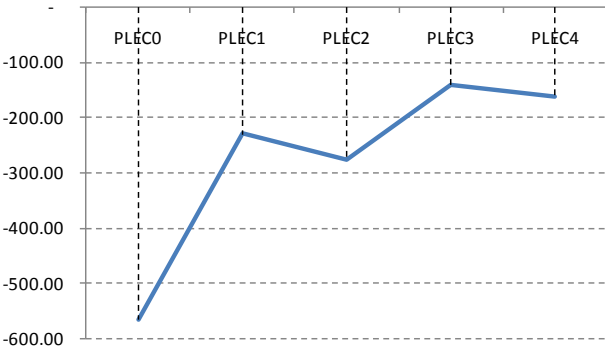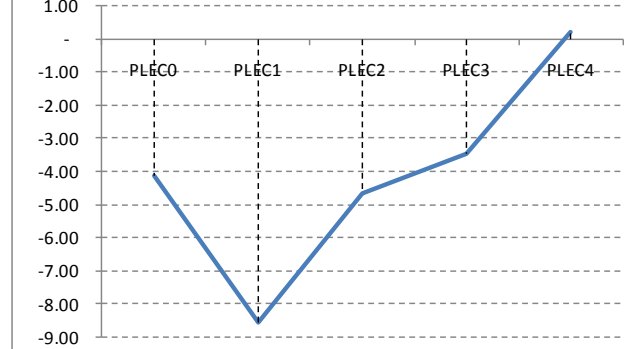
Further Works

- **Improve results for cross-section estimation**

    – **Period/periods of estimation**

    – **Choice of estimators: Nonlinear Probit, Bayesian Tobit**

- **Cohort analysis and the estimation of cohort effects**

- **Aggregation and PADS time-series estimation**

- **TIDY updated**