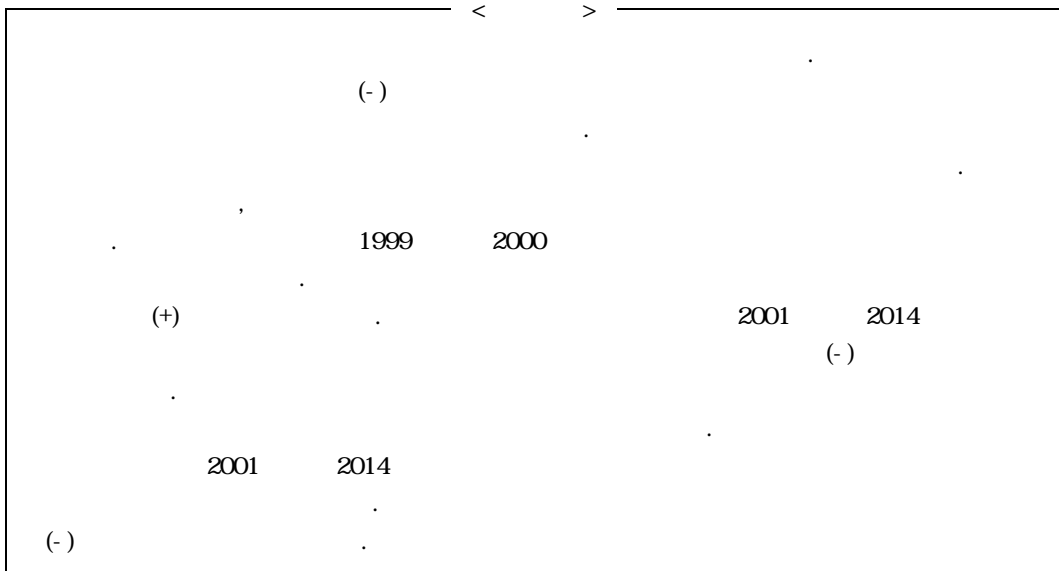


*

()
()**



JEL : G11, G12, G33

*

2016 5

** : 5 1 , 02841;

E-mail: kimdc@korea.ac.kr; Tel: 02- 3290- 2606; Fax: 02- 922- 7220.

2016- 05- 03; 1 2016- 06- 23, 2 2016- 08- 04; 2016- 08- 29

1.

(bankruptcy risk) (compensation)
Dichev(1998)
(-)
1) (market
capitalization) - (book- to- market, BM)
(proxy) (Chan and Chen, 1991;
Fama and French, 1996)
(-) (distress anomaly) (distress puzzle)

Griffin and Lemmon(2002) Ohlson(1980) O-
BM
Vassalou and Xing(2004)
(distance- to- default, DD)
(+)
BM
Campbell et al.(2008) DD
BM
DD
Da and Gao(2010) Vassalou and Xing(2004)
(short- term reversal)

Campbell et al.(2008) (hazard model) DD

Standard & Poors(S&P) (credit rating) Avramov et al.(2009)
() ()

1)
financial failure)

(bankruptcy risk, default risk, distress risk,

(profitability) . Novy- Marx(2013)

(gross profitability) (profitability factor) . Chen et al.(2011)

Tobin(1969) q_t

Fama and French(2015) (dividends discount model)

Fama and French(1993) 3- (five- factor model) 5-

(asset pricing model) (identification)

(+)

Turtle(2003) Vassalou and Xing(2004) DD (2011) Brockman and 1994 2009

(2009) Vassalou and Xing(2004) DD 1999

2009 (2014)

1999 2010 (-)

(2013)

Altman(1968) Z-

. Bharath and Shumway(2008) (iteration) DD

DD

(Han et al., 2012; , , 2015).

20%

(2015)

(2013)

Altman(1968) Z-

Z- (2015) Altman(1968)

(sample selection)

(source)

Altman, Kim and Eom(1993) K- (K- Score) ,
Cosbie and Bohn(2003) Vassalou and Xing(2004) DD ,
(2015) (hazard model)

Fama and French(2015) 5-
(Jensen's alpha) Fama- MacBeth

1999 2009 DD
(+)
(-)
1999 2000
(+)

, 2001 2014

2001 2014

(-) Fama-

MacBeth(1973)

2

3

4
5
6

2.

1999 1 2014 12 (KOSPI) (KOSDAQ)
FnGuide
3

Campbell et al.(2008)
(firms that are delisted for performance- related reasons)

KISLINE (issues for ad-
ministration)

< 1> 1999 2014 1
2006 2007
0.45%, 0.67% 2008 2010 4.80%
2004 KOSDAQ
2008

3.

3.1 부도예측모형

2)

〈표 1〉 연도별 전체, 상장폐지 및 부도기업 추이

연도	2001	2014	상장폐지 (%)	부도기업 (%)
1999	1,023	35(3.42)	110(10.75)	
2000	1,129	29(2.57)	148(13.11)	
2001	1,319	15(1.14)	173(13.12)	
2002	1,459	37(2.54)	181(12.41)	
2003	1,489	29(1.95)	169(11.35)	
2004	1,475	48(3.25)	240(16.27)	
2005	1,518	46(3.03)	161(10.61)	
2006	1,564	7(0.45)	80(5.12)	
2007	1,630	11(0.67)	111(6.81)	
2008	1,660	19(1.14)	157(9.46)	
2009	1,645	69(4.19)	178(10.82)	
2010	1,646	79(4.80)	157(9.54)	
2011	1,669	48(2.88)	122(7.31)	
2012	1,638	43(2.63)	115(7.02)	
2013	1,614	27(1.67)	123(7.62)	
2014	1,643	20(1.15)	114(6.54)	

3.1.1 K-점수모형

Altman et al.(1995) K- (K- Score) 34
 3) 1990 1993 (matched sample)
 () Altman(1968) (discriminant analysis)
 Altman et al.(1995) K-
 (1)

$$K-Score = -18.70 + 1.501 \cdot \ln TA + 2.706 \cdot \ln SLTA + 19.760 \cdot RETA + 1.146 \cdot METL \quad (1)$$

$\ln TA$, $\ln SLTA$ (/), $RETA$
 / , $METL$ / . K-

3) , (2015) 2001 2007 (in-sample) K- (2015)
 (look-ahead bias) Altman et al.
 (1995) K-

3.1.2 DD모형

DD 모형은 Merton(1974)의 Black-Scholes 모형과 유사하게 (2) (3)

$$V_E = V_A N(d_1) - e^{-r_f T} X N(d_2) \quad (2)$$

$$\sigma_E = \left(\frac{V_A}{V_E} \right) N(d_1) \sigma_A \quad (3)$$

$$d_1 = \left[\ln(V_A / X) + (r_f + 0.5\sigma_A^2)T \right] / [\sigma_A \sqrt{T}], d_2 = d_1 - \sigma_A \sqrt{T}, V_E, V_A$$

() , r_f , X , $N(\cdot)$, σ_E , σ_A T (4) DD () (default point)

$$DD = \frac{\ln(V_A / X) + (\mu_A - 0.5\sigma_A^2)T}{\sigma_A \sqrt{T}} \quad (4)$$

μ_A (iteration method)

Crosbie and Bohn(2004) Vassalou and Xing(2004) (4)

(r_f) 1 , (X) +0.5× (T) 1 (V_A) (σ_A) (μ_A) (2)

(10⁻³)

3.1.3 헤저드모형

(hazard model) (static)

Shumway(2001) (multi- period
logit model) , Campbell et al.(2008)

(2015) 2001 1 2007 12 188 86,003

Campbell et al.(2008)

(2015) ⁴⁾

$$\text{Hazard} = -3.83 - 1.58 \cdot \text{NIMTA} + 2.07 \cdot \text{TLMTA} - 2.11 \cdot \text{EXRETAVG} - 0.02 \cdot \text{RSIZE} + 1.36 \cdot \text{SIGMA} - 1.51 \cdot \text{CASHMTA} - 0.52 \cdot \text{PRICE} - 0.45 \cdot \text{SLMTA} - 3.70 \cdot \text{FFOMTA} \quad (6)$$

NIMTA , TLMTA , EXRETAVG
, RSIZE , SIGMA , CASHMTA , PRICE
, SLTMA , FFOMTA
< >

3.1.4 신용등급

(credit agency)

NICE 3 AAA D 22
CCC+ C
D
(2014) () ()
() () (7)

2

$$\begin{aligned} & \text{AAA} = 1, \text{AA}^+ = 2, \text{AA} = 3, \text{AA}^- = 4, \text{A}^+ = 5, \text{A} = 6, \text{A}^- = 7 \\ & \text{BBB}^+ = 8, \text{BBB} = 9, \text{BBB}^- = 10, \text{BB}^+ = 11, \text{BB} = 12, \text{BB}^- = 13, \text{B}^+ = 14, \text{B} = 15, \text{B}^- = 16 \quad (7) \\ & \text{CCC}^+ = 17, \text{CCC} = 18, \text{CCC}^- = 19, \text{CC} = 20, \text{C} = 21, \text{D} = 22 \end{aligned}$$

4) (2015) (in- sample)
(out- of- sample)

3.2 부도에 측모형 추정결과

< 2> (fitted value)
 . K- , DD , 1,400
 241 .
 BBB(8.68) . A K-
 , METL(/)
 . K-
 , DD
 . DD

< 2> B . K-
 DD , (magnitude) (Pearson)
 , K- DD
 K- DD . K-
 , DD ,
 , (2015) .
 K- DD
 .
 .⁵⁾ (rank)
 (Spearman) .
 (ex- ante) (hit- ratio) .⁶⁾
 (ex- post)
 . (8)
 1() 10

5) (risk factor) ,
 , 5
 (http://www.kisrating.com).

6) , (2015) , ROC ,

〈표 2〉 부도에측모형 추정결과 및 상관계수

A	1999	1	2014	12		
	K-		DD		(Pearson)	(Spearman)
A:						
K-	1,402	13.83	15.87	- 2.00	- 130.78	206.22
DD	1,378	1.42	1.78	1.46	- 4.73	46.03
	1,380	- 7.23	1.35	0.69	- 11.77	21.86
	241	8.68	4.18	0.52	1.00	22.00
B:						
		K-	DD			
(Pearson)	K-	1				
	DD	0.52	1			
		- 0.63	- 0.63	1		
		- 0.66	- 0.59	0.67	1	
(Spearman)	K-	1				
	DD	0.62	1			
		- 0.76	- 0.67	1		
		- 0.80	- 0.60	0.70	1	

()

1

$$\text{부도적중률(Hit-ratio)} = \frac{\text{각 포트폴리오에서 1년 후 발생한 부도기업 수}}{\text{전체 부도기업 수}} \quad (8)$$

< 3>

1
63.81%
K- (58.12%), (54.00%), DD(43.52%)
6 10
1 (type I error)
1
0% Hazard
(5.35%), K- Score(7.05%), DD(10.11%)

45 5 (2016)

5 1
 (High)
 (Low) 58.46%
 (54.00%), K- (51.07), DD (33.41%)

<표 3> 부도적중률(Hit-Ratio) 평가 결과

1999 1 2014 12 (%)
 1
) 10() 10 1(

Portfolio	K-	DD		
(High) 1	58.12	43.52	63.81	54.00
2	23.50	20.44	16.70	24.00
3	5.56	10.99	7.49	16.00
4	3.21	7.47	3.00	6.00
5	2.56	7.47	3.64	0.00
(Low) 6~ 10	7.05	10.11	5.35	0.00
High- Low	51.07	33.41	58.46	54.00

4.

4.1 부도에측모형별 주요 변수의 기초통계량

< 4> 1999 1 2014 12
 A~ D K- , DD ,
 (Size) 1611
 BM
 BM
 BM
 (-) BM
 (outlier) 7)

7)

(winsorization)

〈표 4〉 부도위험 포트폴리오의 주요변수의 기초통계량

Portfolio	K- Score	Rating	Size	BM	Illiq	Beta	IVOL	TLTA	ROA	Distance to default (DD)	
										DD	Rating
(Low) 1	28.73	4.83	1,323	1.05	3.85	0.89	14.83	22.59	7.46	3.43	5.45
2	18.58	6.61	431	1.52	9.18	0.94	15.07	39.11	5.00	1.84	7.46
3	14.82	8.61	162	1.79	10.27	1.01	16.32	47.43	2.60	1.14	8.88
4	11.03	11.03	74	1.74	8.46	0.98	19.21	54.45	- 1.29	0.52	10.09
(High) 5	- 6.84	14.63	47	- 0.61	9.94	0.96	25.39	66.39	- 29.61	- 0.53	12.50

Portfolio	K- Score	Rating	Size	BM	Illiq	Beta	IVOL	TLTA	ROA	Distance to default (DD)	
										DD	Rating
(Low) 1	28.73	4.83	1,323	1.05	3.85	0.89	14.83	22.59	7.46	3.43	5.45
2	18.58	6.61	431	1.52	9.18	0.94	15.07	39.11	5.00	1.84	7.46
3	14.82	8.61	162	1.79	10.27	1.01	16.32	47.43	2.60	1.14	8.88
4	11.03	11.03	74	1.74	8.46	0.98	19.21	54.45	- 1.29	0.52	10.09
(High) 5	- 6.84	14.63	47	- 0.61	9.94	0.96	25.39	66.39	- 29.61	- 0.53	12.50

Portfolio	K- Score	Rating	Size	BM	Illiq	Beta	IVOL	TLTA	ROA	Distance to default (DD)	
										DD	Rating
(Low) 1	28.73	4.83	1,323	1.05	3.85	0.89	14.83	22.59	7.46	3.43	5.45
2	18.58	6.61	431	1.52	9.18	0.94	15.07	39.11	5.00	1.84	7.46
3	14.82	8.61	162	1.79	10.27	1.01	16.32	47.43	2.60	1.14	8.88
4	11.03	11.03	74	1.74	8.46	0.98	19.21	54.45	- 1.29	0.52	10.09
(High) 5	- 6.84	14.63	47	- 0.61	9.94	0.96	25.39	66.39	- 29.61	- 0.53	12.50

Portfolio	K- Score	Rating	Size	BM	Illiq	Beta	IVOL	TLTA	ROA	Distance to default (DD)	
										DD	Rating
(Low) 1	28.73	4.83	1,323	1.05	3.85	0.89	14.83	22.59	7.46	3.43	5.45
2	18.58	6.61	431	1.52	9.18	0.94	15.07	39.11	5.00	1.84	7.46
3	14.82	8.61	162	1.79	10.27	1.01	16.32	47.43	2.60	1.14	8.88
4	11.03	11.03	74	1.74	8.46	0.98	19.21	54.45	- 1.29	0.52	10.09
(High) 5	- 6.84	14.63	47	- 0.61	9.94	0.96	25.39	66.39	- 29.61	- 0.53	12.50

(Beta) (IVOL) ⁸⁾ (Illiq)

(Beta)

(TLTA) (ROA)

8) (Illiq) Amihud(2002) (Beta) (IVOL)

60

(+)

(-)

4.2 포트폴리오 분석

	$\langle 5 \rangle_{t-1}$	t	(equal-weighted)
	1999 1	2009 12	
	. ⁹⁾	(2011)	(+)
A			$\langle 5 \rangle$
			. DD
	- (high-low)		(1.85%)
	. , K-		- (high-low)
	(0.25%, 0.86%)	(+)	
		- (high-low)	(-)
B			. DD
			(3.26% 2.42%)
	- (high-low)		
K-		DD	
			- (high-low)
		(-)	A B
C		1999 1	
2009 12	1		
		- 0.61%	
. DD	- 0.49	$\langle 4 \rangle$	

9) DD 1999 1 , (2011) , (2014)
2009 12

〈표 5〉 부도위험과 주식수익률의 관계

1999 , DD	1 t	2009 ,	12 (equal-weighted)	t-1	A		K-
					B	C	
				D			1
				()	t	* , ** , *** 10%, 5%, 1%	
A:							
		Low	2	3	4	High	High-Low
K-		1.66 (1.60)	2.82*** (3.05)	2.74*** (2.94)	3.01*** (2.95)	1.90 (1.60)	0.25 (0.29)
DD		1.41** (1.98)	1.94** (2.33)	2.24** (2.29)	2.85*** (2.69)	3.26** (2.41)	1.85* (1.92)
		2.47*** (3.05)	1.83* (1.92)	1.51 (1.65)	2.39** (2.39)	3.33*** (2.76)	0.86 (1.20)
		2.05*** (3.03)	2.35*** (2.97)	1.98** (2.24)	1.82* (1.92)	0.90 (0.81)	- 1.15 (- 1.34)
B:							
K-		1.75* (1.71)	2.68*** (2.98)	2.84*** (3.01)	2.98*** (2.84)	1.07 (0.92)	- 0.68 (- 0.74)
DD		1.44** (1.99)	1.89** (2.27)	2.41** (2.41)	2.81** (2.57)	2.42* (1.91)	0.98 (1.05)
		2.45*** (3.04)	1.74* (1.84)	1.67* (1.80)	2.27** (2.28)	2.63** (2.23)	0.18 (0.24)
		2.04*** (3.02)	2.34*** (2.90)	1.93** (2.18)	1.83* (1.92)	0.15 (0.14)	- 1.89** (- 2.17)
C:							
				ME	BM	DD	
		604	- 0.61	112.06	- 1.42	- 0.49	
		1,311	2.01	335.34	1.42	1.06	
		1,915	1.85	321.07	1.24	0.96	
D:							
		Low	2	3	4	High	High-Low
K-		1.90*** (2.73)	2.34*** (2.97)	2.14** (2.49)	2.07** (2.26)	0.03 (0.03)	- 1.87** (- 2.14)
DD		1.68*** (2.77)	2.06*** (2.68)	1.91** (2.16)	1.86* (1.97)	1.00 (0.91)	- 0.68 (- 0.84)
		2.37*** (3.58)	1.88** (2.41)	1.69* (1.92)	1.54* (1.67)	0.89 (0.84)	- 1.49** (- 2.00)
		2.04*** (3.02)	2.34*** (2.90)	1.93** (2.18)	1.83* (1.92)	0.15 (0.14)	- 1.89** (- 2.17)

D

(high- low) (-)

1999 1 2000

12 (2008) IT

< 6> A 1999 1 2000 12

. DD

DD K-

(high- low)

(+)

(-) ¹⁰⁾ A 1999

1 2000 12

2001 1 2009 12 B

(high-

low) (-) C 2001 1

2014 12

(high- low)

(-)

(+)

2001 2014

(-)

10) 1999 1 2000 12 K- , DD ,

〈표 6〉 부분샘플기간별 부도위험과 주식수익률의 관계

t-1 weighted)	A: 1999 1 ~ 2000 12		B: 2001 1 ~ 2009 12		C: 2001 1 ~ 2014 12	
	Low	2	3	4	High	High-Low
K-	3.56 (0.87)	4.34 (1.46)	4.57 (1.53)	6.09* (1.71)	5.85 (1.51)	2.29 (0.55)
DD	0.21 (0.08)	1.90 (0.76)	4.45 (1.41)	6.70* (1.93)	9.25* (1.94)	9.04** (2.37)
	2.48 (0.94)	2.15 (0.69)	3.06 (1.07)	5.20 (1.61)	8.54** (1.99)	6.07** (2.00)
	0.85 (0.38)	0.81 (0.33)	- 0.38 (- 0.17)	- 0.46 (- 0.19)	- 1.42 (- 0.55)	- 2.26 (- 1.14)
K-	1.35 (1.55)	2.31** (2.61)	2.46** (2.59)	2.29** (2.27)	0.01 (0.01)	- 1.34** (- 2.05)
DD	1.71** (2.45)	1.88** (2.20)	1.96* (1.95)	1.94* (1.80)	0.90 (0.82)	- 0.81 (- 1.22)
	2.45*** (3.06)	1.65* (1.77)	1.36 (1.44)	1.62 (1.65)	1.32 (1.25)	- 1.13* (- 1.97)
	2.30*** (3.40)	2.67*** (3.20)	2.42** (2.53)	2.31** (2.25)	0.48 (0.40)	- 1.82* (- 1.86)
K-	1.22** (2.07)	1.97** (3.24)	2.05*** (3.14)	1.92*** (2.77)	- 0.20 (- 0.27)	- 1.43*** (- 3.07)
DD	1.60*** (3.34)	1.68*** (2.84)	1.70** (2.49)	1.55** (2.10)	0.43 (0.57)	- 1.17** (- 2.39)
	2.19*** (4.02)	1.44** (2.26)	1.17* (1.80)	1.30 (1.92)	0.84 (1.15)	- 1.35*** (- 3.15)
	1.71*** (3.60)	1.99*** (3.45)	1.72** (2.56)	1.52** (2.12)	0.06 (0.07)	- 1.66** (- 2.40)

4.3 횡단면 회귀분석

(univariate)

(multivariate)

Fama- MacBeth

(1973)

$$\text{Neg.DD} (= \text{DD} \times - 1) \quad \text{Neg.K} (= \text{K} - \times - 1)$$

(outlier) 1% 99% (winsorization) Chava and Jarrow (2004)

(9) (10)

$$R_{i,t} = \alpha + \beta_1 \cdot \text{Distress}_{i,t-1} + \beta_j \cdot \text{Industry}_{i,j} + e_{i,t} \quad (9)$$

$$R_{i,t} = \alpha + \beta_1 \cdot \text{Distress}_{i,t-1} + \beta_2 \cdot \log(\text{Size}_{i,t-1}) + \beta_3 \cdot \log(\text{BM}_{i,t-1}) + \beta_j \cdot \text{Industry}_{i,j} + e_{i,t} \quad (10)$$

$R_{i,t}$ i t , $\text{Distress}_{i,t-1}$ i $t-1$, $\text{Size}_{i,t-1}$ i $t-1$, $\text{BM}_{i,t-1}$ i $t-1$ - $\text{Industry}_{i,j}$ i j 1, 0 < 7> A < 5> 1999 1 2009 12 (1) (2) (3) (4)

(1) Neg.DD (0.84) (2)

(3) Neg.DD (+) (size) BM (magnitude) BM Neg.DD (4)

(5) (6) 1999 1 2000 12 Neg.DD (6) (Size) (4) A (+)

2014 B 2001 (1) (4) (-) BM (-) B 2001

〈표 7〉 Fama-MacBeth 횡단면 회귀분석 결과
(month-by-month) Fama-MacBeth(1973)

$$R_{i,t} = \alpha + \beta_1 \cdot \text{Distress}_{i,t-1} + \beta_2 \cdot \log(\text{Size}_{i,t-1}) + \beta_3 \cdot \log(\text{BM}_{i,t-1}) + \beta_j \cdot \text{Industry}_{i,j} + e_{i,t}$$

$R_{i,t}$: i 회사의 t 기간 수익률, $\text{Distress}_{i,t-1}$: i 회사의 $t-1$ 기간 Distress, $\text{Size}_{i,t-1}$: i 회사의 $t-1$ 기간 Size, $\text{BM}_{i,t-1}$: i 회사의 $t-1$ 기간 BM, $\text{Industry}_{i,j}$: i 회사의 j 산업군에 속하는지 여부 (1, 0)
 (Hazard), (distress) K- (Neg.K = K- ×- 1), DD (Neg.DD = DD×- 1), Admin
 A 1999
 B 2001 1 2014 12
 , * , ** , *** 10%, 5%, 1%

A: (Sub-period)		Estimation period							
		199901~ 200912	199901~ 200912	199901~ 200912	199901~ 200912	200101~ 200912	200101~ 200912		
Explanatory variable		(1)	(2)	(3)	(4)	(5)	(6)		
Neg.DD		0.84** (2.48)	0.29* (1.75)	0.70** (2.14)	0.15 (1.03)	0.06 (0.33)	0.02 (0.08)		
Size			- 0.82** (- 2.21)		- 0.81** (- 2.25)		- 0.09 (- 0.54)		
BM			2.08*** (6.4)		2.15*** (6.87)		2.19*** (10.41)		
Constant		5.60** (2.61)	15.85*** (3.33)	5.30** (2.48)	15.51*** (3.32)	3.83** (2.21)	7.59*** (2.72)		
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Admin	No	No	Yes	Yes	Yes	Yes	Yes		
Adj. R ²		0.093	0.121	0.087	0.115	0.078	0.101		
B: Estimation period: 200101~ 201412									
Explanatory variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Neg.K		- 0.05*** (- 5.99)				- 0.03*** (- 3.81)			
Neg.DD			- 0.25** (- 2.25)				- 0.16 (- 1.41)		
Hazard				- 0.50*** (- 4.81)				- 0.37 (- 4.45)	
Rating					- 0.17*** (- 3.57)				- 0.11** (- 2.02)
Size						- 0.07 (- 0.69)	- 0.00 (- 0.01)	- 0.09 (- 0.90)	0.13 (1.01)
BM						1.87*** (12.98)	1.96*** (13.45)	1.89*** (13.58)	1.55*** (7.48)

Constant	2.04** (2.18)	2.27** (2.30)	- 0.86 (- 0.68)	2.55*** (2.89)	5.71*** (3.69)	4.77*** (3.21)	3.63** (2.15)	0.31 (0.15)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.08	0.08	0.08	0.26	0.10	0.11	0.10	0.29
No. of Month	168	168	168	168	168	168	168	168

5.

< 4> (ROA) (-) (Altman, 1968; Zinjewski, 1984; Ohlson, 1980; Shumway, 2001; Campbell et al., 2008). (profitability) (ex ante) (-) (ex post) (Novy-Marx, 2013; Chen et al., 2011; Hou et al., 2015). 2001

5.1 부도위험, 수익성 그리고 주가수익률의 관계

Fama and French(2015) (dividend discount model) (profitability factor) 5- (five-factor model) (11)

$$M_t = \sum_{\tau=0}^{\infty} \frac{E(d_{t+\tau})}{(1+r)^\tau} = \sum_{\tau=0}^{\infty} \frac{E[Y_{t+\tau} - dB_{t+\tau}]}{(1+r)^\tau} \quad (11)$$

M_t t, d_t t, $Y_{t+\tau}$ t+ τ , $dB_{t+\tau}$ t+ τ , r (11) (expected profitability;) (expected stock return) . Fama and French(2015) (+)

< 8> A 1 (return on asset; ROA) () (-) < 4> < 8> A

〈표 8〉 부도위험, 수익성, 그리고 주식수익률의 관계

2001 A	1	2014 K-	12	, DD	,	,	1
(ROA)	t	B	t-1	(equal-weighted)	, ROA	, ROE	, FFOTA
GITA	, GIEQ	, OITA	, OIEQ	, ROE	, FFOTA	10%, 5%, 1%	
FFOEQ		()	t-	, *, **, ***			

A:						
	Low	2	3	4	High	High- Low
	(1 ROA, %)					
K-	5.19*** (32.88)	3.24*** (26.58)	0.52*** (4.45)	- 4.65*** (- 16.94)	- 27.17*** (- 25.27)	- 32.36*** (- 31.74)
DD	5.01*** (43.89)	0.86*** (4.73)	- 3.21*** (- 10.87)	- 7.99*** (- 18.91)	- 17.98*** (- 24.72)	- 22.99*** (- 33.29)
	5.95*** (50.44)	1.14*** (4.28)	- 3.60*** (- 11.74)	- 8.01*** (- 20.80)	- 18.87*** (- 25.46)	- 24.82*** (- 32.71)
	5.83*** (46.18)	4.09*** (28.15)	1.29*** (6.86)	- 2.85*** (- 9.82)	- 16.78*** (- 19.19)	- 22.61*** (- 25.41)
B: (profitability)						
	Low	2	3	4	High	High- Low
	(%)					
GITA	- 0.35 (- 0.51)	1.38** (2.14)	1.74*** (2.72)	1.91*** (2.99)	2.22*** (3.54)	2.57*** (8.75)
OITA	- 0.99 (- 1.27)	1.25* (1.92)	1.74*** (2.83)	2.21*** (3.67)	2.68*** (4.13)	3.67*** (8.57)
ROA	- 1.10 (- 1.43)	1.11* (1.74)	1.97*** (3.11)	2.19*** (3.55)	2.71*** (4.22)	3.80*** (9.08)
FFOTA	- 0.26 (- 0.34)	1.21* (1.85)	1.69*** (2.73)	1.94* (3.23)	2.31*** (3.81)	2.58*** (7.09)
GIEQ	- 0.12 (- 0.17)	1.42** (2.15)	1.61** (2.50)	2.08*** (3.14)	1.91*** (3.12)	2.02*** (7.61)
OIEQ	- 0.49 (- 0.64)	1.33** (2.07)	1.73*** (2.85)	2.09*** (3.30)	2.22*** (3.55)	2.71*** (6.96)
ROE	- 0.44 (- 0.58)	1.05 (1.64)	1.87*** (3.04)	2.12*** (3.39)	2.29*** (3.59)	2.73*** (7.56)
FFOEQ	0.00 (0.01)	1.24* (1.89)	1.66*** (2.70)	2.07*** (3.40)	1.91*** (3.14)	1.91*** (5.63)

11)

$$\begin{aligned}
 & \frac{B_{t-1}}{t} \text{ (Gross Income to Total Asset; GITA),} \\
 & \text{(ROA),} \\
 & \text{(Gross Income to Equity; GIEQ),} \\
 & \text{to Equity; OIEQ),} \\
 & \text{From Operations to Equity; FFOEQ)} \\
 & \frac{B_{t-1}}{t} \text{ (Operating Income to Total Asset; OITA),} \\
 & \text{(Funds From Operations to Total Asset; FFOA),} \\
 & \text{(Operating Income to Equity; OIEQ),} \\
 & \text{(return on equity; ROE),} \\
 & \text{(Funds From Operations to Equity; FFOEQ)} \\
 & \frac{B_{t-1}}{t} \text{ (high- low)} \\
 & \text{(+) }
 \end{aligned}$$

5.2 수익성 효과와 부도위험 이례현상

Fama and French(2015) 5-3 (MKTRF), (SMB), (HML) (RMW) (CMA) (SMBN) 3- Fama and French(2015) 5-13 (MKTRF) (KOSPI KOSDAQ) (equal- weighted)

11) 1

12) Novy- Marx(2013) (net income) (gross income) Ball et al.(2015) () () Hou et al.(2015) (ROE) , Fama and French(2015) et al.(2002) (OITA) , Cohen

13) Fama and French(2015) (value-weighted)

(1) 1 (factor port-
folio) 6 KOSPI
(median) 2 (B, S) 12
KOSPI BM 30%, 40%, 30%
3 (H, N, L) BM
(< - >/) ()
3 (<R, N, W> <A, N, C>)
(B, S) BM (H, M, L) 6
(BH, BM, BL, SH, SM, SL)
, (BR, BN, BW, SR, SN, SW) (BA, BN, BC, SA, SN, SC)
18

$$\begin{aligned} \text{SMB} &= ((\text{SL} + \text{SN} + \text{SH}) - (\text{BL} + \text{BN} + \text{BH})) / 3 \\ \text{SMB}_{\text{OP}} &= ((\text{SW} + \text{SN} + \text{SR}) - (\text{BW} + \text{BN} + \text{BR})) / 3 \\ \text{SMB}_{\text{INV}} &= ((\text{SC} + \text{SN} + \text{SA}) - (\text{BC} + \text{BN} + \text{BA})) / 3 \\ \text{SMBN} &= (\text{SMB} + \text{SMB}_{\text{OP}} + \text{SMB}_{\text{INV}}) / 3 \\ \text{HML} &= ((\text{SH} + \text{BH}) - (\text{SL} + \text{BL})) / 2 \\ \text{RMW} &= ((\text{SR} + \text{BR}) - (\text{SW} + \text{BW})) / 2 \\ \text{CMA} &= ((\text{SC} + \text{BC}) - (\text{SA} + \text{BA})) / 2 \end{aligned}$$

< 9> 2001 1 2014 12 (monthly return)
A , (MKTRF)
1.28% (SMB) (HML) 0.31%,
1.91% 5- (RMW) (CMA)
0.69%, 0.49%
B
(-)

14)

14)

(- 0.02)

1118

〈표 9〉 요인별 기초통계량과 상관관계

Factor	Factor portfolio		Monthly return	
	2001 1	2014 12	MKTRF, SMB, SMBN, HML, CMA, RMW	(equal-weighted return)
MKTRF	(KOSPI KOSDAQ)	(median)		
(B, S)	6	KOSPI	2	
30%, 40%, 30%	12	KOSPI	BM	
BM		($<R, N, W>$)	3	(H, N, L)
	3	($<R, N, W>$)	$<A, N, C>$	
(B, S) BM		(H, M, L)	6	(BH, BR)
BM, BL, SH, SM, SL)				
BN, BW, SR, SN, SW)	(BA, BN, BC, SA, SN, SC)			

$$SMB = ((SL + SN + SH) - (BL + BN + BH)) / 3$$

$$SMB_{Op} = ((SW + SN + SR) - (BW + BN + BR)) / 3$$

$$SMB_{INV} = ((SC + SN + SA) - (BC + BN + BA)) / 3$$

$$SMBN = (SMB + SMB_{Op} + SMB_{INV}) / 3$$

$$HML = ((SH + BH) - (SL + BL)) / 2$$

$$RMW = ((SR + BR) - (SW + BW)) / 2$$

$$CMA = ((SC + BC) - (SA + BA)) / 2$$

A:						
(%)						
MKTRF	168	1.28	8.16	- 32.17	42.43	
SMB	168	0.31	3.91	- 8.50	13.75	
SMBN	168	0.46	3.82	- 10.17	12.84	
HML	168	1.91	4.67	- 26.48	18.40	
RMW	168	0.69	2.85	- 8.95	7.50	
CMA	168	0.49	2.53	- 9.53	11.52	

B: (Pearson)						
	MKTRF	SMB	SMBN	HML	RMW	CMA
MKTRF	1					
SMB	0.00	1				
SMBN	- 0.02	0.99	1.00			
HML	- 0.40	- 0.02	0.03	1		
RMW	- 0.40	- 0.36	- 0.32	0.36	1	
CMA	- 0.07	0.36	0.35	0.17	- 0.40	1

5.3 요인 시계열 회귀분석

(12) (16) (single-factor)

$$R_{p,t} - r_{ft} = a_p + b_p(R_{m,t} - r_{ft}) + e_{p,t} \quad (12)$$

$$R_{p,t} - r_{ft} = a_p + s_p \text{SMBN}_t + e_{p,t} \quad (13)$$

$$R_{p,t} - r_{ft} = a_p + h_p \text{HML}_t + e_{p,t} \quad (14)$$

$$R_{p,t} - r_{ft} = a_p + r_p \text{RMW}_t + e_{p,t} \quad (15)$$

$$R_{p,t} - r_{ft} = a_p + c_p \text{CMA}_t + e_{p,t} \quad (16)$$

$R_{p,t}$, r_{ft} , $R_{m,t}$, SMBN_t , HML_t , RMW_t , CMA_t , a_p , b_p , s_p , h_p , r_p , c_p (loading)
 < 10> . $t-1$
 2001 1 2014 12
 (equal-weighted)
 (high-low) (a_p) , (a_p)
 (high-low)
 (r_p) - 1.42 (-)
 (high-low) (-)
 (high-low) (adjusted R-squared)
 0.53 (0.12) (0.24), (0.14), (0.13),
 (0.12)

15)

(17) (19) (multi-factor)

$$(3) R_{p,t} - r_{ft} = a_p + b_p(R_{m,t} - r_{ft}) + s_p \text{SMB}_t + h_p \text{HML}_t + e_{p,t} \quad (17)$$

$$(4) R_{p,t} - r_{ft} = a_p + b_p(R_{m,t} - r_{ft}) + s_p \text{SMB}_t + h_p \text{HML}_t + r_p \text{RMW}_t + e_{p,t} \quad (18)$$

$$(5) R_{p,t} - r_{ft} = a_p + b_p(R_{m,t} - r_{ft}) + s_p \text{SMBN}_t + h_p \text{HML}_t + r_p \text{RMW}_t + c_p \text{CMA}_t + e_{p,t} \quad (19)$$

15) K- , DD , .

. 3- , - (high- low)
 - 1.19% 1% (-)
 . 4- , - (high- low)
 10%
 (Adj. R²) 3- (0.44 0.63)
 (negative risk premium)
 (r_p) - 1.05 - (high- low) (-)

<표 10> 단일요인(Single-Factor) 시계열 회귀분석

(factor portfolio)		2001 1	2014 12	(single-factor) (excess return)						
	c _p		(factor loading) (equal-weighted)	α _p	(intercept)	b _p	s _p	h _p	r _p	
low)		(R-squared)	(R-squared)	()	()	t-	R ²	*	**	***
5%, 1%										(high- 10%,
MKTRF ()	α _p	0.99*** (6.50)	0.03 (0.25)	- 0.28*** (- 2.86)	- 0.20* (- 1.82)	- 0.67** (- 2.34)	- 1.66*** (- 4.05)			
	b _p	0.83*** (45.25)	0.99*** (61.59)	1.02*** (86.56)	1.06*** (80.21)	1.07*** (30.62)	0.24*** (4.79)			0.12
SMBN ()	α _p	2.20*** (4.04)	1.42** (2.22)	1.09* (1.67)	1.11 (1.63)	0.52 (0.71)	- 1.68*** (- 4.44)			
	s _p	- 0.32** (- 2.23)	- 0.26 (- 1.58)	- 0.14 (- 0.81)	0.10 (0.54)	0.40** (2.09)	0.71*** (7.22)			0.24
HML ()	α _p	3.02*** (5.43)	2.62*** (4.13)	2.42*** (3.77)	2.57*** (3.82)	2.51*** (3.58)	- 0.51 (- 1.18)			
	h _p	- 0.51*** (- 4.60)	- 0.69*** (- 5.50)	- 0.73*** (- 5.74)	- 0.74*** (- 5.54)	- 0.95*** (- 6.84)	- 0.44*** (- 5.16)			0.14
RMW ()	α _p	2.43*** (4.42)	1.86*** (2.94)	1.78*** (2.87)	2.06*** (3.27)	2.05*** (3.37)	- 0.38 (- 1.24)			
	r _p	- 0.55*** (- 2.92)	- 0.81*** (- 3.76)	- 1.10*** (- 5.18)	- 1.32*** (- 6.11)	- 1.97*** (- 9.49)	- 1.42*** (- 13.69)			0.53
CMA ()	α _p	2.31*** (4.23)	1.57** (2.45)	1.23* (1.88)	1.24* (1.79)	0.57 (0.76)	- 1.75*** (- 4.27)			
	c _p	- 0.54** (- 2.53)	- 0.55** (- 2.22)	- 0.43* (- 1.70)	- 0.16 (- 0.60)	0.27 (0.93)	0.81*** (5.08)			0.13

〈표 11〉 다중요인(Multi-Factor) 시계열 회귀분석

Factor	Parameter	(excess return)						Adj R ²
		Low	2	3	4	High	High-Low	
(3-factor model)	a _p	0.89 ^{***} (6.43)	0.11 (0.87)	-0.19 [*] (-1.87)	-0.25 ^{**} (-2.19)	-0.30 (-1.09)	-1.19 ^{***} (-3.20)	
MKTRF	b _p	0.85 ^{***} (52.57)	0.99 ^{**} (65.36)	1.01 ^{***} (83.07)	1.06 ^{***} (79.05)	1.02 ^{***} (31.49)	0.16 ^{***} (3.76)	
SMB	s _p	-0.28 ^{***} (-8.99)	-0.22 ^{***} (-7.69)	-0.10 ^{***} (-4.37)	0.14 ^{***} (5.28)	0.44 ^{***} (7.07)	0.72 ^{***} (8.57)	
HML	h _p	0.08 ^{***} (2.98)	-0.00 (-0.17)	-0.02 (-1.10)	0.00 (0.18)	-0.23 ^{***} (-4.11)	-0.32 ^{***} (-4.15)	0.44
(4-factor model)	a _p	0.65 ^{***} (5.49)	-0.10 (-0.93)	-0.23 ^{**} (-2.12)	-0.22 [*] (-1.90)	0.13 (0.54)	-0.51 (-1.65)	
MKTRF	b _p	0.89 ^{***} (62.64)	1.03 ^{***} (75.85)	1.02 ^{***} (79.00)	1.06 ^{***} (74.30)	0.94 ^{***} (31.91)	0.05 (1.34)	
SMB	s _p	-0.18 ^{***} (-6.54)	-0.14 ^{***} (-5.14)	-0.09 ^{***} (-3.52)	0.12 ^{***} (4.46)	0.27 ^{***} (4.56)	0.45 ^{***} (6.06)	
HML	h _p	0.03 (1.36)	-0.05 ^{**} (-2.21)	-0.03 (-1.38)	0.01 (0.41)	-0.14 ^{***} (-2.77)	-0.17 ^{***} (-2.69)	
RMW	r _p	0.37 ^{***} (8.66)	0.34 ^{***} (8.21)	0.05 (1.27)	-0.04 (-0.99)	-0.67 ^{***} (-7.50)	-1.05 ^{***} (-9.16)	0.63
(5-factor model)	a _p	0.72 ^{***} (6.07)	-0.04 (-0.35)	-0.14 (-1.31)	-0.23 [*] (-1.90)	0.04 (0.17)	-0.68 ^{**} (-2.15)	
MKTRF	b _p	0.89 ^{***} (62.74)	1.02 ^{***} (75.60)	1.01 ^{***} (80.61)	1.06 ^{***} (73.06)	0.95 ^{***} (31.91)	0.06 [*] (1.66)	
SMB	s _p	-0.18 ^{***} (-6.32)	-0.13 ^{***} (-4.67)	-0.06 ^{**} (-2.58)	0.13 ^{***} (4.38)	0.26 ^{***} (4.37)	0.44 ^{***} (5.84)	
HML	h _p	0.06 ^{**} (2.33)	-0.03 (-1.17)	-0.00 (-0.03)	0.01 (0.20)	-0.17 ^{***} (-3.28)	-0.23 ^{***} (-3.48)	
RMW	r _p	0.33 ^{***} (6.90)	0.29 ^{***} (6.43)	-0.02 (-0.54)	-0.05 (-0.96)	-0.61 ^{***} (-6.15)	-0.94 ^{***} (-7.47)	
CMA	c _p	-0.11 ^{**} (-2.33)	-0.11 ^{**} (-2.47)	-0.17 ^{***} (-4.12)	-0.00 (-0.03)	0.14 (1.39)	0.25 ^{**} (1.98)	0.64

(high- low) 5% (-)
 0.64 4- (0.63)
 (-)
 factor model) 4- (single- (-)

5.4 Fama-MacBeth 횡단면 회귀분석

Fama- MacBeth(1973) < 12>
 (ROA) (1)
 (4) (20) , (5) (8) BM
 (21)

$$R_{i,t} = \alpha + \beta_1 \text{Distress}_{i,t-1} + \beta_2 \text{Profit}_{i,t-1} + \beta_j \text{Industry}_{i,j} + e_{i,t} \quad (20)$$

$$R_{i,t} = \alpha + \beta_1 \text{Distress}_{i,t-1} + \beta_2 \text{Profit}_{i,t-1} + \beta_3 \log(\text{Size}_{i,t-1}) + \beta_4 \log(\text{BM}_{i,t-1}) + \beta_j \text{Industry}_{i,j} + e_{i,t} \quad (21)$$

BM_{i,t} i t , Distress_{i,t-1} i t-1 ,
 Profit_{i,t-1} i t-1 , Size_{i,t-1} i t-1 , BM_{i,t-1} i
 t-1 - . Industry_{i,j} i
 j 1, 0 .
 (1) (4) (-)
 (Profit) (+)
 16) BM (5) (8)
 (-)
 (Profit) (+)

16) < 8> B (OITA), (ROE), (FFOTA), (FFOEQ), (ROA), (GIEQ), (GITA), (OIEQ), (+)

〈표 12〉 수익성을 통제 한 Fama-MacBeth 횡단면 회귀분석 결과
(month-by-month) Fama-MacBeth(1973)

$$R_{i,t} = \alpha + \beta_1 \text{Distress}_{i,t-1} + \beta_2 \text{Profit}_{i,t-1} + \beta_3 \log(\text{Size}_{i,t-1}) + \beta_4 \log(\text{BM}_{i,t-1}) + \beta_j \text{Industry}_{i,j} + e_{i,t}$$

$R_{i,t}$: i 회사 t 시점의 수익률, $\text{Distress}_{i,t-1}$: i 회사 $t-1$ 시점의 Distress, $\text{Profit}_{i,t-1}$: i 회사 $t-1$ 시점의 Profit, $\text{Size}_{i,t-1}$: i 회사 $t-1$ 시점의 Size, $\text{BM}_{i,t-1}$: i 회사 $t-1$ 시점의 BM, $\text{Industry}_{i,j}$: i 회사가 속한 산업 j 의 Industry Dummy Variable.
 (Neg.K = K-1), DD (Neg.DD = DD×-1), (Hazard), (Rating) (Rating = Rating-1), DD (DD = DD-1),
 *, **, *** 10%, 5%, 1%

Explanatory variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Neg.K	0.00 (0.62)				0.02** (2.57)			
Neg.DD		0.17 (1.65)				0.07 (0.64)		
Hazard			0.22** (2.47)				0.11 (1.50)	
Rating				- 0.01 (- 0.22)				- 0.01 (- 0.14)
Profit	13.12*** (14.40)	13.64*** (14.42)	14.28*** (18.24)	15.18*** (8.95)	12.35*** (13.89)	11.36*** (12.65)	11.71*** (14.14)	14.07*** (6.66)
Size					- 0.17 (- 1.60)	- 0.19** (- 1.98)	- 0.16 (- 1.64)	0.10 (0.82)
BM					1.77*** (12.55)	1.70*** (12.15)	1.73*** (12.82)	1.56*** (7.61)
Constant	1.29 (1.37)	1.29 (1.32)	2.77** (2.28)	0.37 (0.42)	6.05*** (3.94)	6.04*** (4.16)	6.55*** (3.99)	- 0.93 (- 0.48)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of month	168	168	168	168	168	168	168	168
Adj R ²	0.09	0.09	0.09	0.28	0.11	0.11	0.11	0.31

6.

(-)

, ,
 .
 ,
 .
 1999 2009
 (+)
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 . 1999 2000
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 2001 2014
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 2001 2014
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 .
 Fama-French 3-
 (profitability factor)
 .
 (-)
 , (+)
 (-)
 (market anomaly)
 () , (irra-
 tional behavior) (risk)
 (supporting)
 (distress anomaly)
 (misspecified asset pricing model)

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(NIMTA)	$\frac{\text{당기순이익(NI)}}{\text{시장총자산(MTA, 자본의 시장가치+부채의 장부가치)}}$
(TLMTA)	$\frac{\text{총부채(TL)}}{\text{시장총자산(MTA, 자본의 시장가치+부채의 장부가치)}}$
(EXRETAVG)	$\frac{1-\varnothing}{1-\varnothing^{12}}(\text{EXPET}_{t-2} + \dots + \varnothing^{11}\text{EXPET}_{t-12}), \varnothing = 2^{-3}$ cf) $\text{EXPRT} = \log(1 + \text{Return}_{i,t}) - \log(1 + \text{KOSPI Return}_{i,t})$
(RSIZE)	$\log\left(\frac{\text{개별기업 시장가치}_t}{\text{KOSPI 시장가치}_t}\right)$
(SIGMA)	$\left(252 \times \frac{1}{N-1} \sum_{K \in (t-1, t-2, t-3)} R_{i,K}^2\right)^2$
(CAHMTA)	$\frac{\text{현금 및 현금성 자산+단기투자자산(CASH)}}{\text{시장총자산(MTA, 자본의 시장가치+부채의 장부가치)}}$
(PRICE)	15,000 /1,000, 15
(FFOMTA)	$\frac{\text{영업현금유인(FFO)}}{\text{시장총자산(MTA, 자본의 시장가치+부채의 장부가치)}}$
(SLMTA)	$\frac{\text{매출액(SALES)}}{\text{시장총자산(MTA, 자본의 시장가치+부채의 장부가치)}}$

A Study on the Financial Distress Risk Puzzle in Korea*

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Abstract

There has been no consensus in the finance literature in Korea on whether the financial distress risk puzzle, which is a negative relation between financial distress and subsequent stock returns in the cross-section, is prominent in the Korean stock markets. By using various bankruptcy prediction models and a longer time-series of stock return data, we examine which cause(s) drives the conflicting results on the financial distress risk puzzle. We find that one of the main causes is the inclusion or not of a specific sample period such as 1999~2000, which is the period of the internet bubble. When this period is excluded, we find that the financial distress puzzle is prominent. However, when this period is included, the puzzle is no longer observed, since during this period, small-sized firms with high financial distress earn high return. We also find that the financial distress puzzle is related with future profitability and the puzzle is well explained by a four-factor model including the Fama-French three-factor plus the profitability factor.

Keywords: Financial Distress Risk Puzzle; Bankruptcy Prediction Model;
Credit Rating; Profitability; Factor Models

JEL Classification: G11, G12, G33

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