





< 1>

( : , %)

		(A=B+C)	(B)	(C=E+F)	(D=C/A x 100)	(E)	(F)	(G=F/D x 100)
1997	1	20,510	7,475	13,035	63.6	7,321	5,713	43.8
	2	21,382	8,062	13,319	62.3	7,282	6,038	45.3
	3	21,402	8,125	13,277	62.0	7,061	6,216	46.8
	4	21,132	7,859	13,273	62.8	6,942	6,331	47.7
1998	1	19,762	7,442	12,319	62.3	6,765	5,555	45.1
	2	20,244	8,024	12,220	60.4	6,526	5,694	46.6
	3	20,049	7,998	12,051	60.1	6,329	5,721	47.5
	4	19,924	7,752	12,172	61.1	6,207	5,966	49.0
1999	1	19,105	7,248	11,857	62.1	6,030	5,827	49.1
	2	20,362	7,862	12,500	61.4	5,989	6,511	52.1
	3	20,695	7,994	12,701	61.4	6,044	6,657	52.4
	4	20,962	7,930	13,031	62.2	6,138	6,893	52.9
2000	1	20,313	7,442	12,871	63.4	6,124	6,747	52.4
	2	21,268	8,059	13,209	62.1	6,231	6,978	52.8
	3	21,395	8,218	13,177	61.6	6,282	6,895	52.3

:

1997 3/4 2,140 2 1999 1/4 1,910 5  
 가 2000 3/4 2,139 5  
 가 , 3  
 1,327 7 1,317 7 10 812 5  
 821 8 9 3 가 .

가 . ,  
 1997 3/4 706 1 628 2 77 9  
 ( + ) 621 6 689 5 67 9 가 .  
 46.8% 52.3% 34)  
 가

, ,  
 .5)

(2000) 1999  
 68 112 57%  
 4 5 4  
 27%  
 1 (2000) 19.3%가 ‘  
 , ( , ‘0 )  
 114.7 , 111.6  
 (2000)  
 “ ( )  
 ”

가 가

- 
- 3) (1999) 가 1995  
 1997 가 가 .
- 4) 가 1980 .  
 10.5% 1998 17.7% 4.7% 13.9% , 1985 7.5%  
 12.7% . 15.6% 32.9%  
 가 가 (Auer and Cazes; 2000).  
 1982 11.0% 가 1997  
 18.8% (Houseman and Osawa; 2000).  
 5) (2000) .

### III.

( , ) 5,000 가 2 13,000 15  
 . 2 1999 7 12  
 . 2  
 , 25,000  
 ( )  
 ) ( ) , , , ,  
 / / /  
 /  
 가 가 / 가 가 가  
 .  
 가 가 ( , 가  
 ) ) 가 가  
 .  
 ( 3,748 , 3,535 ) 14,882 ( 8,365 , 6,517 ) . 7) 7,283

1.

가 < 2>  
 (transition matrix) .  
 가  
 2  
 . 가 4,617 , 가 2,982 .  
 ,

---

6) (2000)  
 가 / 0.8162

7) 1 < 2> .

< 2>

( : , %)

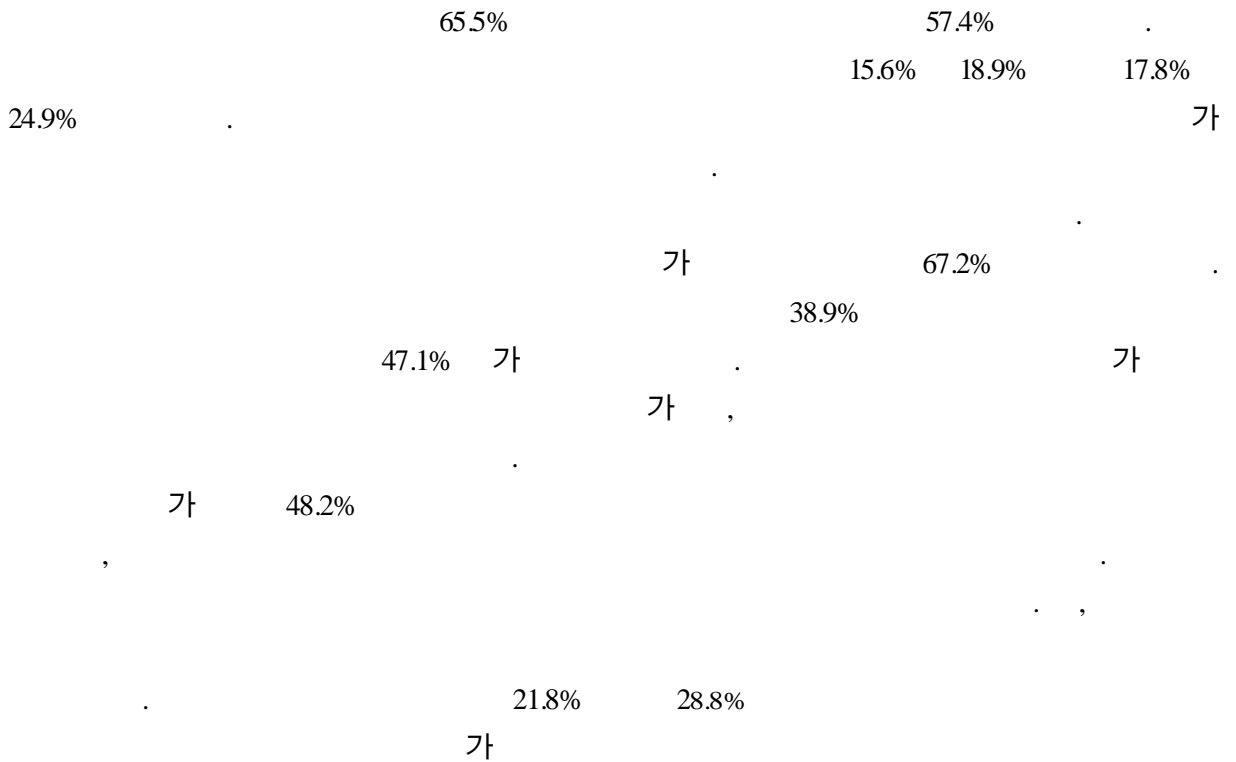

1.

	2,034 (67.2)	364 (12.0)	627 (20.7)	3,025 (100.0)	< 65.5>
	280 (38.9)	339 (47.1)	101 (14.0)	720 (100.0)	< 15.6>
	334 (38.3)	118 (13.5)	420 (48.2)	872 (100.0)	< 18.9>
	2,648 (57.4)	821 (17.8)	1148 (24.9)	4,617 (100.0)	<100.0>

2.

	1,217 (63.9)	406 (21.3)	281 (14.8)	1,904 (100.0)	< 63.8>
	200 (30.8)	361 (55.5)	89 (13.7)	650 (100.0)	< 21.8>
	99 (23.1)	91 (21.3)	238 (55.6)	428 (100.0)	< 14.4>
	1,516 (50.8)	858 (28.8)	608 (20.4)	2,982 (100.0)	<100.0>

: ( ) 가 , < >



가

30.8% 23.1% 38.9% 38.3%

가

가 60.5% (4,617 2,793(=2,034+339+420) ), 가 60.4% (2,982 1,816(=1,217+361+238))

. < 3>

3

( ,

)

2,435

(

n

. , n 3)

(

(n-2)

)

< 3>

((n-1)

)가

(n-2)

n

(n-2)

(

) ,

65.9%, 13.1%, 21.0%

< 2>

가

( , (n-2)

)가

n

가

68.8%

65.9%

(n-2)

가

54.1% 57.7%

(n-2)

가

(n-2)

n

가

가

27.4%

(n-2)

가

n

가

가

(29.4%)

< 3>

(n-1)

가

(n-2)

n

(59.4%)

(n-2)

가

(n-2)

가

(40.0%)

(25.9%)

< 3> (n-2) n (n 3): ( : , %)

(n-2)	n				
1. (n-1) 가					
	834 (68.8)	136 (11.2)	242 (20.0)	1,212 (100.0)	< 77.2>
	85 (54.1)	43 (27.4)	29 (18.5)	157 (100.0)	< 10.0>
	116 (57.7)	26 (12.9)	59 (29.4)	201 (100.0)	< 12.8>
	1,035 (65.9)	205 (13.1)	330 (21.0)	1,570 (100.0)	<100.0>
2. (n-1) 가					
	70 (40.0)	80 (45.7)	25 (14.3)	175 (100.0)	< 45.0>
	49 (30.6)	95 (59.4)	16 (10.0)	160 (100.0)	< 41.1>
	21 (38.9)	19 (35.2)	14 (25.9)	54 (100.0)	< 13.9>
	140 (36.0)	194 (49.9)	55 (14.1)	389 (100.0)	<100.0>
3. (n-1) 가					
	110 (46.8)	29 (12.3)	96 (40.9)	235 (100.0)	< 49.4>
	16 (36.4)	15 (34.1)	13 (29.5)	44 (100.0)	< 9.2>
	59 (29.9)	20 (10.2)	118 (59.9)	197 (100.0)	< 41.4>
	185 (38.9)	64 (13.4)	227 (47.7)	476 (100.0)	<100.0>

: ( ) 가 , < >

(n-1) 가 .  
 , < 3> 2  
 (59.9%)  
 (n-2) 가 n 가  
 (46.8%) (n-2) 가 n 가  
 (34.1%)  
 < 3> 2  
 가 - -



가 54.1% 27.4%  
40.0% 47.5%

( , (n-2) ) 가 가  
2 - -  
- 가 ,

가 가  
2.

( ) 가 , ,  
가 가

1996 1  
가 1998

2,019 45 8)

(proportional hazard) 가

Cox  
x 가 t

---

8) < 3>

$\lambda(t, x, \beta, \lambda_0)$

$$\lambda(t, x, \beta, \lambda_0) = \phi(x, \beta) \lambda_0(t) \quad (1)$$

$\lambda_0(t)$  t (baseline hazard)

(scale up) (scale down)

가

가

가

가 9)

$d_{ik}$  i variable)

가 k

Cox

가

가 1

(indicator

$$L(\beta_k) = \sum_{i=1}^n \{ d_{ik} \ln \phi(x_i, \beta_k) - \ln [ \sum_{j=1}^n \phi(x_j, \beta_k) ] \} \quad k = 1, 2, 3. \quad (2)$$

$$\phi(x_i, \beta) = \exp(x_i' \beta) \quad (10)$$

< 4>

가

(time-varying covariates)

1 가

가

< 1>

가

가

.11)

9)

(censored)

. Cox

Kiefer(1988)

(1999)

10)

가

exp( )

11)

가  
 가 0 1  
 가  
 .<sup>12)</sup>  
 < 4> . < 4>  
 가

. 가 가  
 . 가

. 가 가  
 가 가

가 가 가  
 가 가 가

가 가 가  
 가 -U 가  
 32 가 34 40 가  
 .<sup>13)14)</sup>  
 가

---

가 (1999)  
 가 10%

12) 가 1996  
 13) , ,  
 5 (0.13583, -0.00213), (0.07340, -0.00108), (0.29609,  
 -0.00370)

14) (1999) (2000) 1  
 가 44 가 U-

가 1996 1998  
 가 U- 가  
 55 60 가 가

		t-		t-		t-	
1.							
a.		0.1358 **	4.12	0.0734 **	2.02	0.2961 **	5.53
		-0.0021 **	-5.21	-0.0011 **	-2.47	-0.0037 **	-5.88
b.	( = )						
		-0.1946	-1.54	0.3159 **	2.37	-0.2572	-1.56
		0.0076	0.06	-0.1293	-0.71	-0.1386	-0.66
		-0.0193	-0.18	-0.3788 **	-2.33	-0.2344	-1.49
c.	( = )						
		0.2842 **	2.61	0.2530	1.58	0.5181 **	2.74
2.							
d.	( = )						
		-0.7599 **	-5.89	0.5042 **	4.01	-0.6351 **	-2.89
		-0.4938 **	-3.58	-0.0276	-0.15	0.3652 **	2.29
e.	( = )						
		-0.0426	-0.46	0.0196	0.14	-0.3724 **	-2.54
		-0.2610 **	-2.10	0.3232 **	2.42	0.0101	0.06
f.	( = )						
		0.2818 **	2.30	-0.3892 *	-1.84	0.0014	0.01
		0.1491	1.45	-0.0465	-0.33	0.0032	0.02
		0.1220	0.74	0.0075	0.04	-0.0132	-0.05
g.							
		-0.0137	-1.21	-0.0276 **	-2.17	0.0043	0.31
3.							
		0.0036	0.33	-0.0193 *	-1.76	-0.0018	-0.14
		-0.0156	-0.79	0.0002	0.02	-0.0247	-0.98
		-0.0034	-0.26	0.0087	0.59	-0.0065	-0.40
		0.0426	1.24	0.0718 **	2.08	0.0030	0.07
4.							
		-0.0656 **	-3.82	0.0468 *	1.74	-0.0466 *	-1.76
	-2Log Likelihood		-9,985.38		-5,617.99		-5,557.81
					2019		

: \*\* 5% , \* 10%



104.8%

가 .16)

#### IV.

가 가 . 1997  
가 가

가 가  
( ; 1999).  
,

가

가

가  
가

가

가

가

가

가

가

가

가 가  
가

가

16)

(2000)

가

가

1%

-0.132

-0.234

가

가

87.6%

79.1%

가

가가

가

가

< >

. , 「 」, 『 』 23 ,  
2000, 81- 108.

, 「 」, 『 』 23  
, 2000, 55- 80.

, 「 」, 『 』 47 1 , 1999, 71- 96.

—— . , 「 」, 『 』 5 2 , 1999,  
105- 126.

. , 「 」, 『 』 23 1 , 2000,  
137- 166.

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< 1> : 1996 - 2000

( : %)

	1	2	3	4	5	6	7	8	9	10	11	12
1996	2.1	2.3	2.2	2.0	1.9	1.9	1.8	1.9	1.8	1.8	2.0	2.3
1997	2.6	3.2	3.4	2.8	2.5	2.3	2.2	2.1	2.1	2.1	2.6	3.1
1998	4.5	5.9	6.4	6.6	6.8	7.0	7.6	7.3	7.2	7.1	7.2	7.9
1999	8.5	8.6	8.0	7.1	6.4	6.2	6.2	5.7	4.8	4.6	4.4	4.8
2000	5.3	5.3	4.7	4.1	3.7	3.6	3.6	3.7	3.6			

< 2> 1

( : , )

1	(A)	(B)	(C=AxB)	(D)	(E=AxD)	(F=B+D)	(G=C+E)
	1	1,566	1,566	1,831	1,831	3,397	3,397
	2	981	1,962	954	1,908	1,935	3,870
	3	565	1,695	421	1,263	986	2,958
	4	323	1,292	215	860	538	2,152
	5	155	775	64	320	219	1,095
	6	84	504	31	186	115	690
	7	43	301	9	63	52	364
	8	21	168	6	48	27	216
	9	3	27	3	27	6	54
	10	5	50	0	0	5	50
	11	0	0	1	11	1	11
	12	1	12	0	0	1	12
	13	1	13	0	0	1	13
		3,748	8,365	3,535	6,517	7,283	14,882

:

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0	2,019	113	40	46	33
1	1,787	225	94	116	46
2	1,306	84	41	34	38
3	1,109	49	26	25	32
4	977	35	22	22	17
5	881	29	25	13	16
6	798	19	16	11	15
7	737	14	12	9	9
8	693	20	24	8	20
9	621	18	13	4	13
10	573	17	9	4	15
11	528	18	8	4	14
12	484	10	13	3	11
13	447	16	13	10	18
14	390	6	6	5	12
15	361	5	11	4	7
16	334	7	7	2	11
17	307	9	8	5	15
18	270	7	6	4	13
19	240	5	0	0	9
20	226	3	6	0	21
21	196	3	5	0	15
22	173	3	4	2	14
23	150	3	3	2	10
24	132	1	0	1	9
25	121	3	3	1	12
26	102	0	1	0	5
27	96	0	0	0	6
28	90	1	3	0	8
29	78	1	3	1	5
30	-	9	7	0	52
	-	733	429	336	521

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< 4>

0.	( )	4.7	6.3	6.9	7.6	4.1	5.3	13.2	11.3
1.									
a.	( , 99 )	35.1	9.2	36.9	11.3	39.5	8.9	38.7	13.8
b.									
		0.13		0.30		0.18		0.22	
		0.12		0.10		0.09		0.10	
		0.23		0.14		0.18		0.25	
c.	( )	0.66		0.67		0.85		0.60	
2.									
d.									
		0.13		0.45		0.11		0.37	
		0.11		0.12		0.29		0.16	
e.									
		0.36		0.25		0.24		0.27	
		0.12		0.31		0.17		0.17	
f.									
		0.18		0.07		0.17		0.16	
		0.49		0.50		0.42		0.37	
		0.07		0.16		0.07		0.17	
g.									
		3.8	5.7	3.3	5.5	5.3	6.4	5.2	8.5
3.									
		6.2	7.1	4.2	6.5	6.9	7.6	6.3	9.7
		0.6	2.5	2.2	4.9	0.8	2.8	1.5	4.8
		1.1	3.6	1.7	4.5	2.4	5.1	2.2	5.8
	( )	2.4	1.5	2.4	1.7	2.4	1.7	2.3	1.7
4.									
	(%)								
		733		429		336		521	