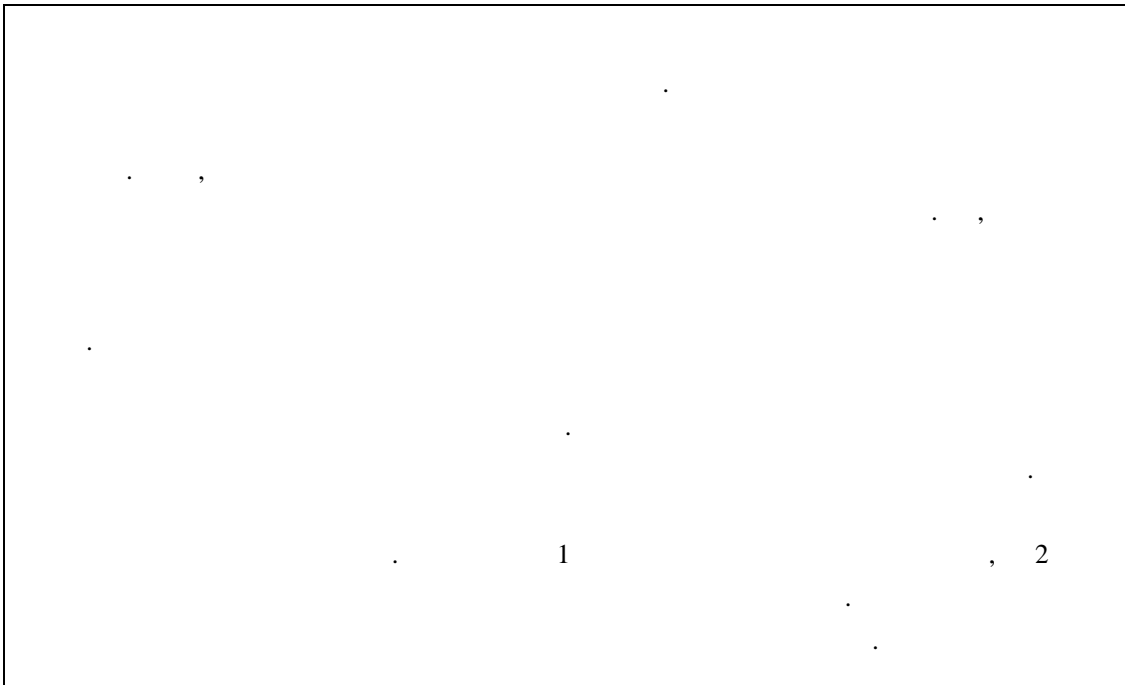


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( )

**The Effectiveness of Customer Scoring System in Bank Marketing**  
**-Focusing Credit and Profitability-**

Myung-Sik Lee



•

IMF BIS 8% 가  
가 ,  
「 」 .

가  
가 .  
가 가 .  
가 .

IMF

(Follow-up)

가  
가 .  
가 . ,  
가  
가 ( ) 가  
가 가  
가

( 1999. 1. 12).

(< 1> ).

가 가 .  
( , 10 , 2 ; 가 15 , 3 ),

(Capon 1982).

(Judgement) 가 가 가

가 . (Credit Risk)

(Loss) (Probability) .

< 1 >

		1	2	3	4
( )		3	4	5	7
		,	,	,10	,3
	30				.
	( 1 )		.	.	
		80	70	60	50
		6	4 8	3 6	2 4
		2	1 5	1	5
		5	3 5	2 5	1 7

( ) 1999 1 12

(Credit Scoring Model)

(

)

, '

(Customer

Homogeneity)' 가

( 1998a).

(Customer Homogeneity)

( 1998).

(Profitability-based Scoring System)

(Duality)

(Revolving Credit)

1 (Type

I Error)가

## 2. (Credit)

가 가 (Scoring Model) 가

가

(Credit Risk)

( 1998a).

“3C”- (Character), (Capacity), (Capital)-  
(Eisenbeis 1978).

(Characteristics)

(Creditworthiness)

가

가 (Credit Scoring System)

(Churchill, Nevin and Watson 1977; Cremer 1972; Duffy 1977; Long 1986; Myers 1962; Weingartner 1966).

가

가 (Consumer Credit) 가

가(Credit Evaluation)가

(Creditworthiness)

가

가 가

가 가

가 (Risk)

(Credit Risk)

(Credit Scoring Model)

가

가

가

가

Durand(1941)

가

37

7,200

. Durand

2

가

(Efficiency Index)

(Discriminant Function)

Wolbers(1949)

가

. Wolbers

, 1

(Rating Weight)

2

7%

. Myers

Cordner(1957)

가

6%

3%

. 1950

가

가

가

가

가

(Point Assignment)

(Trial and Error)

(Myers and Forgy 1962). 1960

가

가

가

(Level)

(Significantly)

(Capon 1982).

(Credit Scoring System)

가

((< 2 )).

and Barcum 1970 ; Eisenbeis 1978 ; Long 1976 ; Myers and Forgy 1962).

가

( Point

Assignment) ( ; 10 , 2 ; 가 20 , 5 ),

( :

).

가

가

(Single Cut-off)

< 2> 가

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.	.	

( ) Capon, Noel(1982), "Credit Scoring System : A Critical Analysis,"  
*Journal of Marketing* Vol(46), P85

2

2

(Cut-off Point)

2

2

가

가

1

(Type Error)

2

(Type Error)

(Trade-off)

1

(

)

2

(

)

(

1

)

(InterrelationShip) ( 2 ) 1 2

(Scoring Table) 가 ( 1998).

(Capon 1982).

Eisenbeis(1978)

가 가 .

(Nonnormality), (Inequality),

가

(Logit Model)

가 2 S 가 가

(Likelihood Function)

(Qualitative)

가

가

가 , 가 ,

(Judgement)

가, /

가 , 가 , 가

( 1998b).

Gradstrom(1996) 7

가 (A Balanced Credit Policy) ,

가 (A Cleary

Defined Risk Rating System) 가 (Timely Application of Risk

Rating) 가

(Use of Early Warning Risk Rating)

(Effective Loan Officer Participation)

가(Independent Credit Review)

가 (Learning from Charged-off Loans).

### 3. (Profitability)

(Credit Risk) (Default)

Scoring Model) (Credit Homogeneity) (Customer

(Profit Maximization) (Effectiveness) (Altman Haldeman 1995). 가

(Leonard 1995).

(Profitability-based Scoring Model)

가

(+)

(-) (Customer Homogeneity) 가

5 1 1:5 (1 to 5 rule)

(Credit Risk: Default Probability) P

(Expected Revenue: ER)

$$ER = P \times (-500) + (1-P) \times (100) \dots \dots \dots$$



5, 1, 1 (1998).  
 가  
 (Cash Flow-In : CFI) (Cash Flow-Out : CFO) 가 .

$$ER = P \times (CFO) + (1-P) \times (CFI) \dots \dots \dots \langle$$

$$(CFI) (CFO) \rangle$$

가 .  
 (P) || 가 .

$$CFI = a_0 + a_1X_1 + a_2X_2 + \dots + a_nX_n \dots \dots \dots \rangle$$

$$CFO = b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n \dots \dots \dots |$$

(P) || .

$$P = \text{prob}(Y_i=1) = \frac{\exp(\beta X_i)}{1 + \exp(\beta X_i)} \dots \dots \dots ||$$

Y<sub>i</sub> = 1 : 가  
 Y<sub>i</sub> = 0 : 가

4.

4-1.

4-1-1.

6,000  
 (Stratified Random Sampling) (Heterogeneity)  
 Good1, Good2 1,500  
 3,000 , Bad1, Bad2, Bad3 1,000 3,000 , 6,000  
 1 1,552 가  
 238 1,314 가 가  
 2 264 가 가 1,578 가

4-1-2.

(1)

(2)

가

(Characteristics)

(3) (Attributes)

(4)

(Holdout Sample)

가,

(Validation Test)

1,578

1,250

328

(5)

(6)

4-1-3.

1)

· Good1 : (Outcome Period)

3

· Good2 : Good1

2

3





, WE<sub>i</sub> = Weight of Evidence for i-attribute

P<sub>gi</sub> = i

P<sub>bi</sub> = i

(Information Theory)

(Continuous) 가 (Discrete) 가 (Scoring Table) 가

(< 4> < 10> ).

< 4> (AG)

	Good(%)	Bad(%)	
20 29	58(7.5)	132(27.5)	-1.299
30 39	374(48.6)	203(42.3)	0.139
40 49	338(43.9)	145(30.2)	0.374
	770(100.0)	480(100.0)	

< 5> (IN)

	Good(%)	Bad(%)	
1,000	59(7.7)	74(15.7)	-0.712
1,000 3,000	635(83.0)	368(78.1)	0.061
3,000 4,500	50(6.5)	19(4.0)	0.486
4,500	21(2.8)	10(2.2)	0.241
	765(100.0)	471(100.0)	

< 6> (MP)

	Good(%)	Bad(%)	
3	70(9.9)	68(18.2)	-0.609
3 5	74(10.5)	32(8.6)	0.199
5 20	424(60.0)	232(62.7)	-0.044
20	139(19.6)	42(11.1)	0.569
	770(100.0)	480(100.0)	

## &lt; 7&gt; 가 (DE)

	Good(%)	Bad(%)	
2	170(23.8)	111(29.7)	-0.229
3	315(44.1)	161(43.2)	0.021
4	230(32.1)	101(27.1)	0.169
	715(100.0)	373(100.0)	

## &lt; 8&gt; (EY)

	Good(%)	Bad(%)	
6	17(2.3)	14(3.0)	-0.266
6 5	172(23.1)	171(37.1)	-0.473
5 7	101(13.6)	65(14.1)	-0.036
7 20	345(46.5)	187(41.0)	0.126
20	107(14.4)	23(5.0)	1.058
	742(100.0)	460(100.0)	

## &lt; 9&gt; (LA)

	Good(%)	Bad(%)	
500	205(38.2)	135(42.9)	-0.116
500 1500	214(40.0)	125(39.7)	0.007
1500	117(21.8)	55(17.4)	0.225
	536(100.0)	315(100.0)	

## &lt; 10&gt; (BC)

	Good(%)	Bad(%)	
1	5(0.3)	13(2.7)	-1.349
1 5	198(25.8)	192(40.4)	-0.448
5 10	320(41.7)	189(40.0)	0.042
10	244(31.8)	81(16.9)	0.632
	767(100.0)	475(100.0)	

## 5-1-2.

(&lt; 11&gt; ).

&lt; 11&gt;

$$\begin{aligned}
 Z(\text{Score}) = & -6.8178 + 1.361*AG1 + 0.9882*AG2 \\
 & + 0.6078*IN1 + 1.0915*IN2 + 1.0064*IN3 \\
 & + 0.8834*MP1 + 0.2106*MP2 + 0.5169*MP3 \\
 & - 0.0155*DE1 + 0.2115*DE2 + 0.4163*EY1 \\
 & + 0.9383*EY2 + 1.0785*EY3 + 1.8134*EY4 \\
 & + 0.0206*LA1 + 0.2364*LA2 + 3.5370*BC1 \\
 & + 3.7009*BC2 + 4.3690*BC3
 \end{aligned}$$

5-2.

(Profitability-based Scoring Model)

(Coefficients)가,

가

(AG), (IN), 가 (DE), (EY), (LA), (BC)

(Continuous)

(CFI) (CFO) (< 12> < 13> ).

< 12>

	1.9512	0.0125	0.0020
	0.9892	0.2246	0.0001
(IN)	0.9970	0.2796	0.0004
(MP)	0.00378	0.0086	0.0000
가 (DE)	-0.78512	0.3043	0.0019
(EY)	0.7545	0.0220	0.0008
(LA)	-0.5489	0.04331	0.0250
(BC)	0.0086	0.0325	0.3150

< 13>

	-1.5089	0.2546	0.0018
(AG)	-0.0283	0.0271	0.0012
(IN)	-0.2048	0.1842	0.0071
(MP)	0.0026	0.0179	0.2541
가 (DE)	0.8962	0.2469	0.0004
(EY)	-0.1821	0.0374	0.0010
(LA)	0.9197	0.2283	0.0001
(BC)	-0.0982	0.0423	0.0003

500 250

(-) (< 14> (+)

< 14>

			t
	-1.8712	1.3085	-1.43
(AG)	0.5821**	0.2189	2.66
(IN)	0.0698**	0.0140	4.99
(MP)	0.0211	0.0175	1.21
가 (DE)	-0.4512	0.3621	-1.24
(EY)	0.2942	0.1487	1.97
(LA)	-0.5487**	0.1994	2.75
(BC)	0.0006	0.0004	1.50

(\*\* p<0.05)

## 6.

328

250 (Hold-Out-Sample) (Default)  
(Credit Risk) '0'

가 (Hit Ratio)

### 6-1.

328 268  
73.8% 96.7%  
81.7% 가

< 15>



(206)	<b>150</b> (72.8%)	<b>56</b> (27.2%)
(122)	<b>4</b> (3.3%)	<b>118</b> (96.7%)

6-2.

(Default Risk)

(+) (-)

< 16>

83.3% 86.2% 250 84.4% 211

< 16>

(156)	<b>130</b> (83.3%)	<b>26</b> (16.7%)
(94)	<b>13</b> (13.8%)	<b>81</b> (86.2%)

(Hit-Ratio)

2

(+) (-)  
가

(Hit-Ratio)

가 ( 8 ) 가

# 7.

가  
 가 .  
 가 가 . 1997  
 IMF .  
 , 가  
 (Credit Risk) 가 .  
 가 가  
 (Credit Scoring Method) .  
 가 가 , 가  
 가 가 .  
 가 가  
 가 가  
 가 가  
 가 가  
 가 .  
 가 .  
 가 가  
 (Discriminant Score) .  
 (Centroid) (Cut-off Point) .  
 (Discriminant Score) .  
 ,  
 .  
 가  
 가  
 (Creditworthi- ness)

1 2  
가

(Credit Risk)

가

(Loan Loss)

(Minimization of Loan

Lost)가

(Maximization of Profit)

(Customer Homogeneity) 가

(Default)

(Credit Risk)

가

< 17>

< 17>

	81.7%(268/328)	84.4%(211/250)
1	4%	13%
2	27.2%	16.7%

1 (Type I Error)

2 (Type II Error)

(Loan Loss)

가

1

가

가

2 가

가

1

가 4%

13%

3

2

27.3%

가

가

(Profitability)

1

2

가

'1:5 (1 to 5 rule)'

가

(1998),“ 가 ,” , 7,  
407 428

(1998a),“ ,” ,27(3), 631 659.

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,” ,330 334  
,1999 1 12 .

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