り求まる逆ミルズ比を説明変数に追加することにより、第一段階の選択と第二段階の選択の独立性を検討する。

(3) 変数

本稿の推計で用いる説明変数は次の通りである。まず、個人の基本的な属性として、性別ダミー（女性＝1）、年齢 および年齢の 2 乗項を説明変数に用いる。また、X 市では中学校卒業までが乳幼児医療費助成制度の対象となっているが、3 歳未満、3 歳以上小学校卒業まで、中学生で助成内容が異なっている。そこで、「0-2 歳ダミー」、「3-6 歳ダミー」、「7-12 歳ダミー」を用いる。また、国民健康保険において、70 歳以上は 1 割負担となっていることを踏まえ、「70-74 歳ダミー」を追加する。

次に、本稿の主要な課題である、短期証・資格証の交付状況との関係を明らかにするため、短期証交付ダミー、資格証交付ダミーを説明変数にそれぞれ追加する。短期証ダミーは 2010 年 10 月に短期証の交付を受けており、かつ同一の月内に資格証の交付を受けていない場合を「1」、それ以外の場合を「0」とする変数であり、資格証ダミーは 2010 年 10 月に資格証の交付を受けている場合を「1」、そうでない場合を「0」とする変数である。

また、所得が受診行動に与える影響を考慮するため、世帯所得の対数値を説明変数に追加する。ここで世帯所得は 2010 年の年間の所得である。なお、被保険者情報から求められる世帯所得が、等価所得平均の 1%未満となる場合、等価所得の 1%を当てはめる bottom coding を行っている。

4. 分析結果

(1) 基礎集計

表 1 は、普通証・短期証・資格証別の医療機関受診確率について、2010 年 9 月から 2011 年 3 月までの 7 ヵ月間の月次推移で示したものである。当該期間を通じて大きな変動はなく、普通証の場合は約 51～54%、短期証の場合は大きく低下して約 23～28%、資格証の場合は 1～3%とほとんど受診していない[7]。資格証保持者の受診確率が低いことは、全国保険医団体連合会（2009）からもすでに示唆されているが、受診確率は年齢や所得によって異なり、また全国保険医団体連合会（2009）の推計では実際の資格証保持者の世帯員数は一般の国保被保険者数の平均値を当てはめられているだけであり、それらの影響についても考慮する必要がある。

そこで図 3 では、年齢に関して考慮する為、普通証・短期証・資格証別の年齢分布（2010 年 10 月）について示している。普通証の年齢分布は、短期証と資格証のそれに比べて大きく右に偏っており、60 歳以上が過半数を占めている。したがって、普通証の場合に比べて、

---

[7] 当該期間の被保険者の短期証・資格証交付状況の変化が乏しいこと、また所得情報が年次データとなっていることから、本稿における分析ではパネルデータ分析を行わず、2010 年 10 月のみのクロスセクション分析を行っている。

短期証、資格証の受診確率は極めて低くなっているが、それはまず両者の年齢分布の相違を反映しているだけという可能性がある。さらには、保険料の未納が続いているということは、短期証・資格証の方がより所得水準が低い可能性も考えられ、そのことが影響していることも考えられる。

(2) 推計結果

そこで、年齢や所得を同時にコントロールした上、短期証・資格証による影響をみるために、前節で説明した多変量解析を行った。記述統計量を表 2、全被保険者について分析した結果を表 3、世帯主のみについて分析した結果を表 4 として示す。

まず全被保険者について分析した表 3 をみると、短期証の場合に 16～17%、資格証の場合に 46～47%、それぞれ受診確率は低下している。一方、受診日数への影響は、短期証・資格証の場合とも正に有意となっている。また、医療費や一日当たり医療費への影響は観察されなかった。

続いて世帯主について分析した表 4 をみると、短期証の場合に約 20%、資格証の場合に約 50%、それぞれ受診確率は低下している。一方、受診日数への影響は観察されなかったが、資格証については当該観測期間における受診経験者がほとんどいないため、検出力が低くなり、十分に影響をとらえきれていない可能性もある。

5. 結びにかえて

本稿では、2010 年 10 月の X 市国民健康保険のデータを利用し、短期証・資格証の交付と受診行動の関係を、年齢や所得水準を考慮したうえで分析している。

推計の結果は次のように整理されよう。

第一に、年齢や所得の違いをコントロールしても短期証・資格証の場合には受診確率が有意に低くなることが観察された。ただし、逆選択として保険料の滞納を続けているために保険証・資格証の交付にいたっている可能性を識別できておらず、短期証・資格証の交付による影響として過大推計の可能性が残る。

第二に、全被保険者の分析においては、短期証・資格証の場合には受診日数が有意に増加していることが観察されたが、世帯主の分析においては観察されなかった。

本稿の分析結果の留保として、短期証・資格証の交付と受診行動の関係については因果関係を特定できていない。短期証・資格証の交付と受診行動の関係については因果関係を特定できていない。別の言い方をすれば、(主観的な) 疾病確率の低さにより、逆選択として保険料の滞納を続けているために短期証・資格証の交付に至っており、その結果、受診確率が低くなっているケースと、短期証・資格証の交付自体に受診を抑制する効果があり受診確率が低くなっているケースについて、本稿の分析では十分識別できていない。これらの点については、短期証・資格証交付時の疾病確率を統御可能なデータセットにより、より詳細な検証を行う必要があり、今後の研究課題としたい。

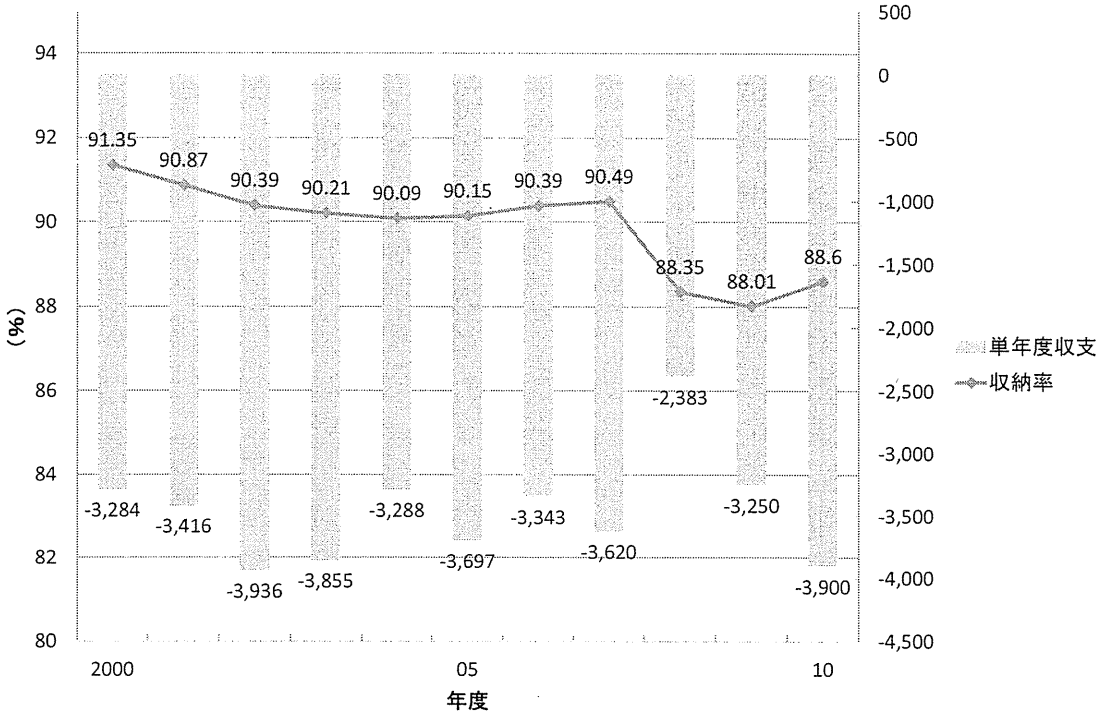
【参考文献】

四方理人・田中聡一郎・大津唯(2012)「国民健康保険料の滞納の分析」『医療経済研究』Vol.23, No.2.(掲載決定済)

結城康博・本田敏明(2008)『地方財務』2008 年 12 月号, pp.1-13.

全国保険医団体連合会（2009）「国保資格書明書を交付された被保険者の受診率（2007 年度） の調査結果について」（http://hodanren.doc-net.or.jp/news/tyousa/090615kokuho.html、2012 年 3 月 15 日閲覧）

図１　国民健康保険の財政状況と保険料収納率



（注１）　収納率は、居所不明者分調定額を控除した調定額を用いて算出している。（小数点第２位未満四捨五入）

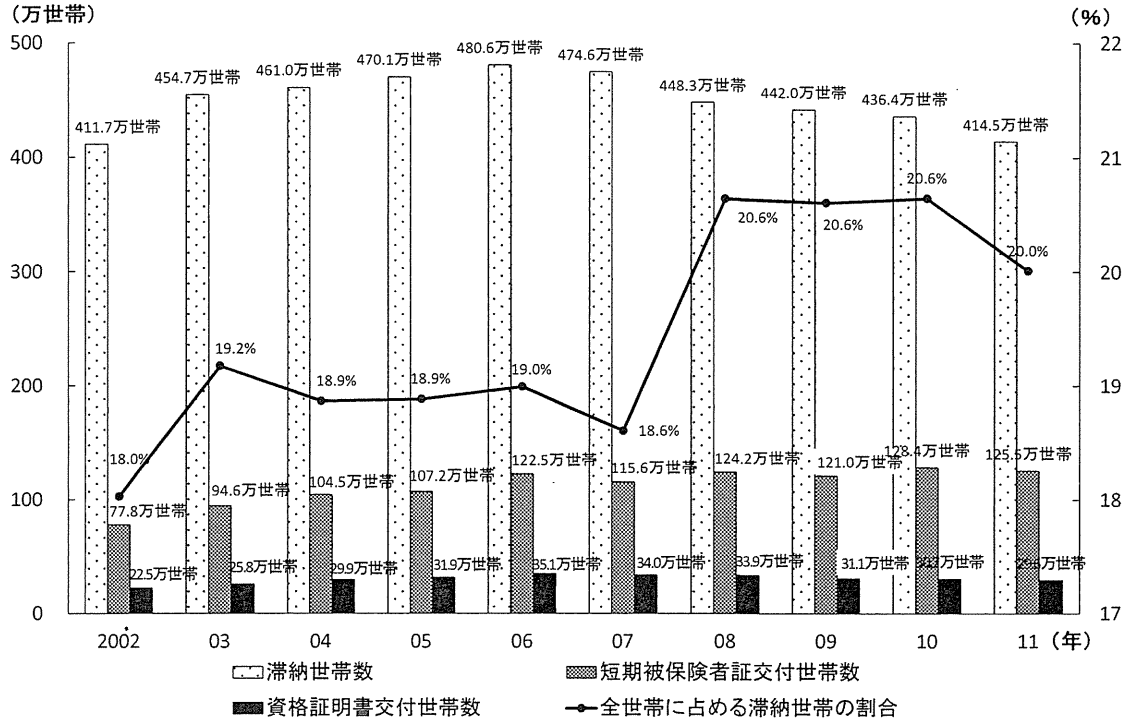
（注２）　2000 年度以降の調定額等は介護納付金、2008 年度以降は後期高齢者支援金を含んでいる。

（注３）　2010 度の収納率は速報値である。

（注４）　単年度収支は一般会計繰入金(赤字補填を目的とするもの）を除いた場合の精算後単年度収支差引額である。

（注５）　2010 年度の単年度収支は見込額である。

図２　短期証・資格証交付世帯等の推移



注１：各年６月１日現在。ただし、2007 年以前の全世帯数は各年３月 31 日現在。

注２：2007 年以降の滞納世帯数は６月１日現在で国民健康保険の資格を有する世帯とすることを明確化したところであり、2006 年までとの比較には注意を要する。

注３：2011 年は福島県の一部の町（広野町、楢葉町、富岡町、大熊町、双葉町、浪江町及び新地町）については含まれていない。

注４：2011 年は速報値。

資料：厚生労働省「平成 19 年度国民健康保険(市町村)の財政状況等について」(2009 年１月 16 日報道発表資料)、同「平成 20 年度国民健康保険(市町村)の財政状況等について」(2010 年２月 22 日報道発表資料)、同「平成 21 年度国民健康保険(市町村)の財政状況等について」(2011 年２月４日報道発表資料)、同「平成 22 年度国民健康保険(市町村)の財政状況について」(2012 年２月３日報道発表資料)、四方・田中・大津(2012)より筆者作成。

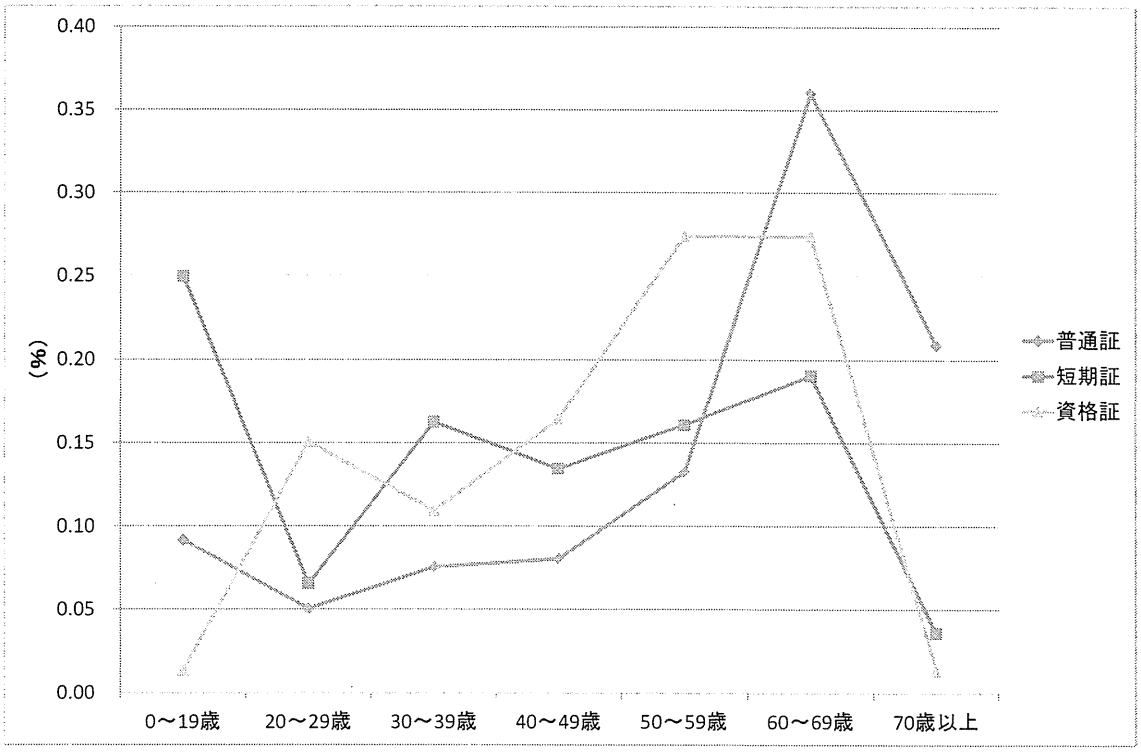
表 1　普通証・短期証・資格証別の医療機関受診確率

	医療機関受診確率(%)								
				入院			外来		
	普通証	短期証	資格証	普通証	短期証	資格証	普通証	短期証	資格証
2010年9月	52.4	28.1	1.4	2.8	1.0	0.0	50.9	27.8	1.4
2010年10月	52.9	26.5	2.7	3.0	0.9	0.0	51.2	25.9	2.7
2010年11月	52.4	25.1	1.4	2.8	1.3	0.0	50.7	24.7	1.4
2010年12月	53.3	26.6	1.5	3.0	1.3	0.0	51.7	26.4	1.5
2011年1月	50.9	23.0	2.9	3.0	1.1	0.0	49.4	22.8	2.9
2011年2月	51.3	23.7	1.5	2.9	1.1	1.5	49.6	23.7	0.0
2011年3月	53.5	25.8	2.9	3.0	0.7	1.5	52.0	25.6	1.5
延べ	52.4	25.5	2.1	2.9	1.0	0.4	50.8	25.2	1.6

注：2011 年度末までに 19 歳に達するサンプルに限定。年度末時点で 18 歳以下の高校生世代には、資格証が発行されないため。

出所：筆者作成。

図 3　普通証・短期証・資格証別の年齢分布（2010 年 10 月）



注 1：各月に 1 日以上で加入している場合は集計対象に含めている。

注 2：普通証の交付者は、月内に短期証・資格証の交付を受けていない場合。

注 3：短期証の交付者からは月内に資格証の交付を受けている者を除く。

表２　記述統計量

Variable	Mean	Std. Dev.	Min	Max
女性ダミー	0.55	0.50	0	1
年齢	53.43	19.54	0	74
0-2歳	0.01	0.10	0	1
3-6歳	0.02	0.13	0	1
7-12歳	0.03	0.17	0	1
70-74歳	0.20	0.40	0	1
世帯所得(万円)	1042.39	1714.11	1.7	35285.1
短期証	0.06	0.24	0	1
資格証	0.01	0.09	0	1
地区0ダミー	0.00	0.02	0	1
地区1ダミー	0.05	0.21	0	1
地区2ダミー	0.07	0.25	0	1
地区3ダミー	0.23	0.42	0	1
地区4ダミー	0.22	0.41	0	1
地区5ダミー	0.02	0.15	0	1
地区6ダミー	0.07	0.25	0	1
地区7ダミー	0.07	0.25	0	1
地区8ダミー	0.24	0.43	0	1
地区9ダミー	0.03	0.18	0	1

（注）X市データより筆者作成。

表３　分析結果（全被保険者）

1st step	受診確率 Probit		受診確率 Probit	
	係数	限界効果	係数	限界効果
女性ダミー	0.08545 **	0.03407	0.07217 **	0.02878
	[0.02634]	[0.01050]	[0.02644]	[0.01054]
年齢	-0.00545	-0.00218	-0.00946	-0.00377
	[0.00612]	[0.00244]	[0.00616]	[0.00246]
年齢二乗	0.00029 ***	0.00012	0.00034 ***	0.00013
	[0.00007]	[0.00003]	[0.00007]	[0.00003]
0-2歳	1.02258 ***	0.35125	0.98376 ***	0.34171
	[0.17267]	[0.04243]	[0.17288]	[0.04410]
3-6歳	0.84457 ***	0.30437	0.80016 ***	0.29145
	[0.14404]	[0.04159]	[0.14421]	[0.04310]
7-12歳	0.09498	0.03786	0.07375	0.02941
	[0.11357]	[0.04518]	[0.11372]	[0.04530]
70-74歳	0.14004 **	0.05581	0.11518 *	0.04592
	[0.04752]	[0.01888]	[0.04767]	[0.01897]
ln(世帯所得)			-0.03327 ***	-0.01327
			[0.00478]	[0.00191]
短期証	-0.41347 ***	-0.16062	-0.43323 ***	-0.16786
	[0.05934]	[0.02191]	[0.05951]	[0.02180]
資格証	-1.77222 ***	-0.46055	-1.84619 ***	-0.4661
	[0.30681]	[0.02578]	[0.30999]	[0.02289]
地区0ダミー	-0.4022	-0.15569	-0.49588	-0.18916
	[0.77624]	[0.28365]	[0.78172]	[0.27331]
地区1ダミー	-0.24018 ***	-0.09484	-0.24363 ***	-0.09616
	[0.06645]	[0.02576]	[0.06654]	[0.02577]
地区2ダミー	-0.09459 +	-0.03766	-0.09075	-0.03613
	[0.05700]	[0.02262]	[0.05711]	[0.02267]
地区4ダミー	-0.09007 *	-0.03589	-0.08658 *	-0.0345
	[0.03884]	[0.01545]	[0.03890]	[0.01547]
地区5ダミー	-0.24763 **	-0.09765	-0.21655 *	-0.08559
	[0.09128]	[0.03524]	[0.09134]	[0.03551]
地区6ダミー	-0.09528 +	-0.03793	-0.08389	-0.03341
	[0.05718]	[0.02269]	[0.05728]	[0.02275]
地区7ダミー	-0.18171 **	-0.07206	-0.18373 **	-0.07285
	[0.05708]	[0.02241]	[0.05724]	[0.02246]
地区8ダミー	-0.09268 *	-0.03693	-0.10952 **	-0.04362
	[0.03786]	[0.01506]	[0.03801]	[0.01511]
地区9ダミー	-0.1613 *	-0.06401	-0.19609 *	-0.07763
	[0.07802]	[0.03068]	[0.07825]	[0.03057]
定数項	-0.64006 ***		-0.38386 **	
	[0.13158]		[0.13682]	
N	9942		9942	
R-sq				
pseudo R	0.089		0.092	
log likelihood	-6278.00		-6253.75	

2nd step	受診日数 NB	受診日数 NB
女性ダミー	-0.18242 ***	-0.19817 ***
	[0.03623]	[0.03331]
年齢	0.05899 ***	0.03703 ***
	[0.00864]	[0.00864]
年齢二乗	-0.00093 ***	-0.00065 ***
	[0.00011]	[0.00011]
0-2歳	-0.64641 +	-0.75948 *
	[0.37464]	[0.35027]
3-6歳	-0.79331 *	-0.86088 **
	[0.32502]	[0.30225]
7-12歳	-0.07478	-0.14273
	[0.19182]	[0.18836]
70-74歳	0.08244	0.02169
	[0.05679]	[0.05358]
ln(世帯所得)		-0.05982 ***
		[0.00885]
短期証	0.30527 *	0.24886 +
	[0.14385]	[0.13931]
資格証	2.31952 *	1.85799 *
	[0.95647]	[0.92340]
逆ミルズ比	-1.92019 ***	-1.77526 ***
	[0.39320]	[0.36376]
定数項	2.62947 ***	3.06425 ***
	[0.57602]	[0.49078]
N	4953	4953
R-sq		
pseudo R-sq	0.006	0.02
log likelihood	-11257.72	-11094.37

2nd step	医療費 OLS	医療費 OLS
女性ダミー	-26595.19 *** [6265.08]	-26274.49 *** [5863.91]
年齢	2648.16 + [1496.84]	1699.72 [1509.68]
年齢二乗	-44.94 * [18.68]	-27.61 [19.37]
0-2歳	-21287.11 [62477.05]	-2742.6 [59182.41]
3-6歳	-72299.11 [54038.12]	-55234.11 [50806.31]
7-12歳	-7771.44 [31184.89]	-7335.9 [30878.08]
70-74歳	-12095.31 [9749.53]	-14276.24 [9384.78]
ln(世帯所得)		-3699.82 * [1551.92]
短期証	45187.14 + [24515.60]	33223.08 [24171.79]
資格証	160499.69 [161296.00]	89333.67 [158844.64]
逆ミルズ比	-1.38E+05 * [66416.46]	-1.01E+05 [62681.51]
定数項	179785.93 + [96747.70]	162747.49 + [83637.45]
N	4953	4953
R-sq	0.006	0.013
adj. R-sq	0.004	0.011

2nd step	ln(医療費) OLS	ln(医療費) OLS
女性ダミー	-0.16632 *** [0.04491]	-0.17622 *** [0.04188]
年齢	0.03635 *** [0.01073]	0.02676 * [0.01078]
年齢二乗	-0.0005 *** [0.00013]	-0.00037 ** [0.00014]
0-2歳	0.03722 [0.44786]	0.02548 [0.42268]
3-6歳	-0.1992 [0.38737]	-0.199 [0.36285]
7-12歳	0.03032 [0.22355]	0.01058 [0.22053]
70-74歳	0.12081 + [0.06989]	0.0831 [0.06703]
ln(世帯所得)		-0.03664 *** [0.01108]
短期証	0.25277 [0.17574]	0.21122 [0.17263]
資格証	1.78859 [1.15624]	1.4591 [1.13445]
逆ミルズ比	-1.15498 * [0.47610]	-1.05543 * [0.44767]
定数項	9.97459 *** [0.69353]	10.16897 *** [0.59733]
N	4953	4953
R-sq	0.014	0.028
adj. R-sq	0.012	0.026

2nd step	一日当医療費 OLS	一日当医療費 OLS
女性ダミー	-1730.77 *** [413.39]	-1724.58 *** [387.98]
年齢	106.07 [98.78]	72.48 [99.89]
年齢二乗	-0.71 [1.23]	-0.06 [1.28]
0-2歳	4444.66 [4121.38]	5297.31 [3914.56]
3-6歳	-546.37 [3564.71]	201.08 [3360.56]
7-12歳	363.25 [2057.76]	385.03 [2043.05]
70-74歳	-629.79 [643.22]	-700.48 [620.85]
ln(世帯所得)		-160.32 [102.66]
短期証	1747.56 [1617.08]	1222.17 [1598.84]
資格証	771.06 [10638.87]	-2106.13 [10506.01]
逆ミルズ比	-1941.21 [4380.83]	-357.8 [4145.98]
定数項	8064.98 [6381.55]	7272.73 [5531.74]
N	4948	4948
R-sq	0.01	0.012
adj. R-sq	0.008	0.01

2nd step	ln(一日当医療費) OLS	ln(一日当医療費) OLS
女性ダミー	-0.08937 ** [0.02828]	-0.08674 ** [0.02655]
年齢	0.01211 + [0.00676]	0.00988 [0.00683]
年齢二乗	-0.0001 [0.00008]	-0.00005 [0.00009]
0-2歳	0.35371 [0.28198]	0.43918 [0.26783]
3-6歳	0.13926 [0.24389]	0.21431 [0.22992]
7-12歳	0.03654 [0.14079]	0.04183 [0.13978]
70-74歳	-0.00058 [0.04401]	-0.00284 [0.04248]
ln(世帯所得)		-0.01023 [0.00702]
短期証	0.15119 [0.11064]	0.10526 [0.10939]
資格証	0.23743 [0.72790]	-0.01042 [0.71881]
逆ミルズ比	-0.22025 [0.29973]	-0.07593 [0.28366]
定数項	8.56168 *** [0.43662]	8.45288 *** [0.37847]
N	4948	4948
R-sq	0.014	0.015
adj. R-sq	0.012	0.013

注：+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001。

出所：X 市データより筆者ら推計。

表4　分析結果（世帯主に限定）

1st step	受診確率 Probit		受診確率 Probit	
	係数	限界効果	係数	限界効果
女性ダミー	0.09007 *	0.03586	-0.03724	-0.01485
	[0.03890]	[0.01546]	[0.04299]	[0.01714]
年齢	-0.02244 +	-0.00895	-0.02783 *	-0.01109
	[0.01308]	[0.00521]	[0.01315]	[0.00524]
年齢二乗	0.00044 ***	0.00017	0.00051 ***	0.0002
	[0.00013]	[0.00005]	[0.00013]	[0.00005]
70-74歳	0.10757	0.04278	0.0674	0.02684
	[0.06613]	[0.02622]	[0.06644]	[0.02641]
ln(世帯所得)			-0.04904 ***	-0.01955
			[0.00689]	[0.00275]
短期証	-0.50333 ***	-0.19562	-0.50693 ***	-0.19688
	[0.08236]	[0.03011]	[0.08261]	[0.03013]
資格証	-1.97831 ***	-0.49747	-2.08291 ***	-0.50326
	[0.41503]	[0.02740]	[0.42168]	[0.02300]
地区1ダミー	-0.32176 ***	-0.12713	-0.33045 ***	-0.13046
	[0.09631]	[0.03715]	[0.09652]	[0.03714]
地区2ダミー	-0.06807	-0.02715	-0.05916	-0.0236
	[0.08160]	[0.03255]	[0.08195]	[0.03269]
地区4ダミー	-0.14487 **	-0.05774	-0.12744 *	-0.05081
	[0.05329]	[0.02121]	[0.05354]	[0.02132]
地区5ダミー	-0.32762 *	-0.12927	-0.28588 +	-0.11314
	[0.14671]	[0.05634]	[0.14663]	[0.05687]
地区6ダミー	-0.13029	-0.05194	-0.1112	-0.04434
	[0.08334]	[0.03315]	[0.08354]	[0.03326]
地区7ダミー	-0.24498 **	-0.09729	-0.24525 **	-0.09738
	[0.08247]	[0.03237]	[0.08276]	[0.03247]
地区8ダミー	-0.07155	-0.02853	-0.08247	-0.03288
	[0.05155]	[0.02056]	[0.05176]	[0.02064]
地区9ダミー	-0.11495	-0.04583	-0.15712	-0.06259
	[0.10398]	[0.04139]	[0.10469]	[0.04152]
定数項	-0.13835		0.1876	
	[0.30959]		[0.31399]	
N	5102		5102	
R-sq				
pseudo R-sq	0.073		0.08	
log likelihood				

2nd step	受診日数 NB	受診日数 NB
女性ダミー	0.13977 **	-0.0826
	[0.05130]	[0.05168]
年齢	0.08177 ***	0.05056 **
	[0.01759]	[0.01786]
年齢二乗	-0.001 ***	-0.00064 **
	[0.00020]	[0.00020]
70-74歳	0.00163	-0.09173
	[0.07723]	[0.07398]
ln(世帯所得)		-0.07459 ***
		[0.01508]
短期証	0.08606	0.09443
	[0.19949]	[0.19677]
資格証	1.9127	1.5767
	[1.30767]	[1.28538]
逆ミルズ比	-1.3694 **	-1.37181 **
	[0.43561]	[0.42802]
定数項	1.08345 +	1.93422 ***
	[0.62714]	[0.56142]
N	2659	2659
R-sq		
pseudo R-sq	0.005	0.021
log likelihood		

2nd step	医療費 OLS	医療費 OLS
女性ダミー	-11066.39 [9757.52]	-20081.87 + [10260.02]
年齢	5045.93 [3446.79]	3828.46 [3531.44]
年齢二乗	-62.42 [38.34]	-44.22 [40.39]
70-74歳	-18124.73 [14666.48]	-21866.47 [14354.42]
ln(世帯所得)		-3308.76 [2921.49]
短期証	38011.02 [38158.33]	33631.75 [38124.10]
資格証	200655.65 [247230.44]	147046.85 [248330.03]
逆ミルズ比	-1.47E+05 + [81651.58]	-1.28E+05 [81356.98]
定数項	105012.6 [116292.57]	112019.27 [105107.80]
N	2659	2659
R-sq	0.003	0.01
adj. R-sq	0.001	0.007

2nd step	ln(医療費) OLS	ln(医療費) OLS
女性ダミー	-0.02523 [0.06481]	-0.16268 * [0.06781]
年齢	0.05744 * [0.02289]	0.04514 + [0.02334]
年齢二乗	-0.00065 * [0.00025]	-0.00048 + [0.00027]
70-74歳	0.12727 [0.09742]	0.07209 [0.09487]
ln(世帯所得)		-0.0469 * [0.01931]
短期証	0.14187 [0.25346]	0.15094 [0.25195]
資格証	2.40393 [1.64215]	2.07492 [1.64116]
逆ミルズ比	-0.90565 + [0.54235]	-0.8582 [0.53767]
定数項	9.03992 *** [0.77244]	9.35714 *** [0.69464]
N	2659	2659
R-sq	0.006	0.022
adj. R-sq	0.003	0.019

2nd step	一日当医療費 OLS	一日当医療費 OLS
女性ダミー	-1442.36 * [595.50]	-1717.55 ** [628.28]
年齢	100.92 [210.33]	77.5 [216.17]
年齢二乗	-0.51 [2.34]	-0.19 [2.47]
70-74歳	-270.01 [895.22]	-376.67 [878.95]
ln(世帯所得)		-94.31 [178.86]
短期証	1390.99 [2328.33]	1401.46 [2333.60]
資格証	3477.81 [15085.38]	2843.99 [15200.45]
逆ミルズ比	-1349.15 [4982.37]	-1248.42 [4979.96]
定数項	6938.71 [7096.33]	7561.4 [6434.02]
N	2657	2657
R-sq	0.006	0.007
adj. R-sq	0.003	0.004

2nd step	ln(一日当医療費) OLS	ln(一日当医療費) OLS
女性ダミー	-0.10608 ** [0.04044]	-0.12532 ** [0.04265]
年齢	0.01827 [0.01428]	0.01504 [0.01467]
年齢二乗	-0.00017 [0.00016]	-0.00011 [0.00017]
70-74歳	0.03739 [0.06079]	0.03169 [0.05966]
ln(世帯所得)		-0.0082 [0.01214]
短期証	0.16579 [0.15811]	0.13436 [0.15840]
資格証	1.03085 [1.02439]	0.82547 [1.03180]
逆ミルズ比	-0.28803 [0.33833]	-0.18719 [0.33804]
定数項	8.48708 *** [0.48188]	8.44824 *** [0.43674]
N	2657	2657
R-sq	0.01	0.011
adj. R-sq	0.007	0.008

注：+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001。

出所：X 市データより筆者ら推計。

Health Effects on Labor Participation of Japanese Elderly Males*

Junya Hamaaki (corresponding author)†
Research Officer
Economic and Social Research Institute, Cabinet Office, Government of Japan

Haruko Noguchi‡
Senior Researcher
National Institute of Population and Social Security Research

March 2012

* This study was supported by grants from Research on Policy Planning and Evaluation of Health Labour Sciences Research Grant by the Ministry of Health, Labour and Welfare in Japan to the National Institute of Population and Social Security Research (PI: Nobuyuki Izumida-# H22-seisaku ippan-008) in 2011. We thank Prof. Shinya Kajitani of Meisei University for a thorough review of this paper and helpful suggestions at Japan Japanese Economic Association.
† Address: Economic and Social Research Institute, Cabinet Office, Government of Japan, 3-1-1, Kasumigaseki, Chiyoda-ku, Tokyo 100-8970 Japan; Tel: +81-3-3581-0930; Fax: +81-3-3581-0571 ; E-mail: junya.hamaaki@cao.go.jp
‡ Address: Department of Theoretical Social Security Research, National Institute of Population and Social Security Research, Hibiya Kokusai Building 6th Floor, 2-2-3 Uchisaiwai-cho, Chiyoda-ku, Tokyo Japan,100-0011; Tel: +81-3-3595-2989; Fax: +81-3-3591-4816; E-mail: hnoguchi@ipss.go.jp

1. Introduction

In graying society like Japan, withdrawal from the labor market and then income reduction among middle and older-aged workers is an urgent and significant policy issue. This is not only because an elderly person would face various risks, but also because the prospect sustainability of social security system highly depends on the economic capability of an individual household under the current stringent financial state of affairs in Japanese government. Health deterioration is one of the most significant causes for older people to leave the labor market in Japan. According to the "Survey on Employment Conditions of Elderly Persons (2004)" conducted by the Ministry of Health, Labour and Welfare (MHLW) in Japan, 39% of males do not work and even have no wish to work due to their "poor health," which shares the highest percentage among various causes withdrawing the labor market (i.e., "domestic works" for females (28%)).

Proactive disease prevention programs and/or private and social health care insurance systems would be valid for reducing and sharing health-related risks when people become old. Also, public assistance and mutual aids among household members, relatives, and regional social networks could play compelling roles to secure basic income after people get older and sicker. For constructing these socio-economic policies, it is inevitable to assess the quantitative effects of health deterioration on labor participation and income, as well as, to evaluate cost effectiveness among these policies. However, not many empirical studies have been accumulated. One reason is the lack of appropriate data in Japan. Beyond that, since an individual health status would be associated with various aspects, such as genetic factors, lifestyle, life events (i.e., employment, marriage, and child birth), untangling complicated and comprehensive

causalities between these factors and health status is challenging to be adjusted in statistical models (Adams, Hurd, McFadden, et al., 2003; Noguchi, 2008). And finally, measurement errors which often occur when asking self-reported health status would be major sources of endogeneity biases in the estimated health effects. In particular, this study addresses a tendency of those who are not working to justify their behavior by false poor health ("justification behavior") (Chirikos and Nestel, 1984; Anderson and Burkhauser, 1985; Bazzoli, 1985; Bound, 1991; Waidmann et al., 1995; Dwyer and Mitchell, 1999).

The main objective of this study is to investigate the relation between health status and labor participation among middle- and old-aged males, using unique panel data "Survey on Health and Retirement" conducted from 2008 through 2010 by the National Institute of Population and Social Security Research (NIPSSR). In this study, we will focus on males, because female labor participations are more likely to be affected by other various factors such as marriage and child birth than health status, compared to male labor participation, and therefore, it should be intricate to extract pure health effects adjusted for these factors. In order to control endogeneity biases in the estimated health effects, we apply body mass index (BMI)[4] at age 30 and parent clinical history as instrumental variables (IVs). Our analysis focuses on the effect of three types of health measures within the past 3 years before the date of survey; (1) the number of diagnosed diseases, (2) the clinical history of three major diseases (cancer or malignant tumore, cerebral stroke and cerebrovascular diseases, and heart diseases,), and (3) the clinical history of lifestyle related diseases (hypertension, hyperlipidemia, diabetes, and gout). We might be able to observe direct and immediate effects of health status within

[4] BMI is one of standard measures to indicate obesity, which is calculated by weight (kg)/squared height (m).

relatively shorter periods - 3 years – on the probabilities of not working and being retired from the labor market, and average working hours per week. Also, we include market hourly wage rate at each study period as an opportunity cost of "not working" or "being retired" for adjusting individual economic incentives.

Our empirical results show that the deterioration of health status would have a significant negative effect on the probability of not working and being retired from the labor market, and also it would tend to decrease average working hours per week. In particular, for those who have the history of three major diseases, both rates of not working and being retired tend to increase by approximately 52-83 and 57 percentage points, respectively, and working hours per week would be shortening by about 17 hours. Further, working status for males who are 60 years and older would be influenced by the number of diagnosed diseases and the clinical history of lifestyle related diseases more significantly than those under 60, while the clinical history of three major diseases has a significant effect on both age groups.

This paper is organized as follows. Section 2 reviews previous literatures. Section 3 describes our data. Section 4 examines the relation between health status and labor participation by basic statistics. Section 5 presents the empirical strategy of this paper and discusses the validity of our instrumental variables. Section 6 explains our empirical results and the final section concludes.

2. Previous studies

In the U.S. and Europe, numbers of studies have thus far conducted the effects of health status on elderly people's retirement behavior. And necessarily, respectable debates have been made about endogeneity biases of self-reported health status to the outcomes of

regressional analyses and choice of IVs[5]. In particular, many studies have been addressing the validity of subjective and self-reported health status as health measurements. Some studies reported that subjective health status and the probablity of being dead in the near future would have a significant positive correlation. On the other hand, others showed that subjective and self-reported health measures could highly depend on whether a respondent is optimistic or pesimistic and therefore these health measures are incomparable among individuals (Bound, 1991; Bound et al, 1999). This could be a cause of attenuation bias, i.e., a bias toward zero, to statistical effects of health status due to random measurement errors caused by an unobservable respondent's personality. Also, numerous literatures pointed out that those who are not working would tend to justify their behavior by false poor health ("justification behavior") (Chirikos and Nestel, 1984; Anderson and Burkhauser, 1985; Bazzoli, 1985; Bound, 1991; Waidmann et al., 1995; Dwyer and Mitchell, 1999). If this is true, poorer health can be observable more likely for both retirees and those who reduced their working hours considerably, all other things being equal. Hence, health effects on labor participation can be overestimated. A solution of avoiding the endogeneity problem could be using more objective health status such as activities of daily living (ADL), but Mathiowetz and Lair (1994) pointed out that it still remained measurement errors as long as the data are self-reported. Even though we apply perfect health measures, we cannot easily stay away from the endogeneity issue because of severe causality between health status and working status (and/or working hours). Various IVs were applied in previous studies, such as duration of dates between the survey and death (Bound, 1991), divorce and separation with spouses (Haveman et al., 1994), and parent health and

[5] Currie and Madrian (1999) and Baker et al. (2004) conducted comprehensive surveys of studies on the relation of health status and wage, working hours, and labor participation.

survival status (Dwyer and Mitchell, 1999).

Only few Japanese studies had evaluated health effects on income, labor participation, and/or retirement behavior, addressing the endogeneity biases of health measurements (Iwamoto, 2000; Oishi, 2000; Hamaaki and Noguchi, 2009, and Hamaaki and Noguchi, 2010). Using a nationally representative survey "Comprehensive Survey of People's Living Conditions (CSPLC)" (1989, 1992, and 1995) conducted by MHLW, Iwamoto (2000) found that health deterioration would have a significant negative impact on income status. This study used four health measures - subjective health, any difficulties to work, presence of diagnosed diseases and subjective symptoms -, and applied a two-stage simultaneous equation approach for estimating the health indexes, wage, and labor participation, as endogenous variables. Here, average health status of other household members and a respondent's daily activities (i.e. eating, exercising, and sleeping) for maintaining his or her own physical and mental health are used as exogenous variables, in order to identify wage and labor supply functions from a health function. Iwamoto found a mechanism such that a respondent's health status might be significantly affected by other family members' health reflecting their lifestyle and needs for care. However, there are not many control variables to capture the change in health status in CSPLC, so that the value of pseudo R-square is not high enough. Ohishi (2000) used the same analytical framework as Iwamoto's study, using a different data set, "Survey on Employment Conditions of Elderly Persons" (1996). This study utilized two health measures – current subjective health and any physical difficulties to work on full-time basis. In this study, prefecture-level average life expectancy for males and its squared values are employed as IVs. But, since these instruments do not have significant impacts on an individual health status in the first stage, the results of wage

and labor supply functions in the second stage are not robust. Obviously, it is a big challenge to find appropriate exogenous IVs to affect people's current health status. Hamaaki and Noguchi (2009) proposed other possible instruments, the accessiblity of each individual to clinical resources (a travel distance (km) from an individual's home to the nearest medical facility and the intensity of medical resources by medical zone ("*Niji Iryoken*")) and BMI at age 30 to control for the endogeneity. Using a unique panel data, "Survey on Health and Retirement" conducted from 2008 through 2009 by NIPSSR, this study estimate health effects on the probability of labor participation. Here, four health measures are used - subjective health status, difficulties to daily life and work, the current number of diagnosed diseases, and disease score calculated by principle component analysis. A travel distance from home to the nearest hospital or clinic would be significantly correlated with all health measures[6], while significant relations between the intensity of medical resources and health status are not observed. On the other hand, obesity in younger age tends to have a negative effect on health status in middle- and older age. Yet, they concluded that the correlations are not robust enough to overcome weak identification problem.

In addtion to BMI at age 30, this study employs parent clinical history as a new instrument, which might reflect a respondent's genetic factors. Actually, Hamaaki and Noguchi (2010) had already show that BMI at age 30 and parent clinical history could technically satisfy with tests for weak and over identification and also high values of pseudo R-square could be achieved. Unlike Hamaaki and Noguchi (2010) focusing on a respondent's life-span clinical history until the date of survey, we will evaluate direct

[6] Longer travel distance would have a negative impact on elderly people's health status in urban areas, while it could have a positive effect in rural areas. That might reflect a reversed causality, such that unhealthy elderly persons tend to reallocate themselves close to medical facilities in small town and village, because scarce source of medical resource (Hamaaki and Noguchi, 2009).