付属資料2　平成19年国民生活基礎調査の個票データ分析[1]

1. 目的

国民生活基礎調査の個票データをもとに，各種の分析が可能である。そこで，平成19年国民生活基礎調査について，目的外使用申請を行い分析し，本格的な研究の準備を行った。た。

2. 分析手法

健康水準をめぐる変数間の関係を分析するために，ここではヒストグラムと密度関数を用いて，全体の傾向を把握した。密度関数についてはカーネル密度推定を Stata の“kdensity”を使用した。Stata プログラムでは，カーネル密度推定を行いたい変数を指定すると，バンド幅などはプログラムが自動的に最適なものを選ぶ。カーネル密度推定によって，表示された曲線の下の面積は累積密度1.0となる。この密度関数によって，ヒストグラムでは明瞭に表示できない傾向を要約することができる。他方，アンケート調査のカテゴリー変数のような離散変数に対してカーネル密度推定を行うとき，累積密度が1.0を大きく下回る近似となる場合が多く生じた。このような場合，密度関数のピークや，分布の歪みをカテゴリー変数間で比較し，解釈した。

3. 分析結果

付属図 1「健康意識別一週間の就業時間」に要約されるように，就業時間は40時間に集中する。就業時間は健康意識に依存する。健康意識が「よくない」，「入院中」と回答した者は就業時間が短いという傾向がある[2]。とりわけ，高齢者，例えば60歳代では，その傾向が顕著になる。また，健康意識の高低は，所得の高低に依存する。健康意識が「よくない」，「入院中」と回答した者の所得は低い。この傾向は，とりわけ50歳代で顕著になる。

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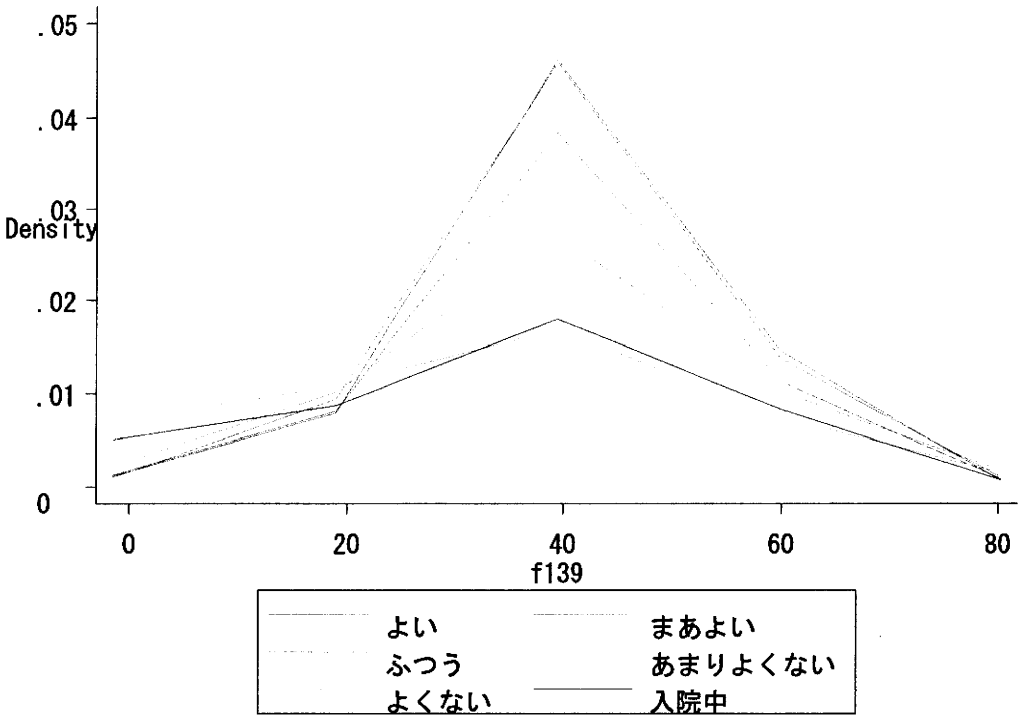
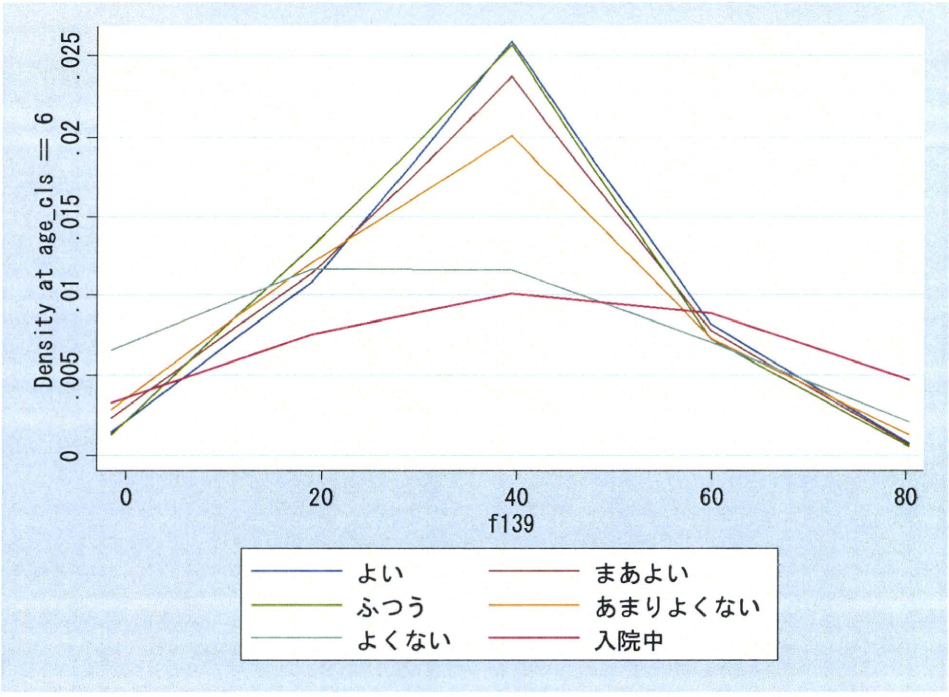
[1]以下の kdensity を使用した分析は，研究代表者が早稲田大学政治経済学術院の川村顕助教と行った。

[2]「入院者」の就業時間は極端に短くなるはずであるが，就業時間の質問は平成19年5月21日から27日の就業時間数であり，回答は実時間数であるが，これを離散データとして近似している。

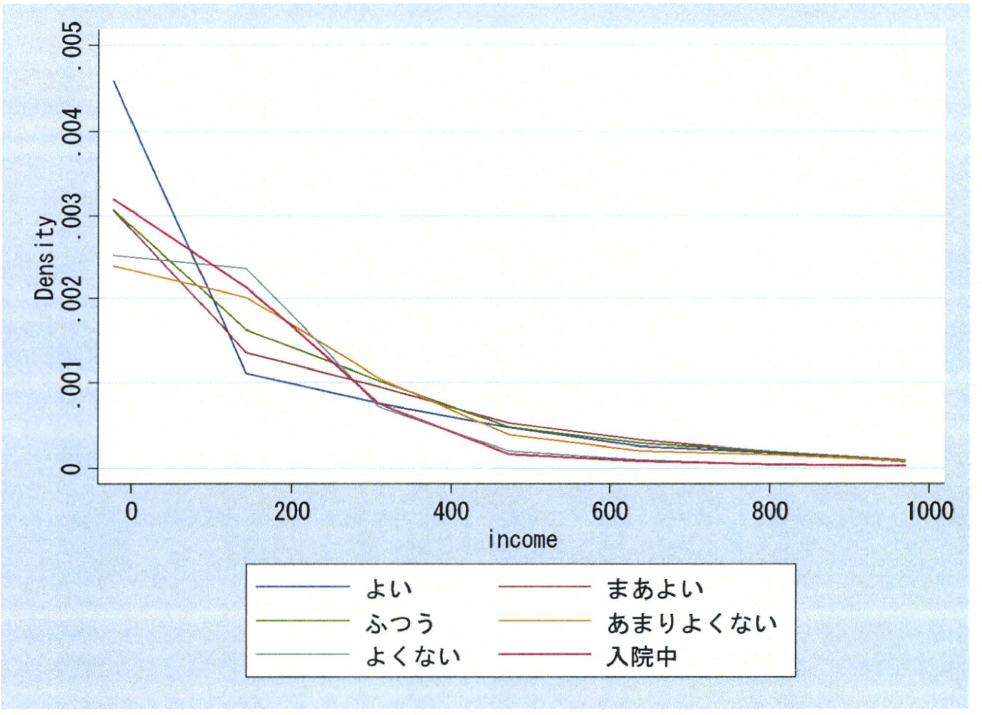
付属図 1：健康意識別一週間の就業時間



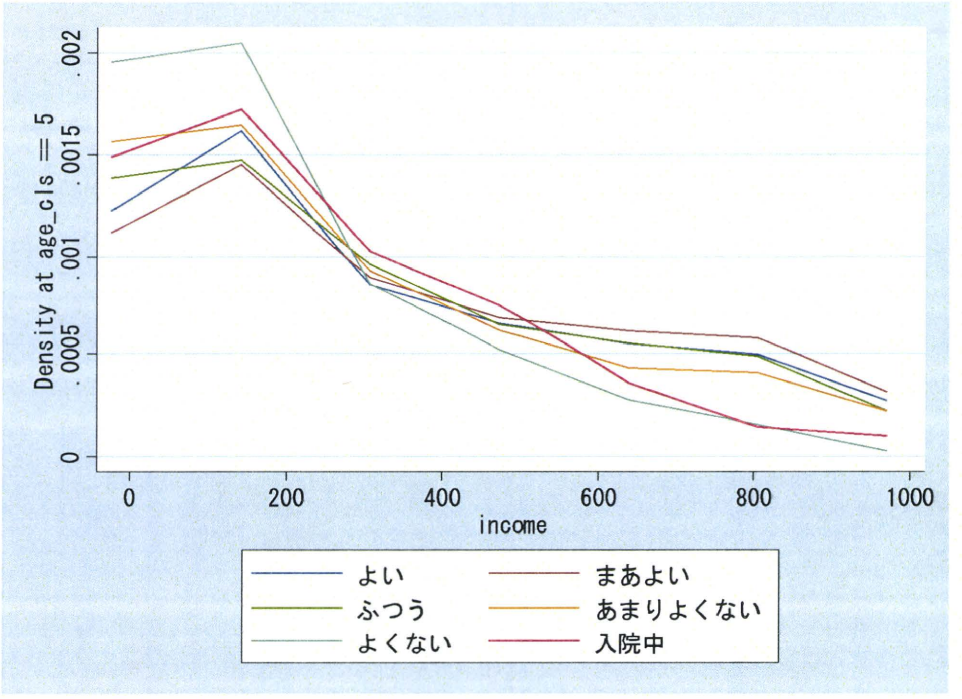
付属図 2：健康意識別一週間の就業時間(60 歳代)



付属図 3：健康意識別所得分布



付属図 4. 健康意識別所得分布(50 歳代)



Geographical Variance and Convergence of Medical Services and Social Capital

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Septermber19, 2010 at JEA

1

Overview

1. Background
2. Method I Growth of Medical Expenditure
3. Method II Convergence
4. Method III Decompostition of the Variance
5. Results and limitations

2

Geographical Variation

Geographic variation of medical cost and services

Cutler David and Louise Sheiner (1999) "The Geography and Medicare" *Federal Reserve Board Working paper.*

Wennberg, John E. Elliott S. Fisher, and Jonathan S. Skinner (2002) "Geography and the Debate Over Medicare Reform,", *Health Affairs, Web Exclusive* reappeared in *Health Affairs* "Variations Revisited" in 2004.

3

Variation on Japan

Geographical variation of medical cost and services
厚生労働省 (various)
前田 (2000,2002)
西村(1998)
泉田 et al. (1998)
中西 (1995, 2000)
漆 (1998)
IHEP(2007) (Survey) *Determinants of medical cost at national and prefectural level.*

Existing studies are cross-section with short time-series

We need longitudinal data to identify the convergence over 20 years

4

Variation on Japan

Geographical variation of medical cost and services
- Ministry of Health, Welfare,and Labor (various)
- Maeda Y. (2000,2002)
- Nishimura(1998)
- Izumida et.al. (1998)
- Nakanishi (1995, 2000)
- Urushi (1998)
- IHEP(2007) (Survey) *Determinants of medical cost at national and prefectural level.*

Existing studies are cross-section with short time-series

We need longitudinal data to identify the convergence over 20 years

5

Medical Social Common Capital

Theory
- To focus on social capital accumulation process
- Physicians, nurses, beds, hospitals and others
- They are best regarded as "Social overhead Capital"
- "Social Common Capital" as Uzawa(various)

Theories behind existing literatures are
- Physician induced demand
- Suppliers induced demand

They should be reinterpreted in acccumulation of medical captial

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Political Background 1

Unique experience of Japan

"Nation-wide health insurance" plan mainly based on fees for services that are set by the government and updated regularly.

No variations of the regulated fees across regions

Outcome or quality of life measures including "longevity" have no geographical variation

Wide geographical variations of medical cost and content of services

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Background 2

National health insurance system

a. "Employee Insurance" by large enterprises

b. "National Health Insurance Plan" by municipal regions

c. "Retiree Medical Care System"

d. "Old-aged Health System"

This study uses data on (b) and (d) at prefectural level data.

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National Health Insurance Plan

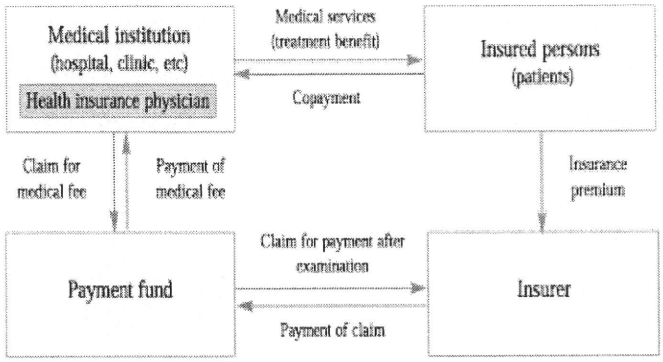

Figure 1. Outline of health insurance payment system.

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Background 3

Geographical regions are aggregated into 47 prefectures level

Average Medical Cost (US$ equivalent/YR,2000)

	Overall	General	Elderly
Average	3,000	1,880	6,400
highest	4,000	2,400	7,900
lowest	2,300	1,500	5,000

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Background4

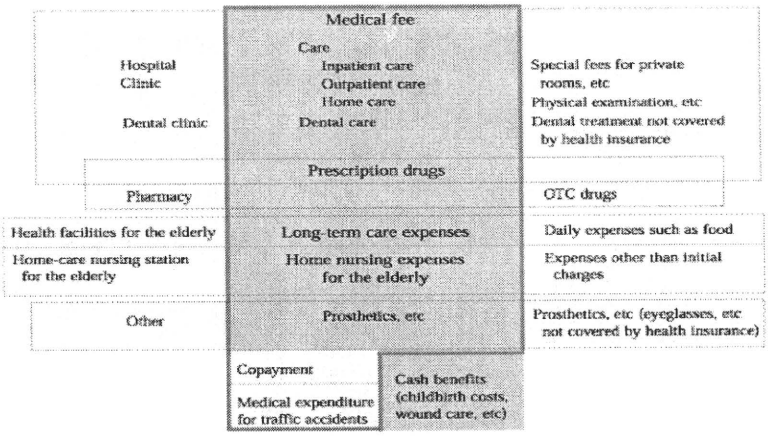

Figure 2. National medical expenditure (▭) and major items covered by insurance (▭).

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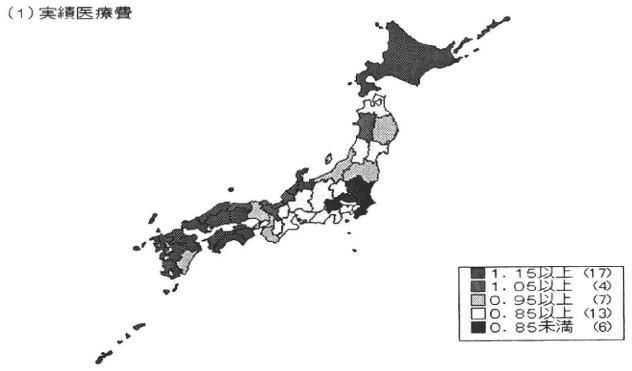
Variation of medical expenditure (1998) (actual per average)

red	>= 1.15
pink	>= 1.05
green	>=0.95
yellow	>=0.85
blue	<0.85

平成１０年度　国民健康保険医療費マップ



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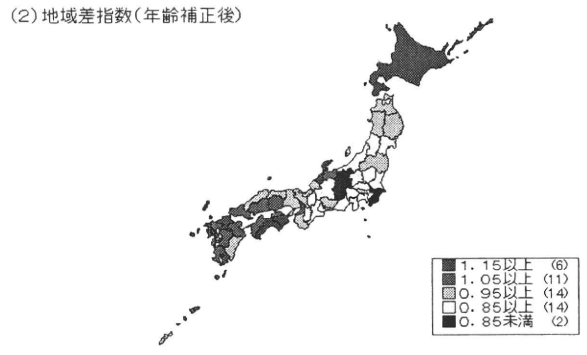
Variation of medical expenditure (1998) (adjusted for age structure)

red	>= 1.15
pink	>= 1.05
green	>=0.95
yellow	>=0.85
blue	<0.85



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Method I: "Growth Accounting"

$$C_{htsi}$$

医療費 medical cost

h-th region (都道府県)

s-health insurance program (s=general, aged)(一般・老人)

i-th medical service (i=inpatient, outpatient, dental services)
(入院, 外来, 歯科)

t-th fiscal year (t if from 1981 to 2005)

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Measurement 2

$$N_{hts} = \sum_s N_{hts} = N_{htg} + N_{hta}$$

N number of insured people（被保険者数）
- h-th region
- s-health insurance program
- g=general, a=aged
- t-th fiscal year

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Measurement 3

$$c^N_{htsi} = C_{htsi} / N_{hts}$$

$$d^N_{htsi} = D_{htsi} / N_{hts}$$

$$d^E_{htsi} = D_{htsi} / E_{htsi}$$

$$e^N_{htsi} = E_{htsi} / N_{hts}$$

C: medical cost 医療費
D : patients days 日数
N: number of insured people 被保険者数
C/D, D/N, D/E, E/N

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Method I: Cost decompostion

$$c^N_{htsi} = \frac{C_{htsi}}{N_{hts}} = \frac{C_{htsi}}{D_{htsi}} \cdot \frac{D_{htsi}}{N_{hts}} = c^D_{htsi} d^N_{htsi}$$

$$\frac{\Delta C_{ht}}{C_{ht}} = \sum_s \sum_i \left\{ \left(\frac{\Delta c^D_{htsi}}{c^D_{htsi}} + \frac{\Delta d^N_{htsi}}{d^N_{htsi}} + \frac{\Delta N_{hts}}{N_{hts}} \right) \cdot \frac{C_{htsi}}{C_{hts}} \right\}$$

$$g(C_{ht}) = \sum_s \sum_i \left\{ \left(g(c^D_{htsi}) + g(d^N_{htsi}) + g(N_{hts}) \right) \cdot w_{htsi} \right\}$$

growth of total medical cost is decomposed to weighted growth of factors.（医療費の成長率の分解）

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Medical Cost per Person

$$c^N_{htsi} = \frac{C_{htsi}}{N_{hts}} = \frac{C_{htsi}}{D_{htsi}} \cdot \frac{D_{htsi}}{E_{htsi}} \frac{E_{htsi}}{N_{hts}} = c^D_{htsi} d^E_{htsi} e^N_{htsi} \quad (6)$$

$$c^N_{htsi} = \frac{C_{htsi}}{N_{hts}} = \frac{C_{htsi}}{D_{htsi}} \cdot \frac{D_{htsi}}{N_{hts}} = c^D_{htsi} d^N_{htsi} \quad (7)$$

Medical cost per Event $c^E_{htsi} = C_{htsi} / E_{htsi}$ (8)

Medical Cost per Day $c^D_{htsi} = C_{htsi} / D_{htsi}$ (9)

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$$C_{hts} = \sum_s \sum_i C_{htsi} = \sum_s \sum_i (C_{htsi} / N_{hts}) N_{hts} = \sum_s \sum_i c^N_{htsi} N_{hts} \quad (10)$$

$$\Delta C_{hts} = \sum_s \sum_i \Delta C_{htsi} = \sum_s \sum_i \Delta((C_{htsi} / N_{hts}) N_{hts}) = \sum_s \sum_i (\Delta c^N_{htsi} \cdot N_{hts} + c^N_{htsi} \Delta N_{hts}) \quad (11)$$

$$\Delta c^N_{htsi} = \Delta c^D_{htsi} \cdot d^E_{htsi} \cdot e^N_{htsi} + c^D_{htsi} \cdot \Delta d^E_{htsi} \cdot e^N_{htsi} + c^D_{htsi} \cdot d^E_{htsi} \cdot \Delta e^N_{htsi} \quad (12)$$

$$\frac{\Delta C_{ht}}{C_{ht}} = \sum_s \sum_i \left\{ \left(\frac{\Delta c^D_{htsi}}{c^D_{htsi}} + \frac{\Delta d^E_{htsi}}{d^E_{htsi}} + \frac{\Delta e^N_{htsi}}{e^N_{htsi}} + \frac{\Delta N_{hts}}{N_{hts}} \right) \cdot \frac{C_{htsi}}{C_{hts}} \right\} \quad (13)$$

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growth of medical cost $g(C_{ht}) = \frac{\Delta C_{ht}}{C_{ht}}$,

growth of medical cost per day $g(c^D_{htsi}) = \frac{\Delta c^D_{htsi}}{c^D_{htsi}}$,

growth of Days per Event $g(d^E_{htsi}) = \frac{\Delta d^E_{htsi}}{d^E_{htsi}}$,

growth of Events per Person $g(e^N_{htsi}) = \frac{\Delta e^N_{htsi}}{e^N_{htsi}}$,

growth of the number of subjects of s-th program $g(N_{hts}) = \frac{\Delta N_{hts}}{N_{hts}}$,

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Weight of i-th medical cost of the total medical cost.

$$w_{htsi} = \frac{C_{htsi}}{C_{hts}}$$

$$g(C_{ht}) = \sum_s \sum_i \left\{ \left(g(c^D_{htsi}) + g(d^E_{htsi}) + g(e^N_{htsi}) + g(N_{hts}) \right) \cdot w_{htsi} \right\} \quad (14)$$

$$\frac{\Delta C_{ht}}{C_{ht}} = \sum_s \sum_i \left\{ \left(\frac{\Delta c^D_{htsi}}{c^D_{htsi}} + \frac{\Delta d^N_{htsi}}{d^N_{htsi}} + \frac{\Delta N_{hts}}{N_{hts}} \right) \cdot \frac{C_{htsi}}{C_{hts}} \right\} \quad (15)$$

$$g(C_{ht}) = \sum_s \sum_i \left\{ \left(g(c^D_{htsi}) + g(d^N_{htsi}) + g(N_{hts}) \right) \cdot w_{htsi} \right\} \quad (16)$$

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$$g(C_{ht}) = \sum_s \sum_i \left\{ g(c^D_{htsi}) w_{htsi} + g(d^N_{htsi}) w_{htsi} + g(N_{hts}) w_{htsi} \right\}$$

$$c^N_{htsi} = \frac{C_{htsi}}{N_{hts}} = \frac{C_{htsi}}{D_{htsi}} \cdot \frac{D_{htsi}}{N_{hts}} = c^D_{htsi} d^N_{htsi}$$

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Data

"Annual Report of the National Health Insurane (国民健康保険事業年報)

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Table Share and Growth of Medical Cost of Japan (national average growth percentage per year)

	General Hospital	General Outpatients	General Dental	Aged Hospital	Aged Outpatients	Aged Dental	General Sum	Aged Sum	Total
Share									
1981–1985	26.4	29.0	7.7	20.8	15.3	1.0	67.1	32.9	100.0
1986–1990	25.0	26.4	6.8	23.5	17.2	1.2	59.7	40.3	100.0
1991–1996	22.7	25.1	5.7	24.6	20.4	1.6	55.4	44.6	100.0
1996–2000	20.1	21.9	5.2	27.2	23.4	2.2	49.4	50.6	100.0
Growth %									
1981–1985	1.50	0.85	0.33	2.46	1.51	0.14	2.85	3.65	6.70
1986–1990	0.38	0.95	−0.03	1.08	1.30	0.09	1.34	2.38	3.78
1991–1996	0.53	0.61	0.15	1.59	1.71	0.20	1.34	3.34	4.81
1996–2000	0.58	0.37	0.14	1.64	1.33	0.22	1.14	3.06	4.26

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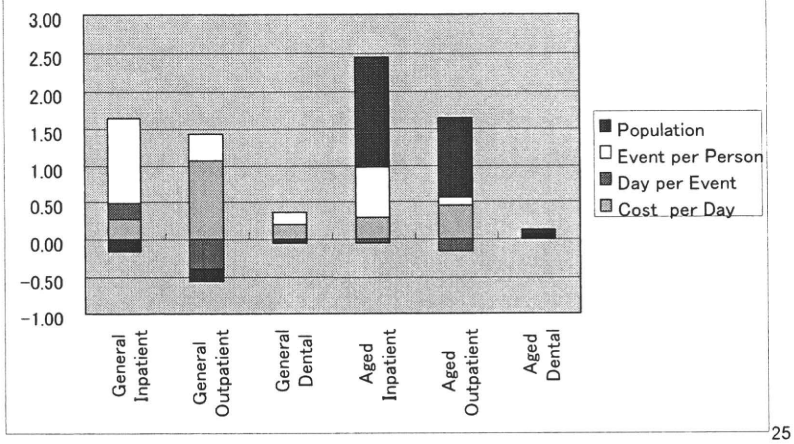
Contribution Factors of the Growth of Medical Cost

Figure 1 Growth of Medical Cost of 1981–1985 (yearly %))



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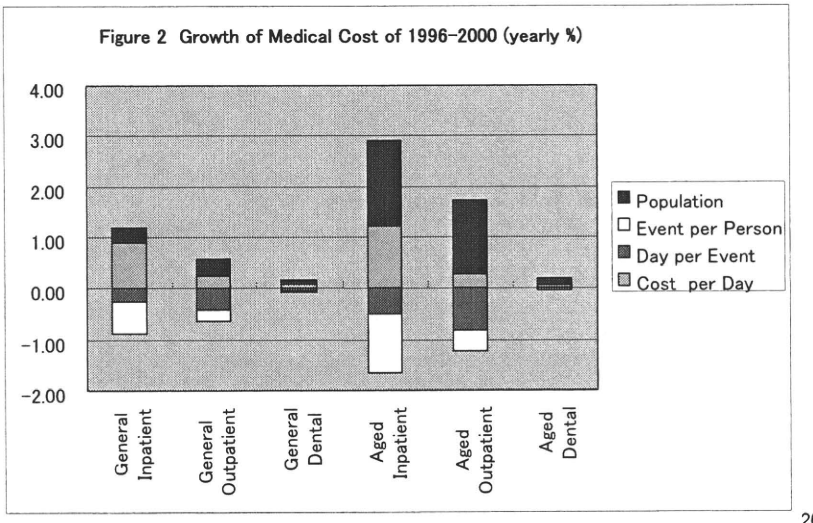
Contribution Factors of the Growth of Medical Cost

Figure 2 Growth of Medical Cost of 1996–2000 (yearly %)



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Contribution factor of Growth of Medical Cost (average % per YR)

	General Inpatient	General Outpatient	General Dental	Aged Inpatient	Aged Outpatient	Aged Dental
Cost per Day						
1981-1985	0.28	1.06	0.20	0.30	0.46	0.02
1986-1990	-0.02	1.01	0.03	0.10	0.57	0.02
1991-1995	0.79	0.72	0.18	0.95	0.50	0.05
1996-2000	0.89	0.25	0.09	1.21	0.28	0.05
Day per Event						
1981-1985	0.21	-0.39	0.00	-0.05	-0.16	0.01
1986-1990	0.13	-0.23	-0.08	-0.14	-0.27	-0.01
1991-1995	-0.15	-0.29	-0.01	-0.33	-0.28	0.00
1996-2000	-0.26	-0.42	-0.05	-0.51	-0.83	-0.05
Event per Person						
1981-1985	1.15	0.36	0.16	0.68	0.11	0.03
1986-1990	0.95	0.89	0.20	0.19	0.31	0.04
1991-1995	0.13	0.46	0.05	-0.31	0.39	0.06
1996-2000	-0.33	0.23	0.03	-0.70	0.46	0.08

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	General Inpatient	General Outpatient	General Dental	Aged Inpatient	Aged Outpatient	Aged Dental
Days per Person						
1981-1985	1.41	-0.03	0.18	0.55	-0.04	0.04
1986-1990	1.13	0.65	0.13	0.05	0.03	0.02
1991-1995	-0.02	0.16	0.04	-0.62	0.09	0.05
1996-2000	-0.60	-0.21	-0.02	-1.14	-0.38	0.02
Population Growth						
1981-1985	-0.16	-0.17	-0.05	1.46	1.07	0.07
1986-1990	-0.66	-0.69	-0.18	0.92	0.68	0.05
1991-1995	-0.24	-0.26	-0.06	1.28	1.07	0.08
1996-2000	0.30	0.32	0.08	1.70	1.46	0.14

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Results

Growth of medical cost in 1996-2000

General Hospitalization	0.58%
Aged Hospitalization	1.64%
Aged Outpatient	1.33%

Mostly explained by
- the growth of the aged population
- Increase in "Cost per Day"
- "Days per Person"
-demography and health plan

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Method II. Convergence Theory

Growth theory with capital accumulation
Barro and Sala-i-Martin (1995)
Shioji (2000)

"absolute convergence" or
"condtional convergence"

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