

研究報告書 2000-4

生命保險商品 損益寄與度 分析

- Asset Share -

2000. 3

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保險開發院
保險研究所

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2000 4

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(sensitivity analysis)

(asset share method)

1999

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2000年 3月

保險開發院

院長朴性昱

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1.	4
2.	6
3.	Flow 가	9
.	14
1.	15
2.	24
3.	48
.	68
1.	68
2.	72
.	75
< >	78
< > Asset Share	79

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< -1> FY'94 FY'98 5	22
< -2> 가	23
< -3> . 가	24
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< -5>	32
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< -14>	50
< -15> 가	52
< -1> ()	69
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< -1>	81
< -2> (asset share)	82
< -3> 가	87
< -4>	90
< -5>	95

< 目次 >

< -1>	flow	9
< -2>	cycle	10
< -1>	53
< -2>	55
< -3>	58
< -4>	59
< -5>	61
< -6>	63
< -7>	64
< -8>	65
< -9>	66
< -10>	67

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. , 1998 4 가 , 2000
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1997

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2)

1.4%,

40.5%

1975

58.0%,

, 1998

39.2%,

7.7%,

53.3%

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가 가 가
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TM, CM 가 .
가

2000 4 가 ,
, 1999 9 EU
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가

3) . 가 가

가
 . 가 2
 , 3
 (sensitivity
 analysis) . 4
 5 ,
 가
 가 (asset share method) .

3)

asset share

, 「 , 1998.12.(10) pp. 281 305
 -----, 「 , 1999.12.(12) pp. 173 196

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1.

가 .

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가 가

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가

$$\begin{aligned}
&= - - \\
&+ (-) \\
&+ (-) \\
&= -
\end{aligned}$$

, ,

(i')

(i)

, ,

가

,

$$\begin{aligned}
&= (-) - \\
&= (-) \times \\
&= (i' - i) \times {}_tV_{x:\overline{n}|}
\end{aligned}$$

, (q) 가 (q')
 , (net amount at
 risk) (가)

$$\begin{aligned}
 &= - \\
 &= (-) \times \\
 &= (q - q') \times (1 - {}_tV_{x:\overline{n}|})
 \end{aligned}$$

(e) 가 (e')

$$\begin{aligned}
 &= (-) \times (가) \\
 &= (e - e') \times (S - P')
 \end{aligned}$$

2.

가.

가 가 가
 가 가 가

가

가 가

가 가 ,

가 가 .

가

가 .
가

가
가
가 .

가

가
가 가 ,
가 가 .
가 .
가 .
가 가
가 , 가
가
가 . 가
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가 가
IMF

가
4) 가

가

가

4) 2000 3

가

가 . 가

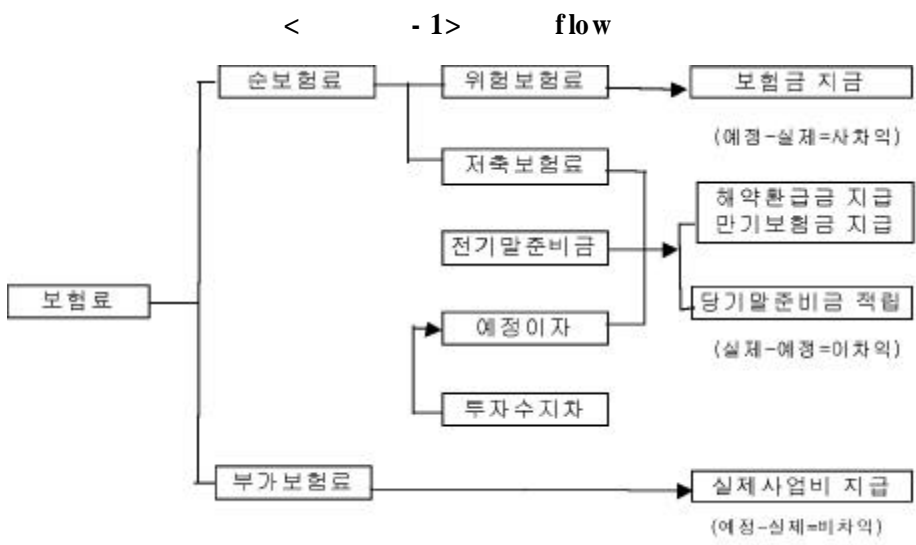
3. Flow 가

가. Flow

가

가

가



: , , 『 』 , , p.284

(profit testing)

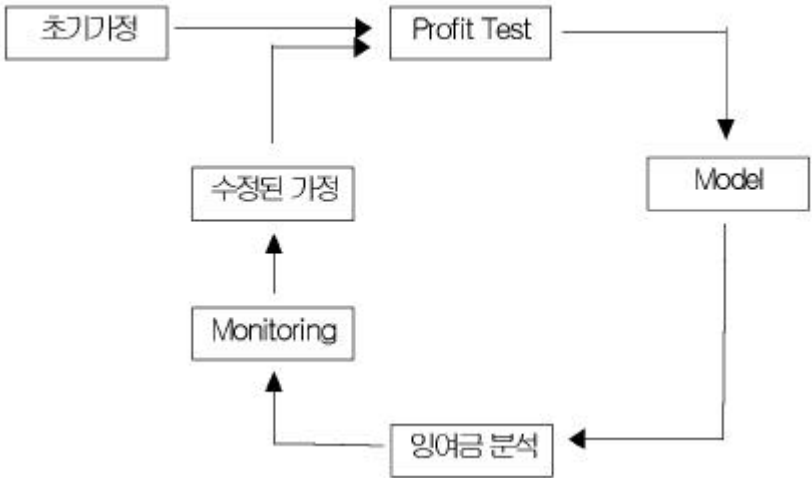
1

가

< -2>

< -2>

cycle



3. 가

가 가

가 .5)

5) Susan Conanat, et al., *Managing for Solvency and Profitability in Life and Health Insurance Companies*, LOMA, 1996, pp. 156 207

1) 가 (net present value of future profit)

가 가

. 가

가

가 (PVFP)

가

$$PVFP = \sum_{t=0}^{\infty} \frac{PROFIT_t}{(1+i)^t}$$

, $PROFIT_t$: t
 i :

2) (internal rate of return)

가 0 가 가

가

가

()

가 . ,

5) (production credit margin)

가 가

$$PCM = \frac{PVFP}{\sum_{t=0}^{\infty} \frac{COMM_t}{(1+i)^t}}$$

, $COMM_t : t$

가 가

PVFP, IRR, DPB, PM,

PCM , 가
 가 , IRR
 15%, DPB() 10 , PM 4%, PCM 20% .⁶⁾
 ,
 n 가 가
 % , 가 %

6) John R. Mungall, *Profit Testing*, The Society of Actuaries of Indonesia, 1993.2, p.14

•

가 . ,

가

가 . 가

가 .

가 , (

), , 7) ,

가

7)

가

1.

가.

가

1,000

10

가

1)

(: 가 1,000)

	1	1,200
	2	300
	2 (10)	100

-

3

- : 6.5%

-

· : 가 30/ 1,000

· : 가 4/ 1,000

· : 3%

(35 가 , 55 , 55)

	691	3,354	4,140

	1	3	5	7	10	15	20
	3,350	10,684	18,954	28,283	44,583	79,539	128,468
	650	8,584	18,097	28,283	44,583	79,539	128,468

2)

(: 가 1,000)

		1,000
		1,000

-

· : 3

·

· : 3

·

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· : 6.5%

· : 7.5%

-

· : 가 30/ 1,000

· : 가 5/ 1,000

· : 3%

(35 가 , 10)

	258	7,086	8,229
	243	6,700	7,846

	1	2	3	4	5	7	10
	7,371	15,222	23,586	32,501	42,005	62,952	100,000
	4,671	12,822	21,486	31,215	41,148	62,952	100,000
	7,034	14,596	22,727	31,474	40,885	61,920	100,000
	4,334	12,196	20,627	30,188	40,028	61,920	100,000

3)

(: 가 1,000)

	1	1,000
	2 6	700 100

-
- : 3
- : 3
-
- : 6.5%
- : 7.5%
-
- : 가 30/ 1,000
- : 가 4/ 1,000
- : 3%

(35 가 ,)

	1,023	1,023	1,686
	873	873	1,553

	1	3	5	7	10	15	20
	885	2,788	4,881	7,168	10,980	18,334	26,920
	0	688	4,024	7,168	10,980	18,334	26,920
	742	2,356	4,154	6,146	9,520	16,193	24,240
	0	256	3,297	6,146	9,520	16,193	24,240

4)

(: 가 1,000)

		1,000
		2,000
		400
	(4 120)	1 10
	(4 120)	1 2
	(1)	500
	(1)	100
	(1)	3
	(1)	0.6

-

· : 3 ,
 · : 3 ,

-

· : 6.5%
 · : 7.5%

-

· : 가 30/ 1,000
 · : 가 5/ 1,000
 · : 3%

(35 가 , 20)

	986	2,474	3,336
	907	2,076	2,944

	1	3	5	7	10	15	20
	46	4,672	12,474	18,264	27,856	46,080	66,720
	0	2,272	11,617	18,264	27,856	46,080	66,720
	42	3,887	10,483	15,453	23,810	40,039	58,880
	0	1,487	9,626	15,453	23,810	40,039	58,880

5)

(: 가 1,000)

		1,000
		2,500
	1 2	150 × 120
	3 6	500 250

-

· : 3 ,
· : 3 ,

-
- : 6.5%
- : 7.5%
-
- : 가 30/ 1,000
- : 가 5/ 1,000
- : 3%

(35 가 , 10)

	489	3,781	4,822
	460	3,187	4,224

	1	2	3	4	5	7	10
	3,614	7,454	11,535	15,876	20,492	30,556	48,220
	914	5,054	9,435	14,590	19,635	30,556	48,220
	3,030	6,280	9,765	13,505	17,515	26,366	42,240
	330	3,880	7,665	12,219	16,658	26,366	42,240

(.) 가
 , 가
 가 .
 가 .

가
 . ,

60%

가 가
 가
 60% 가 .

· , FY'94

FY'98 5 (< -1>) 5
 , 5 (6 10) 5
 1%p , 11 5 2%p
 (< -2>).

가 .

< - 1> FY'94 FY'98 5

	FY'94	FY'95	FY'96	FY'97	FY'98	
(%)	10.8	10.8	10.4	11.0	11.6	10.9

: , 『 』 , 6

< -2> 가

	1 5	6 10	11
(%)	10.9	9.9	8.9

95% ,
 70% , 90%
 .
 . , 가 .
 가 .
 가
 가
 .8) 가 ,
 . 가 .
 , 가 . 1
 . () 35%, 2 30%, 3 20%, 4
 15%, 5 10 10%, 11 5%
 (< -3>). ,
 가 0 . ,
 . 가 .

8) . 가 , 가 , 가

< - 3 > 가

	1	2	3	4	5 10	11
(%)	35%	30%	20%	15%	10%	5%

2 60% ,
 20% , 3
 5% .
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 가 ,
 가 ,
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2.

(Asset Share Method) ,

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 가 1

9)

1 가

9) Asset Share

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가

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가

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$$l_{x+t+1} = l_{x+t} \times (1 - q_{x+t} - qw_{x+t} + \frac{q_{x+t} \times qw_{x+t}}{2})$$

: $l_{x+t} : x+t$

$q_{x+t} : x+t$

$qw_{x+t} : x+t$

.

, r (+) / 2+

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가

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()

가 .10)

가. 「 11) 7

가.

1994 가 가 , , 가
 가 가
 1
 , 2 ()
 < -4> 가 10
 , 가 , 10 9,666 ,
 20 62,313 , ,
 317 ,
 2 32 가 10 1,042 ,
 20 1,400 가 , 21 23

10) = (+ -) × - (+

11) , 『 /2 - 』 , 1999.4

가
. 가 1
956 , 23.1%
. , 가 3.47/ 1,000
8.4%
2 ,
, 가
12) 가 ,
,
가 . , .
(duration)
가 .

12) () 가
.

< - 4 >

1	100,000	0.001104	35%	0	414,039,363	45,130,291	459,169,653
2	64,909	0.001194	30%	71,133,571	268,748,810	37,047,180	305,795,989
3	45,370	0.001296	20%	240,450,114	187,849,659	46,684,675	234,534,334
4	36,243	0.001404	15%	356,191,266	150,060,286	55,181,419	205,241,705
5	30,759	0.001530	10%	450,890,800	127,354,368	63,028,723	190,383,091
6	27,638	0.001674	10%	549,614,563	114,432,199	65,740,629	180,172,828
7	24,830	0.001842	10%	632,610,457	102,805,974	72,806,227	175,612,200
8	22,304	0.002028	10%	704,567,134	92,347,339	78,894,533	171,241,872
9	20,031	0.002232	10%	768,041,415	82,936,225	84,246,786	167,183,011
10	17,985	0.002466	10%	824,729,897	74,464,979	89,020,293	163,485,272
20	9,774	0.006954	5%	1,661,393,918	40,468,207	151,465,729	191,933,936
30	8,570	0.012516	0%	2,256,799,349	0	200,855,142	200,855,142

					1	1
1	350,161,013	2,370,054	23,989,875	388,036,082	779	1,096
2	32,928,993	2,652,247	92,546,567	136,479,447	4,764	5,300
3	23,016,660	6,933,614	82,136,287	118,793,181	8,970	9,828
4	18,386,441	9,336,449	76,871,902	110,542,171	13,409	14,659
5	15,604,352	11,662,858	58,697,818	91,659,328	18,097	19,886
6	13,894,608	10,883,607	66,857,359	97,176,934	23,049	25,478
7	12,482,926	12,054,268	73,702,910	103,655,524	28,283	31,589
8	11,213,016	12,984,365	78,154,791	107,767,591	33,388	38,343
9	10,070,298	13,539,988	81,594,763	110,494,529	38,813	45,857
10	9,041,701	13,941,128	84,151,561	112,423,869	44,583	54,249
20	4,869,027	15,803,411	65,576,124	94,521,002	128,468	190,781
30	88,661	13,197,243	0	116,944,998	106,251	276,582

가 가

1)

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가 26%
. 가 , 5 6,075 , 10
26,327 . 10
3 가 . , ,
703 , 2
450 가 5 846 , 10 1,816
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가 가
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1,578 , 19.2%
. , 가 7.68/ 1,000
9.3%
.
가 .
가 ,

< - 5 >

1	100,000	0.001104	35%	0	822,900,000	99,472,975	922,372,975
2	64,890	0.001194	30%	357,059,859	533,979,810	103,467,538	637,447,348
3	45,346	0.001296	20%	664,061,159	373,152,234	117,489,682	490,641,916
4	36,218	0.001404	15%	891,541,968	298,037,922	133,205,197	431,243,119
5	30,734	0.001530	10%	1,089,559,335	252,910,086	149,333,992	402,244,078
6	27,614	0.001674	10%	1,304,001,040	227,235,606	153,819,564	381,055,170
7	24,806	0.001842	10%	1,486,270,066	204,128,574	169,350,129	373,478,703
8	22,280	0.002028	10%	1,646,843,939	183,342,120	182,985,356	366,327,476
9	20,007	0.002232	10%	1,790,025,783	164,637,603	195,125,288	359,762,891
10	17,962	0.002466	10%	1,919,074,768	147,809,298	206,070,201	353,879,499

					1	1
1	371,272,018	2,273,341	172,394,933	555,536,241	4,800	5,503
2	46,618,286	7,314,454	263,209,394	324,101,834	13,079	14,644
3	32,577,482	15,080,606	205,480,747	258,727,684	21,872	24,616
4	26,019,742	19,883,300	178,825,572	229,684,764	31,215	35,451
5	22,079,926	24,616,269	133,356,103	184,797,548	41,148	47,222
6	19,659,569	22,417,301	149,864,338	196,559,008	51,711	59,916
7	17,660,436	24,842,292	163,888,588	210,904,166	62,952	73,916
8	15,862,070	26,785,499	174,188,277	221,348,696	74,494	89,470
9	14,243,825	28,143,307	182,305,262	229,100,294	86,823	106,841
10	12,787,904	29,157,164	188,511,190	234,864,158	100,000	126,327

< -6> ()

1	100,000	0.001104	35%	0	784,586,000	85,519,874	870,105,874
2	64,909	0.001194	30%	325,427,846	509,266,927	90,981,730	600,248,657
3	45,370	0.001296	20%	616,951,683	355,966,668	106,048,100	462,014,768
4	36,243	0.001404	15%	840,126,861	284,357,504	122,568,796	406,926,300
5	30,759	0.001530	10%	1,043,321,215	241,330,808	140,027,070	381,357,878
6	27,638	0.001674	10%	1,268,278,600	216,843,879	147,027,125	363,871,004
7	24,830	0.001842	10%	1,461,371,033	194,812,704	163,962,190	358,774,894
8	22,304	0.002028	10%	1,636,817,260	174,994,061	179,369,321	354,363,382
9	20,031	0.002232	10%	1,798,538,769	157,160,422	193,614,220	350,774,642
10	17,985	0.002466	10%	1,949,321,568	141,107,792	206,952,507	348,060,299

				1	1	1
1	370,379,723	164,702,355	544,678,028	4,463	5,014	551
2	46,052,756	255,712,364	308,724,820	12,453	13,598	1,145
3	32,189,889	201,060,850	238,839,590	21,013	23,180	2,168
4	25,714,308	173,061,488	203,731,946	30,188	33,919	3,731
5	21,823,425	129,831,818	156,400,493	40,028	45,889	5,861
6	19,432,267	146,728,504	170,778,571	50,585	58,855	8,270
7	17,457,963	161,357,854	183,328,667	61,920	73,387	11,467
8	15,681,934	172,447,090	192,641,873	73,670	89,788	16,118
9	14,083,788	181,500,154	199,991,842	86,336	108,386	22,050
10	12,645,246	188,752,575	205,805,721	100,000	129,557	29,557

가 가 가

가

1)

가 가
3 4
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가
< -7> 가 10
3 가 가
4 가 . 10 1,968 , 20
19,715 , 2
0
3 7 10
539 , 20 723
10 20%
가 가

가 가 1
378 , 22.4%
가 1.55/ 1,000
9.2%
가

가
가 TM, CM
가

가

2)

50 80

가 가 ,

가
3 가 가4
< -8 >

4 가 . 10 2,336 , 20
 24,623 , ,
 , 가 2 0
 , 4 7
 10 655 , 20 965
 . 1,2 가
 , 가 7
 . ,
 3 6
 . 가 가
 가 가 1
 487 , 31.4%
 . 가 1.99/ 1,000
 , 12.8%
 , 가

< -7>

1	100,000	0.001104	35%	0	168,683,107	18,386,459	187,069,565
2	64,909	0.001194	30%	16,932,725	109,490,518	13,780,133	123,270,651
3	45,370	0.001296	20%	28,782,913	76,531,525	11,479,274	88,010,799
4	36,243	0.001404	15%	63,207,555	61,135,818	13,553,428	74,689,246
5	30,759	0.001530	10%	84,308,149	51,885,237	14,845,079	66,730,316
6	27,638	0.001674	10%	114,890,032	46,620,637	15,989,556	62,610,193
7	24,830	0.001842	10%	139,872,725	41,884,015	17,993,917	59,877,933
8	22,304	0.002028	10%	160,621,639	37,623,080	19,626,227	57,249,307
9	20,031	0.002232	10%	178,659,625	33,788,913	21,032,405	54,821,318
10	17,985	0.002466	10%	194,697,521	30,337,657	22,278,483	52,616,139
20	9,774	0.006954	5%	406,106,752	16,487,087	37,610,852	54,097,939
30	5,142	0.021990	5%	699,431,506	8,673,685	63,021,362	71,695,047

					1	1
1	156,970,461	2,388,651	0	170,136,840	0	261
2	101,887,956	1,805,726	0	111,420,463	0	634
3	38,512,534	2,365,450	6,583,151	53,586,157	1,074	1,744
4	30,765,038	2,968,088	14,471,065	53,588,652	2,524	2,741
5	14,170,813	3,817,339	13,051,528	36,148,433	4,024	4,157
6	12,618,139	3,905,960	16,160,531	37,627,501	5,571	5,633
7	11,336,146	4,308,826	18,679,152	39,129,018	7,168	7,201
8	10,182,900	4,620,908	19,632,330	39,211,321	8,387	8,919
9	9,145,161	4,691,198	20,303,564	38,783,422	9,658	10,826
10	8,211,058	4,725,799	20,725,033	38,281,325	10,980	12,948
20	4,421,720	5,101,515	13,741,237	30,272,584	26,920	46,635
30	2,326,221	5,026,255	12,280,378	31,182,545	45,730	154,962

< -8> ()

1	100,000	0.001104	35%	0	155,378,378	16,936,243	172,314,621
2	64,909	0.001194	30%	4,932,016	100,854,551	11,530,736	112,385,287
3	45,370	0.001296	20%	7,939,864	70,495,170	8,549,419	79,044,589
4	36,243	0.001404	15%	40,063,217	56,313,786	10,505,093	66,818,879
5	30,759	0.001530	10%	59,713,285	47,792,835	11,718,167	59,511,002
6	27,638	0.001674	10%	89,363,694	42,943,476	13,098,410	56,041,886
7	24,830	0.001842	10%	114,319,366	38,580,451	15,137,082	53,717,533
8	22,304	0.002028	10%	135,969,960	34,655,593	16,891,930	51,547,523
9	20,031	0.002232	10%	155,744,329	31,123,843	18,499,949	49,623,792
10	17,985	0.002466	10%	174,178,148	27,944,801	20,010,172	47,954,973
20	9,774	0.006954	5%	420,289,974	15,186,683	38,757,422	53,944,105
30	5,142	0.021990	5%	812,850,051	7,989,556	73,054,725	81,044,281

				1	1	1
1	156,660,607	0	167,382,605	0	76	76
2	101,686,833	0	109,377,440	0	175	175
3	38,371,953	2,449,544	46,921,235	642	1,105	464
4	30,652,737	11,151,810	47,168,811	1,945	1,941	- 4
5	14,075,505	10,693,477	29,860,593	3,297	3,233	- 63
6	12,533,274	13,625,399	31,086,215	4,697	4,604	- 93
7	11,259,903	16,015,914	32,066,938	6,146	6,096	- 50
8	10,114,413	16,895,929	31,773,155	7,218	7,775	557
9	9,083,653	17,473,931	31,189,973	8,312	9,685	1,373
10	8,155,834	17,969,245	30,734,538	9,520	11,856	2,336
20	4,391,981	12,373,239	23,767,936	24,240	48,863	24,623
30	2,310,576	11,448,438	25,305,866	42,632	181,903	139,271

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 , 15.0%

13)

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가 80.4% 81.0% .
, 432 41.1% ,
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1,174 , 39.9%
. 가 4.98/ 1,000
, 16.9% .
6 7
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< - 9 >

1	100,000	0.001104	35%	0	333,600,000	36,362,400	369,962,400
2	64,909	0.001194	30%	68,236,699	216,536,424	31,040,270	247,576,694
3	45,370	0.001296	20%	163,426,538	151,354,320	34,311,114	185,665,434
4	36,243	0.001404	15%	256,757,210	120,906,648	41,165,361	162,072,009
5	30,759	0.001530	10%	330,863,004	102,612,024	47,248,778	149,860,802
6	27,638	0.001674	10%	404,569,119	92,200,368	49,180,179	141,380,547
7	24,830	0.001842	10%	467,972,655	82,832,880	54,529,748	137,362,628
8	22,304	0.002028	10%	523,951,435	74,406,144	59,237,400	133,643,544
9	20,031	0.002232	10%	574,762,184	66,823,416	63,516,974	130,340,390
10	17,985	0.002466	10%	621,570,696	59,997,960	67,475,297	127,473,257
15	12,976	0.004206	5%	922,086,840	43,287,936	85,918,355	129,206,291
20	9,774	0.006954	5%	1,282,969,895	32,606,064	117,086,260	149,692,324

					1	1
1	282,246,710	2,388,651	0	301,725,701	0	1,051
2	89,624,212	1,760,057	46,653,162	152,386,856	2,529	3,602
3	27,424,673	4,987,745	48,445,483	92,334,761	5,449	7,084
4	21,907,701	6,664,957	48,592,313	87,966,215	8,476	10,757
5	18,592,804	8,259,709	37,679,701	75,128,567	11,617	14,638
6	16,555,619	7,808,694	43,153,590	77,977,011	14,877	18,847
7	14,873,581	8,557,809	47,594,313	81,383,848	18,264	23,491
8	13,360,465	9,129,174	49,992,568	82,832,796	21,357	28,694
9	11,998,900	9,384,935	51,614,527	83,531,878	24,552	34,551
10	10,773,313	9,527,659	52,578,917	83,667,699	27,856	41,178
15	7,702,112	8,761,690	31,227,107	62,002,231	46,080	80,601
20	5,801,514	9,278,915	34,057,034	67,794,635	66,720	147,735

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1	100,000	0.001104	35%	0	294,400,000	32,089,600	326,489,600
2	64,909	0.001194	30%	28,065,479	191,092,096	23,888,176	214,980,272
3	45,370	0.001296	20%	109,130,685	133,569,280	26,454,296	160,023,576
4	36,243	0.001404	15%	193,541,015	106,699,392	32,726,204	139,425,596
5	30,759	0.001530	10%	261,088,347	90,554,496	38,329,070	128,883,566
6	27,638	0.001674	10%	329,841,743	81,366,272	40,709,593	122,075,865
7	24,830	0.001842	10%	388,960,792	73,099,520	45,743,971	118,843,491
8	22,304	0.002028	10%	442,528,089	65,662,976	50,310,915	115,973,891
9	20,031	0.002232	10%	492,549,237	58,971,264	54,600,530	113,571,794
10	17,985	0.002466	10%	539,799,101	52,947,840	58,681,947	111,629,787
15	12,976	0.004206	5%	835,868,035	38,201,344	77,792,175	115,993,519
20	9,774	0.006954	5%	1,200,023,530	28,774,656	109,363,039	138,137,695

				1	1	1
1	281,333,782	0	298,424,121	0	432	432
2	89,031,639	32,112,099	133,915,066	1,744	2,405	661
3	27,010,477	39,044,696	75,613,246	4,266	5,340	1,074
4	21,576,828	41,541,691	71,878,265	6,890	8,488	1,598
5	18,311,996	32,835,465	60,130,170	9,626	11,934	2,308
6	16,305,579	37,899,144	62,956,817	12,477	15,665	3,188
7	14,648,945	42,168,409	65,276,194	15,453	19,841	4,388
8	13,158,681	44,445,332	65,952,743	18,132	24,589	6,457
9	11,817,681	46,044,627	66,321,930	20,916	30,014	9,098
10	10,610,603	47,061,691	66,340,401	23,810	36,242	12,432
15	7,585,787	28,289,283	49,030,401	40,039	73,556	33,517
20	5,713,893	31,335,600	54,426,194	58,880	139,249	80,369

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가 21%

가 , 5 5,075 , 10

20,912 . 10

1.5 . , ,

698 ,

가 2 388 , 4 421 가

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1,256 , 26.0%

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 , 5 4,359 , 10 20,473
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 , 가
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 1,229 , 29.1%
 가 5.16/ 1,000
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1	100,000	0.001104	35%	0	482,200,000	52,559,800	534,759,800
2	64,912	0.001194	30%	112,984,997	313,005,664	46,432,982	359,438,646
3	45,374	0.001296	20%	308,847,595	218,793,428	67,782,005	286,575,433
4	36,248	0.001404	15%	446,641,612	174,787,856	72,532,419	247,320,275
5	30,765	0.001530	10%	562,369,581	148,348,830	80,350,161	228,698,991
6	27,645	0.001674	10%	683,109,095	133,304,190	82,314,335	215,618,525
7	24,837	0.001842	10%	786,747,574	119,764,014	91,085,125	210,849,139
8	22,311	0.002028	10%	879,398,903	107,583,642	98,917,129	206,500,771
9	20,038	0.002232	10%	964,121,024	96,623,236	106,098,762	202,721,998
10	17,992	0.002466	10%	1,042,635,904	86,757,424	112,786,655	199,544,079

					1	1
1	363,337,456	2,295,768	33,733,455	421,774,803	1,043	1,741
2	41,483,608	2,913,299	103,783,441	163,576,048	5,311	6,807
3	28,997,369	7,628,345	90,287,068	138,512,283	9,821	12,322
4	23,165,175	10,169,871	83,653,803	126,795,698	14,590	18,280
5	19,661,129	12,648,994	63,698,800	105,077,623	19,635	24,710
6	17,507,909	11,770,367	72,186,651	110,490,627	24,880	31,676
7	15,729,569	12,978,225	79,648,588	116,857,332	30,556	39,415
8	14,129,823	13,988,710	84,478,060	120,572,793	36,078	48,115
9	12,690,305	14,587,787	88,235,072	123,122,038	41,957	57,950
10	11,394,548	15,023,177	91,051,916	124,658,717	48,220	69,132

< - 12> ()

1	100,000	0.001104	35%	0	422,400,000	46,041,600	468,441,600
2	64,912	0.001194	30%	67,902,126	274,188,288	37,287,855	311,476,143
3	45,374	0.001296	20%	238,974,369	191,659,776	46,939,122	238,598,898
4	36,248	0.001404	15%	360,989,796	153,111,552	56,037,047	209,148,599
5	30,765	0.001530	10%	467,927,930	129,951,360	65,168,843	195,120,203
6	27,645	0.001674	10%	581,022,205	116,772,480	69,081,674	185,854,154
7	24,837	0.001842	10%	678,971,866	104,911,488	77,604,452	182,515,940
8	22,311	0.002028	10%	769,083,216	94,241,664	85,469,163	179,710,827
9	20,038	0.002232	10%	853,953,120	84,640,512	92,920,770	177,561,282
10	17,992	0.002466	10%	934,700,961	75,998,208	100,059,218	176,057,426

				1	1
1	361,944,774	16,924,725	400,539,474	459	1,046
2	40,579,590	84,955,861	140,403,901	4,137	5,267
3	28,365,453	77,040,317	116,583,470	8,051	9,959
4	22,660,355	70,059,609	102,210,465	12,219	15,210
5	19,232,670	54,040,908	82,025,928	16,658	21,017
6	17,126,373	61,962,319	87,904,492	21,356	27,337
7	15,386,787	68,726,753	92,404,590	26,366	34,471
8	13,821,903	73,252,720	94,840,923	31,284	42,617
9	12,413,755	76,895,760	96,813,440	36,565	51,951
10	11,146,236	79,760,119	97,885,531	42,240	62,713

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14) , 『 』 , 2000. 2 , , pp.538-545.

가

< - 14 >

(: 가 10 , 35 가)
(: , %)

		(10%)	(10%)	(10%)	
	4,140 (100)	3,777 (91.2)	4,149 (100.2)	4,059 (98.0)	3,696 (89.3)
	8,229 (100)	7,982 (97.0)	8,215 (99.8)	8,111 (98.6)	7,850 (95.4)
()	7,846 (100)	7,577 (96.6)	7,832 (99.8)	7,728 (98.5)	7,445 (94.9)
	1,686 (100)	1,613 (95.7)	1,617 (95.9)	1,618 (96.0)	1,477 (87.6)
()	1,553 (100)	1,488 (95.8)	1,490 (95.9)	1,483 (95.5)	1,357 (87.4)
	3,336 (100)	3,113 (93.3)	3,173 (95.1)	3,172 (95.1)	2,807 (84.1)
()	2,944 (100)	2,757 (93.6)	2,804 (95.2)	2,794 (94.9)	2,483 (84.3)
	4,822 (100)	4,454 (92.4)	4,671 (96.9)	4,463 (92.6)	3,986 (82.7)
()	4,224 (100)	3,917 (92.7)	4,096 (96.7)	3,907 (92.5)	3,506 (83.0)

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$$PVPF_{x,t} = PF_{x,t} \times {}_tD_x$$

) $PVPF_{x,t} : t$ 가

$PF_{x,t} : t$ 1 (profit)

${}_tD_x :$ t

$$, {}_tP_x / \prod_{i=1}^t (1+i_p) , i_p$$

${}_tP_x :$ t ,

< - 15 >

가

(: , %)

			(10%)	(10%)	(10%)	(10%)	
	가	956	1,141 119.4%	987 103.2%	1,379 144.2%	1,121 117.3%	1,806 188.9%
	가	1,578	1,868 118.4%	1,602 101.5%	2,042 129.4%	1,775 112.5%	2,599 164.7%
	가	1,774	2,268 127.8%	1,799 101.4%	2,236 126.0%	2,055 115.8%	3,118 175.8%
	가	378	395 104.5%	434 114.8%	702 185.7%	441 116.7%	855 226.2%
	가	487	523 107.4%	545 111.9%	810 166.3%	602 123.6%	1,042 214.0%
	가	1,184	1,249 105.5%	1,283 108.4%	1,607 135.7%	1,325 111.9%	1,944 164.2%
	가	1,174	1,304 111.1%	1,276 108.7%	1,595 135.9%	1,359 115.8%	2,058 175.3%
	가	1,256	1,376 109.6%	1,324 105.4%	1,699 135.3%	1,372 109.2%	2,034 161.9%
	가	1,229	1,412 114.9%	1,297 105.5%	1,668 135.7%	1,377 112.0%	2,109 171.6%

: 가 1
가 .

10%

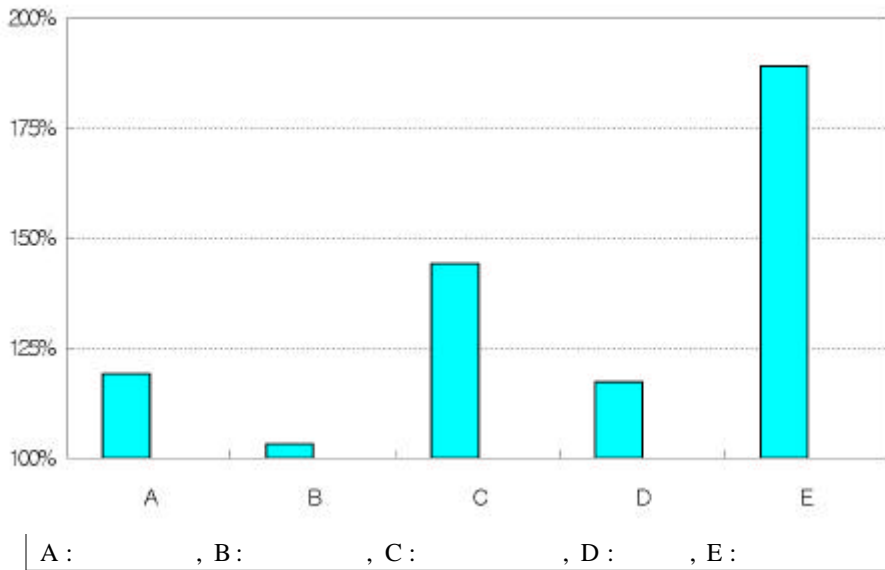
가 가 , < -15 > .

1)

가)

. < -15>
 가 가 10
 956 10% 가 19.4%
 가 1,141 . , 10%
 가 3.2% 가 987 , 10%
 가 44.2% 가 1,379 ,
 . 10% ()
 가가 17.3% 가 1,121 .
 10% 88.9% 가 1,806
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< - 1>



가 가 ,
 가 가 .
 , 가
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<
 -15> 가 가 10
 1,578 10% 가
 18.4% 가 1,868 . , 10%
 가 1.5% 가 1,602 ,
 10% 가가 29.4% 가 2,042
 , . 10% ()
 가가 12.5% 가 1,775 .
 10% 가가 64.7% 가 2,599
 .
 가 가 10
 1,774 10% 가 27.8%

11.1%p

가 ,

가

< -2 >

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가

< -15 >

가 가

10 378

10% 가

4.5% 가 395

10%

가 14.8% 가 434

10%

가 85.7% 가 702

10% ()

가가 16.7% 가 441

10%

126.2% 가 855

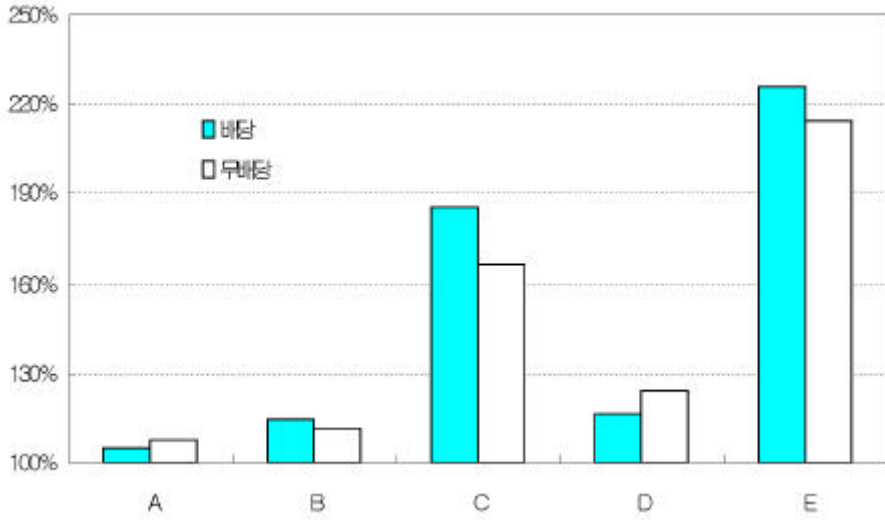
가 가 10

487 10% 가 7.4%
 가 523 . , 10%
 가 11.9% 가 545 , 10%
 가 66.3% 가 810 ,
 . 10% ()
 가가 23.6% 가 602 . 10%
 114.0% 가 1,042 .

가 가
 . 가 ,
 , . 가
 , 가
 10% 가 4.5%,
 7.4% .
 ,
 ,
 가 .
 12.2%p
 가
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A : , B : , C : , D : , E :

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25 30%,

29 30%

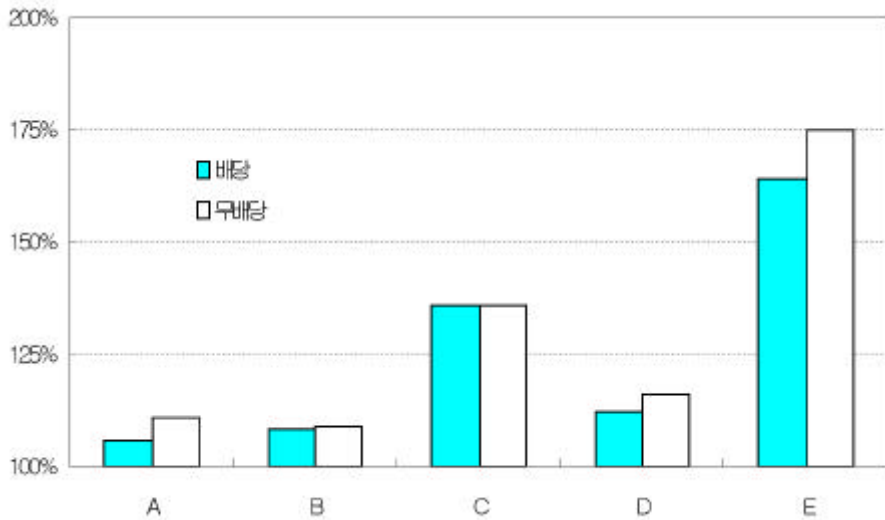
< -15>

가 가 10 1,184
 10% 가 5.5% 가 1,249
 10% 가 8.4% 가 1,283
 , 10%
 가 35.7% 가 1,607 , 10% ()
) 가가 11.9% 가 1,325
 10%

가가 64.2% 가 1,944 .
 가 가 10
 1,174 10% 가 11.1%
 가 1,304 . , 10%
 가 8.7% 가 1,276 , 10%
 가 35.9% 가 1,595
 , . 10% ()
 가가 15.8% 가 1,359 .
 10% 75.3% 가 2,058 .

가 가 ,
 .

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A : , B : , C : , D : , E :

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가

11.1%p

가

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21 24%,

10 20%

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가

가

10

1,256

10%

가

9.6%

가

1,376

, 10%

가 5.4%

가

1,324

10%

가가 35.3%

가

1,668

10%

()

가가 9.2%

가

1,372

10%

61.9% 가 2,034

가

가

10

1,229

10%

가

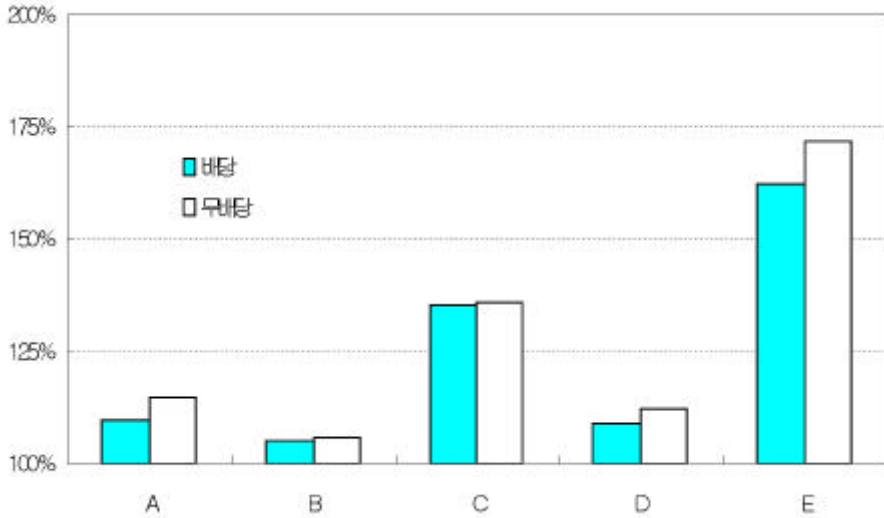
11.1%

가 1,412

10%

가 5.5% 가 1,297 , 10%
 가 35.7% 가 1,668
 , 10% ()
 가가 12.0% 가 1,377 .
 10% 71.6% 가 2,109 .
 가
 가 가
 ,
 가 가
 10% .

< - 5 >



A : , B : , C : , D : , E :

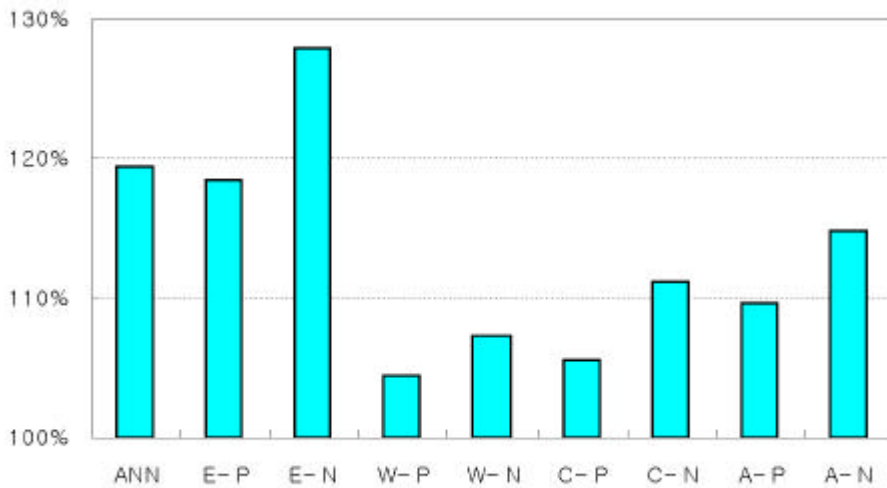
가
.
9.7%p
< -5> .
가 .
,
, 가 가
가 가 ,
가

2)

가)

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 82.3% , 가 가

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ANN : , E-P : , E-N : () , W-P : , W-N : ()
 C-P : , C-N : () , A-P : , A-N : ()

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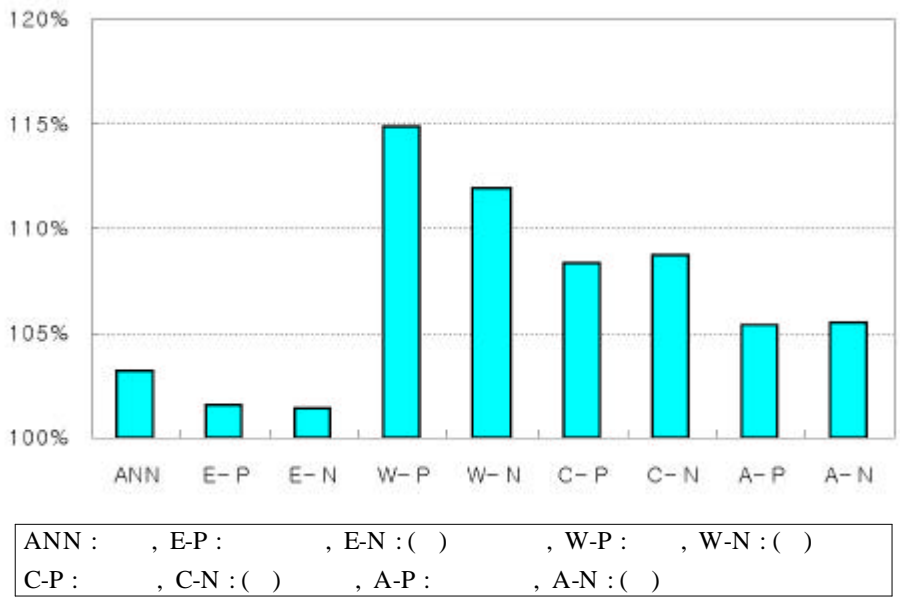
< -7> 가

가

60.7%

3.1%

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가

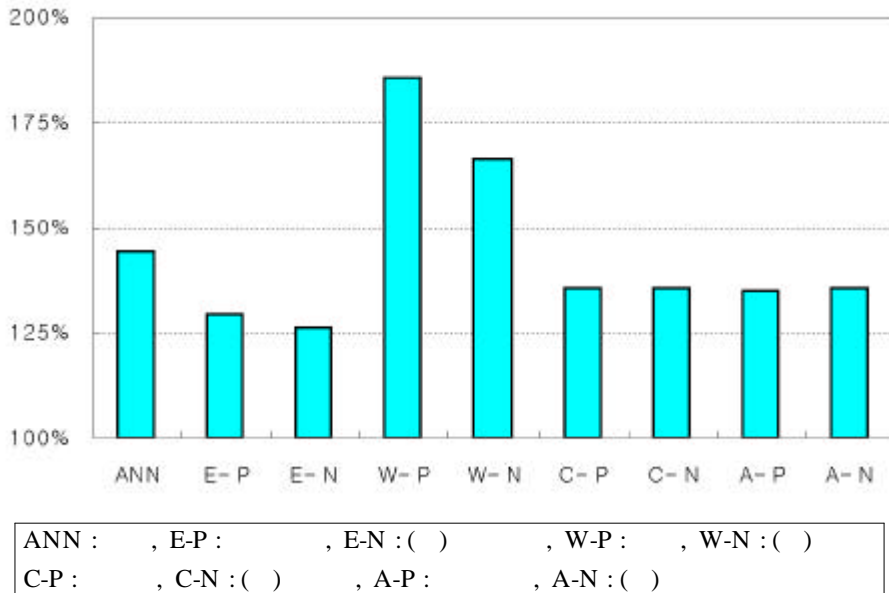
가
가 가

가

40%

가

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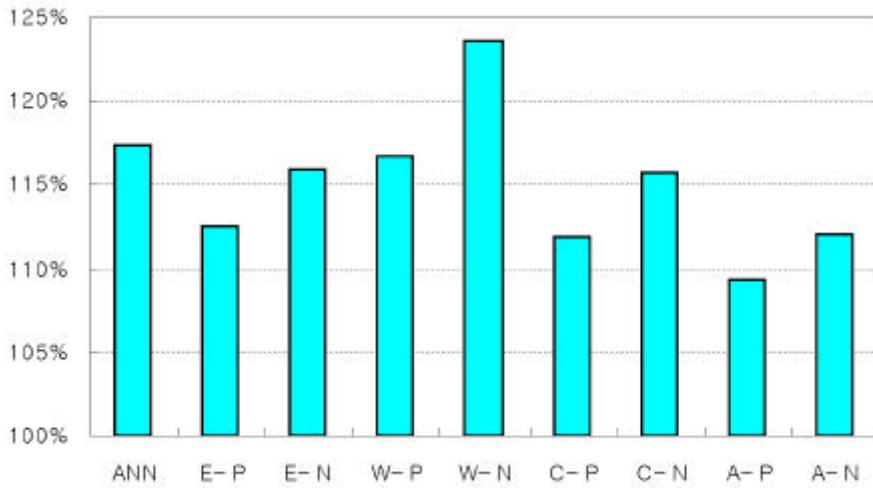
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-9>

가
가

가

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ANN :	E-P :	E-N : ()	W-P :	W-N : ()
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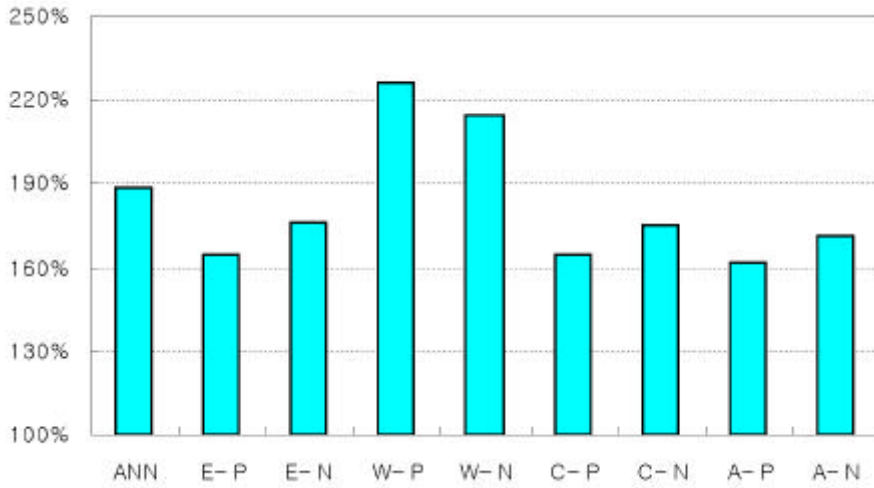
< -10>

가 가

가

가

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ANN :		E-P :		E-N :	()	W-P :		W-N :	()
C-P :		C-N :	()	A-P :		A-N :	()		

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1.

가.

가

1970

1980

가

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가

.15)

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가

가

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(standard valuation reserve)¹⁹⁾

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CM, TM

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(ALM)

(underwriting)

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CM, DM, TM

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< > Asset Share

20)

1. (asset share method)

가
가
가
가
가 (asset share method)²¹⁾
가
가

20) David B. Atkinson "Introduction to Pricing and Asset Shares"(SOA Study note) 가

21) 가 , 가 , 가

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가

가

20

가

가

(trial premium)

22) 가 10

35 가 , 20 3,147

23)

가 가

가

[가]

3 70%

5 10.5%, 6 11 9%, 11

20 8.5%

22) 3

7.5%, 가

30/1,000, 가 4/1,000,

3%

23)

80%, 20%, 85%, 85%, 80%

가

< - 1 >

	1	2	3	4	5	6	7	8	9	10
	0.720	0.610	0.510	0.420	0.340	0.280	0.250	0.230	0.210	0.200
	11	12	13	14	15	16	17	18	19	20
	0.194	0.188	0.182	0.176	0.170	0.167	0.164	0.161	0.158	0.155

20%,

60%,

가

24)

7

가 25)

24)

가 가
가

$$V_t = A_{x+t:\overline{n-t}} - {}_mP_{x:\overline{n}} \cdot \ddot{a}_{x+t:\overline{m-t}}$$

V_t :

$A_{x+t:\overline{n-t}}$: 가

${}_mP_{x:\overline{n}} \cdot \ddot{a}_{x+t:\overline{m-t}}$: 가

, = () -
 - ()
 가 <

-2>

< -2> (asset share)

(1)	(2)	(3) 3	(4)	(5)	(6)	(7)	(8)	(9) 10	(10) 10
1	0.720	0.00184	0.105	100000	129	27871	72000	2435	0
2	0.610	0.00199	0.105	72000	100	10900	61000	905	2494
3	0.510	0.00216	0.105	61000	92	9908	51000	395	5504
4	0.420	0.00234	0.105	51000	84	8916	42000	395	9220
5	0.340	0.00255	0.105	42000	75	7925	34000	395	12756
6	0.280	0.00279	0.09	34000	66	5934	28000	395	16514
7	0.250	0.00307	0.09	28000	60	2940	25000	395	20508
8	0.230	0.00338	0.09	25000	59	1941	23000	395	24328
9	0.210	0.00372	0.09	23000	60	1940	21000	395	28422
10	0.200	0.00411	0.09	21000	60	940	20000	395	32813
11	0.194	0.00456	0.085	20000	64	536	19400	395	37523
12	0.188	0.00508	0.085	19400	69	531	18800	395	42576
13	0.182	0.00566	0.085	18800	74	526	18200	395	48004
14	0.176	0.00629	0.085	18200	80	520	17600	395	53841
15	0.170	0.00701	0.085	17600	86	514	17000	395	60124
16	0.167	0.00780	0.085	17000	93	207	16700	395	66896
17	0.164	0.00865	0.085	16700	101	199	16400	395	74209
18	0.161	0.00955	0.085	16400	110	190	16100	395	82118
19	0.158	0.01049	0.085	16100	118	182	15800	395	90691
20	0.155	0.01159	0.085	15800	128	172	15500	395	100000

25)

(1)	(11)			(12)	(13)	(14)	(15)
	10						
1	0	37	37	0	314700000	243500000	12900000
2	45	39	84	75218500	226584000	65160000	10000000
3	99	41	140	220650071	191967000	24095000	9200000
4	166	43	209	356362228	160497000	20145000	8400000
5	230	46	276	445786525	132174000	16590000	7500000
6	149	48	197	497509062	106998000	13430000	6600000
7	185	51	236	530061538	88116000	11060000	6000000
8	219	54	273	587079088	78675000	9875000	5900000
9	256	56	312	653562504	72381000	9085000	6000000
10	296	59	354	711342674	66087000	8295000	6000000
11	225	61	286	793147860	62940000	7900000	6400000
12	255	63	318	887432076	61051800	7663000	6900000
13	288	65	353	984375988	59163600	7426000	7400000
14	323	65	388	1.084E+09	57275400	7189000	8000000
15	361	65	426	1.186E+09	55387200	6952000	8600000
16	401	62	463	1.292E+09	53499000	6715000	9300000
17	445	57	502	1.421E+09	52554900	6596500	10100000
18	493	49	542	1.557E+09	51610800	6478000	11000000
19	544	38	582	1.703E+09	50666700	6359500	11800000
20	600	22	622	1.857E+09	49722600	6241000	12800000

(1)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1	0	2664000	19582500	75218500	1045	2364	- 1319
2	27184600	5124000	26316171	220650071	3617	4894	- 1277
3	54533632	7140000	38713789	356362228	6987	7604	- 617
4	82205520	8778000	48455817	445786525	10614	10505	109
5	101091300	9384000	54113837	497509062	14633	13614	1019
6	97994076	5516000	49094552	530061538	18931	16943	1988
7	60293520	5900000	52155070	587079088	23483	20508	2975
8	47220648	6279000	57083064	653562504	28416	24328	4088
9	55138680	6552000	62174850	711342674	33873	28422	5451
10	30844220	7080000	67937406	793147860	39657	32813	6844
11	20112328	5548400	71304944	887432076	45744	37523	8221
12	22607856	5978400	79041368	984375988	52360	42576	9784
13	25250104	6424600	86997631	1.084E+09	59562	48004	11558
14	27997320	6828800	95176094	1.186E+09	67413	53841	13572
15	30903736	7242000	103583739	1.292E+09	75985	60124	15861
16	13847472	7732100	113076678	1.421E+09	85073	66896	18177
17	14767591	8232800	123891754	1.557E+09	94968	74209	20759
18	15602420	8726200	135366542	1.703E+09	105755	82118	23637
19	16505762	9195600	147558449	1.857E+09	117532	90691	26841
20	17200000	9641000	160532196	2.021E+09	130412	100000	30412

: (2) (11), (20) (22) 1 , (12) (19)

(1) :

(2) : 가

(3) : 3

(4) :

(5) : (2)

(6) : × 3 70%

(7) : - -

(8) : - -

(9) : 가

(10) :

$$(11) : \quad = \quad \times (\quad - \quad) \times 60\%$$

$$= \quad \times \quad (20\%)$$

$$(12), (20) : \quad = (\quad + \quad + \quad) - (\quad + \quad + \quad)$$

$$(13) : \quad (5) \times$$

$$(14) : \quad (5) \times \quad (9)$$

$$(15) : \quad (6) \times 10$$

$$(16) : \quad (7) \times 10 \quad (10)$$

$$(17) : \quad (8) \times 10 \quad (11)$$

$$(18) : \quad \times \{ (\quad + \quad) - 0.5 \cdot (\quad + \quad + \quad) \} ;$$

, , ,
가

$$(20) : \quad (19) \div \quad (8)$$

$$(22) : \quad (20) - \quad (21)$$

가

가 ,

가 .

가 .

가

가

가 .

가 ,

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가

(sensitivity analysis)

가 .

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가 .

asset share

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가

10%

(

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68.7%

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10%

90%

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10%

가

54.2%

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가

20%

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(+)

3

7

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가

가가

가

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가

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가

가

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가

가

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< - 3> 가

(1)				10%		70% 80%		10% 가			
	(20)	(21)	(22)	(20)	(22)	(20)	(22)	(20)	(22)	(20)	(22)
1	1045	2364	- 1319	1018	- 1346	1018	- 1346	689	- 1675	636	- 1728
2	3617	4894	- 1277	3555	- 1339	3558	- 1336	3041	- 1853	2925	- 1969
3	6987	7604	- 617	6865	- 739	6883	- 721	6176	- 1428	5965	- 1639
4	10614	10505	109	10394	- 111	10449	- 56	9474	- 1031	9122	- 1383
5	14633	13614	1019	14257	643	14378	764	13025	- 589	12456	- 1158
6	18931	16943	1988	18352	1409	18563	1620	16753	- 190	15907	- 1036
7	23483	20508	2975	22685	2177	23004	2496	20779	271	19648	- 860
8	28416	24328	4088	27361	3033	27817	3489	25167	839	23716	- 612
9	33873	28422	5451	32482	4060	33130	4708	29949	1527	28093	- 329
10	39657	32813	6844	37916	5103	38775	5962	35123	2310	32859	46
11	45744	37523	8221	43635	6112	44727	7204	40629	3106	37949	426
12	52360	42576	9784	49814	7238	51190	8614	46592	4016	43424	843
13	59562	48004	11558	56498	8494	58218	10214	53054	5050	49317	1313
14	67413	53841	13572	63736	9895	65872	12031	60069	6228	55666	1825
15	75985	60124	15861	71584	11460	74222	14098	67692	7568	62516	2392
16	85073	66896	18177	79915	13019	83099	16203	75872	8976	69908	3012
17	94968	74209	20759	88936	14727	92762	18553	84760	10551	77900	3691
18	105755	82118	23637	98718	16600	103299	21181	94431	12313	86557	4439
19	117532	90691	26841	109342	18651	114808	24117	104971	14280	95949	5258
20	130412	100000	30412	120898	20898	127398	27398	116477	16477	106160	6160

26)

3.1,

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26)

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120%

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t	$P_{x,t}$	${}_tP_x$	$D_{x,t}$	${}_tD_x$	$AS_{x,t}$	$V_{x,t}$	$SP_{x,t}$
1	0.72	0.720	0.652	0.652	1045	2364	- 1319
2	0.847	0.610	0.767	0.500	3617	4894	- 1277
3	0.836	0.510	0.757	0.378	6987	7604	- 617
4	0.824	0.420	0.746	0.282	10614	10505	109
5	0.81	0.340	0.733	0.206	14633	13614	1019
6	0.824	0.280	0.756	0.156	18931	16943	1988
7	0.893	0.250	0.819	0.128	23483	20508	2975
8	0.92	0.230	0.844	0.108	28416	24328	4088
9	0.913	0.210	0.838	0.097	33873	28422	5451
10	0.952	0.200	0.873	0.081	39657	32813	6844
11	0.97	0.194	0.894	0.071	45744	37523	8221
12	0.969	0.188	0.893	0.063	52360	42576	9784
13	0.968	0.182	0.892	0.056	59562	48004	11558
14	0.967	0.176	0.891	0.050	67413	53841	13572
15	0.966	0.170	0.890	0.045	75985	60124	15861
16	0.982	0.167	0.905	0.040	85073	66896	18177
17	0.982	0.164	0.905	0.037	94968	74209	20759
18	0.982	0.161	0.905	0.033	105755	82118	23637
19	0.981	0.158	0.904	0.030	117532	90691	26841
20	0.981	0.155	0.904	0.027	130412	100000	30412

t	$PF_{x,t}$	가 $PVPF_{x,t}$	가 $PVPT_{x,t}$	$ASCH_{x,t}$	$PFCH_{x,t}$	가 $PVPFCH_{x,t}$
1	- 1319	- 860	1.304	1270	1270	828
2	747	374	1.000	4344	2981	1491
3	1049	397	0.756	8443	3662	1384
4	925	261	0.564	13085	3716	1048
5	873	180	0.412	18259	3780	779
6	617	96	0.312	23019	3662	571
7	345	44	0.256	26486	3379	433
8	457	49	0.216	31102	3280	354
9	608	59	0.194	37230	3305	321
10	336	27	0.162	41953	3170	257
11	421	30	0.142	47454	3096	220
12	588	37	0.126	54319	3090	195
13	603	34	0.112	61791	3102	174
14	617	31	0.100	69935	3105	155
15	633	28	0.090	78826	3108	140
16	362	14	0.080	87013	3058	122
17	675	25	0.074	97054	3058	113
18	701	23	0.066	107987	3058	101
19	725	22	0.060	120027	3061	92
20	725	20	0.054	133053	3061	83
		891	6.08			8861

$$P_{x,t} : t \quad 1 \quad ,$$

$${}_iP_x : \quad t \quad ,$$

$$D_{x,t} : \quad t \quad 1$$

$$P_{x,t}/(1+i) , i$$

${}_tD_x$: $\frac{P}{\prod_{i=1}^t(1+ip)}$, ip
 $AS_{x,t}$: t (asset share)
 $V_{x,t}$: t (valuation)
 $SP_{x,t}$: t (,suplus)
 $PF_{x,t}$: t 1 (profit), $SP_{x,t} - SP_{x,t-1} \times (1+i)/P_{x,t}$
 $PVPF_{x,t}$: ${}_tD_x$ 가
 $PF_{x,t} \times {}_tD_x$
 $PVPT_{x,t}$: 가 1,000 2 ${}_tD_x$
가 , $(2) \times {}_tD_x$
 $ASCH_{x,t}$: 100% 가
 $[AS_{x,t-1} + PR_{x,t}] \times (1+i)/P_{x,t} - EXP_{x,t} \times (1+i/2)/P_{x,t}$
 $PFCH_{x,t}$: 100% 가
 $[PR_{x,t} \times (1+i)/P_{x,t} - EXP_{x,t} \times (1+i/2)/P_{x,t}]$
 $PVPFCH_{x,t}$: $PFCH_{x,t} \times {}_tD_x$ 가
 $PFCH_{x,t} \times {}_tD_x$
 $PR_{x,t}$: t
 $EXP_{x,t}$: t

가
가 , $PRCH_{x,t}$

$$PVPF'_{x,t} = PVPF_{x,t} + PRCH_{x,t} \times PVPFCH_{x,t} \dots\dots\dots$$

(n)

$$AS'_{x,n} = AS_{x,n} + PRCH_{x,t} \times ASCH_{x,n} \dots\dots\dots$$

$$ASCH_{x,n} : n$$

가. : 가가 가 2/ 1,000
가

가 .

$$PVPF'_x = PVPT_x ,$$

$$PVPF_x + PRCH_x \times PVPFCH_x = PVPT_x \text{ 가 } PRCH_x$$

$$PRCH_x = \frac{PVPT_x - PVPF_x}{PVPFCH_x} \text{ 가 } .$$

< -4>

$$PRCH_x = (6.08 \times 100 - 891) / 8861 = - 0.0319 \text{ 가 } .$$

$$= (1 - 0.0319) \times 3,147 = 3,047 .$$

가 2/ 1,000

$$3.2\% \quad 3,047 .$$

. : 120%

"가" 가

$$AS'_{x,n} = 1.2 \times V_{x,n} \quad ,$$

$$AS_{x,n} + PRCH_x \times ASCH_{x,n} = 1.2 \times V_{x,n}$$

$$PRCH_x = \frac{1.2 \times V_{x,n} - AS_{x,n}}{ASCH_{x,n}} \text{ 가}$$

< -4 >

$$PRCH_x = (120,000 - 130,412) / 133,053 = - 0.0783 \quad .$$

$$= (1 - 0.0783) \times 3,147 = 2,901 \quad .$$

120%

7.8% 2,901

가

가 가 .

. < -5 >

$$PVPF'_x = PVPT_x \quad . \quad , \quad \text{가} \quad 602$$

, 가 1 가 6.08

10 608 .

< - 5 >

	가				가
t	$PVPT_{x,t}$	$AS_{x,t}$	$SP_{x,t}$	$PF_{x,t}$	$PVPF_{x,t}$
1	1.304	945	- 1419	- 1419	- 925
2	1.000	3373	- 1521	657	329
3	0.756	6540	- 1064	920	348
4	0.564	9887	- 618	788	222
5	0.412	13512	- 102	727	150
6	0.312	17322	379	516	80
7	0.256	21404	896	395	51
8	0.216	25841	1513	419	45
9	0.194	30687	2265	472	46
10	0.162	35903	3090	386	31
11	0.142	41439	3916	394	28
12	0.126	47435	4859	479	30
13	0.112	53936	5932	491	27
14	0.100	60995	7154	505	25
15	0.090	68669	8545	518	23
16	0.080	76889	9993	395	16
17	0.074	85822	11613	572	21
18	0.066	95541	13423	592	20
19	0.060	106136	15445	614	18
20	0.054	117704	17704	622	17
	6.08				602

가 .