

:

*

27

33

.2003

1994

30

.1

Beaver,)

(Altman,

(1966

.1968)

*

2006/10/18

.2007/9/6

: .2

: .3

: .4

: .5

:

.2

(Beaver, 1966)

:

79

79

1964

1954

:

33

(Altman, 1968)

33

:

.1965

1946

:

22

:

.1

.%91

%81

(Molinero and Ezzamel, 1991) 23 (Taffler, 1982)

235 47 282 1973 1968 45

.1982 1976

(Multidimensional Scaling Approach) 50

(1987)

10 (1995) 10 10

.1985 1981 30

27

7

)

(

46 (1989)

1986 1982

24

.(()

(1999)

...

5

25

18

1994

.(Case Study)

:

(%100)

%83

(Molinero and Cinca, 2001)

(2000)

:

29

.1982 1977

1982

37

(Altman, 1968)

Altman

.1995 1991

(2001)

Z

1.81

23

5

Z

2.99

Z

2.99

1.81

Altman

%100

%75

22 (2003)

(2000)

12

1991

10 12

.2000

6 6

3

%88 %100
%67 %79 %83

(Neophytou and Molinero, 2004)

100

50

50

.1997 1988
5 ()

.2003 1994

(2004)

38

.2003 1994

12

12

11

40

.2000

1993

27

:

(Neophytou and Molinero, 2005)

370

.2001

1993

818

(Taffler,

19

.2003 1994

(Neophytou and Molinero,
(Molinero and (Molinero and Cinca, 2001) 2004)
.Ezzamel, 1991)

(Ordinal)

.(Interval)

(Ratios)

(1)

.1

.2

.3

(Neophytou and

.Molinero, 2004)

.4

(Proximity)

.5

()

()

()

(Multidimensional Scaling, MDS) ()

(stress)
 .(elbow test)

(goodness-of-fit)

.(Neophytou and Molinero, 2004)

(Euclidean distance)

(Kruskal's stress1)

.(Coxon, 1982) (Principal Components Analysis)

: b a (Eab)

$$Eab = \sqrt{(FRa1 - FRb1)^2 + \dots + (FRaN - FRbN)^2}$$

$$Stress1 = \sqrt{\sum_a \sum_b (f(Eab) - dab)^2 / \text{scalefactor}}$$

$$\dots \quad 1 = a \quad b \quad 1 \quad FRb1 \quad a$$

(Maps)

xa (a)

()

$\Delta \equiv \{ Eab \}$ (Square Matrix)

$X_i = (x_{i1}, \dots, x_{in})$

a (Xa)

: R ()

= n

$X_a = (x_{a1}, \dots, x_{ar}, \dots, x_{aR})$

(xbr) (xar) (dab)

6 (spss)

$$dab = \sqrt{(x_{a1} - x_{b1})^2 + \dots + (x_{aR} - x_{bR})^2}$$

Fa :
 1 (binary variable)
 : 0 a

$D \equiv \{ Dab \}$
 . Δ

.(Eab) (dab)

$$Fa = f(x_{a1}, x_{a2}, \dots, x_{a6}, \text{error})$$

logit

$$\ln \{ Fa / (1 - Fa) \} = B_0 + B_1 x_{a1} + \dots + B_6 x_{a6} + e_a$$

(Dimensions)

(dimension)

B

(3)

(ProFit Analysis)

:

(A1)

5

17

) Fran a n

(

(A3)

a

Ran

:

$$FRan = B0 + B1xa1 + + B6xa6 + ea.$$

(4)

(Classification Analysis)

(co-ordinates)

% 100

(R²)

%96.7

%70

% 70

(R²)

(Proximity)

(Cluster Analysis)

()

(Euclidean distance)

(Proximity Square Matrix)

) 57 57

$$\Delta \cong \{Eab \}$$

.(

(Cluster Analysis)

(Dimensionality)

(Principle Components Analysis)

(Between-Group Linkage)

(eigenvalues)

.spss

.(5)

.4

%85

:

(2)

(Stress1)
(6)

(stress)

(Elbow)

(1)

(Stress)

(1)

()

Current Ratio	A1	Liquidity Ratios
Cash Ratio	A2	
Receivable Turnover	A3	
Average Days Sales Uncollected	A4	
Net Profit to Total Liabilities	B1	Profitability Ratios
Return on Equity	B2	
on Assets Return	B3	
Operating Profit to Sales	B4	
Pretax Profit to Sales	B5	
Net Profit to Sales	B6	
Gross Profit to Sales	B7	
Net Profit to Capital	B8	

Debt Ratio	C1	Capital Structure and Financial Leverage Ratios
Debt to Equity Ratio	C2	
Time Interest Earned	C3	
Total Debt to Capital	C4	
Long Term Debt to Equity	C5	
Equity to Total Liabilities	C6	Capital Structure and Financial Leverage Ratios
Equity to Fixed Assets	C7	
Net Working Capital to Equity	C8	
Total Assets to Equity	C9	
Fixed Assets to Equity	C10	
Current Liabilities to Equity	C11	
Equity Ratio	C12	
Fixed Assets Turnover	D1	Activity Ratios
Net Working Capital Turnover	D2	
Total Assets Turnover	D3	
Cash Flow from Operations Yield	E1	Cash Flow from Operations Ratios
Cash Flow from Operations to Sales	E2	
Cash Flow from Operations to Assets	E3	
Cash Flow from Operations to Current Liabilities	E4	
Cash Flow from Operations to Total Liabilities	E5	
Cash Flow from Operations to Net Working Capital	E6	

(2)

135.5395	135.6915	.1519	29.9188	17.3587		A1
58.9770	59.1014	.1243	15.5418	11.0018		A2
65.3266	65.3266	.0000	12.4279	5.7267		A3
535.2309	535.2309	.0000	112.1921	88.3294		A4
107.7141	-.0040	-107.7181	20.5622	-5.1563		B1
3.7420	.9200	-2.8220	.5720	-.1334		B2
33.5438	-.0039	-33.5477	6.4426	-1.3143		B3
6.2239	.0099	-6.2139	1.3955	-.8462		B4
4.1227	.0045	-4.1181	.9558	-.6346		B5
4.1181	.0000	-4.1181	.9572	-.6608		B6
3.3301	1.000	-2.3301	.6495	.2101		B7
33.5438	-.0039	-33.5477	6.4426	-1.3143		B8
15.8508	15.8512	.0004	3.0141	.9222		C1
9.8680	6.3030	-3.5650	1.8708	.4964		C2
182.4965	.1334	-182.3630	41.0173	-.14.2500		C3
12.0306	12.0309	.0003	2.3338	.9344		C4
3.8353	.9503	-2.8850	.6051	-.0280		C5
151.2586	150.8442	-.4143	41.6826	25.1056		C6
146.5007	145.7717	-.7290	34.4587	16.0700		C7
6.1460	1.6196	-4.5263	1.0770	.2177		C8
9.8680	7.3030	-2.5650	1.8901	1.4593		C9
3.9686	2.5966	-1.3720	.8309	.6282		C10
8.7024	6.3030	-2.3994	1.4423	.4065		C11
1.7071	.9996	-.7075	.4320	.6635		C12
14.4081	14.4081	.0000	3.5461	1.7139		D1
152.6673	2.0475	-150.6198	28.9721	-6.2066		D2
11.4391	11.4391	.0000	2.1768	.6376		D3
41.0551	14.5788	-26.4763	6.1689	-.3143		E1
3.8581	2.4740	-1.3841	.6612	-.0312		E2
1.2649	1.0330	-.2319	.2154	.0418		E3
29.2151	15.7376	-13.4774	4.4720	.1723		E4
29.2151	15.7376	-13.4774	4.4605	.2094		E5
5.5216	1.5600	-3.9616	.9667	-.2310		E6

(3)

30.4025	30.4025	.0000	8.0090	5.1371		A1
30.1907	30.1907	.0000	8.0858	4.5630		A2
15.4866	15.4940	.0074	2.9381	1.1732		A3
1452.6135	1455.3172	2.7036	354.0540	208.4239		A4
3.0714	3.0787	.0074	.6668	.4469		B1
.8069	.8167	.0098	.1476	.1005		B2
.6313	.6360	.0047	.1230	.0753		B3
1.8220	.9541	-.8678	.3544	.2552		B4
1.6485	1.6666	.0181	.3987	.4204		B5
1.6208	1.6301	.0092	.3849	.3548		B6
.9120	1.0000	.0880	.3439	.5889		B7
.9494	.9541	.0047	.1752	.0902		B8
.9122	.9199	.0076	.2583	.3399		C1
11.4740	11.4817	.0077	2.7049	1.3168		C2
15.3618	15.3618	.0000	3.4787	1.8075		C3
17.4971	17.5107	.0136	4.1201	2.1413		C4
.3828	.3828	.0000	.0938	.0324		C5
129.6596	129.7467	.0871	24.5011	9.4077		C6
420.5640	420.7876	.2236	100.0963	47.1041		C7
2.5395	2.1318	-.4077	.4821	.3456		C8
11.4740	11.4817	.0077	2.6961	1.3835		C9
4.4705	4.4728	.0024	.9295	.6255		C10
3.1924	3.1924	.0000	.6365	.4303		C11
.9122	.9924	.0801	.2582	.6600		C12
30.2117	30.3519	.1401	8.1060	6.0800		D1
92.7339	39.6231	-53.1109	15.6082	.6423		D2
.9735	.9863	.0128	.3042	.3287		D3
9.3948	9.0984	-.2964	1.7299	.7602		E1
4.5559	1.2694	-3.2865	.8517	.1481		E2
.5135	.2878	-.2257	.1059	.0578		E3
15.7035	9.5512	-6.1523	2.2039	.6587		E4
9.3948	9.0984	-.2964	1.7327	.7250		E5
22.4742	4.2013	-18.2729	4.0987	-.4952		E6

(4)

	Predicted Group Membership		
	27	0	27
%	%100	% 0	%100
	1	29	30
%	% 3.3	% 96.7	% 100

(5)

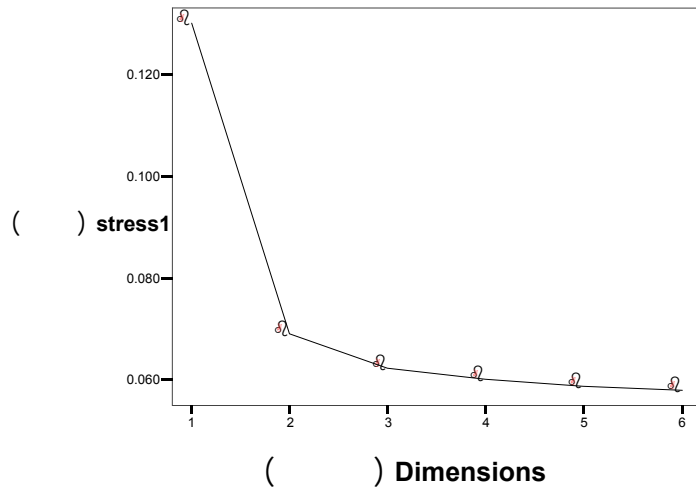
(Principal Components Analysis)

	Initial Eigenvalues		
		%	%
1	7.008	21.237	21.237
2	4.593	13.919	35.156
3	3.147	9.537	44.694
4	3.054	9.254	53.947
5	2.336	7.078	61.025
6	1.926	5.836	66.861
7	1.556	4.714	71.575
8	1.231	3.729	75.304
9	1.209	3.664	78.968
10	1.103	3.342	82.310
11	1.015	3.077	85.387

(6)

(Stress1)

	Stress1 ()
1	.13015
2	.06908
3	.06231
4	.06005
5	.05877
6	.05779



() Elbow :(1)

% 58 % 100

(Maps)

(Profit Analysis)

1

%5

) 33 %5 (B)

(
(R²) (7)

%70 % .2 % 4.1 (B)

(R²)

(8)
17 %70 (R²)

(57) (2)

(4)

Logit

() .(3)

(Cluster Analysis)

(b3,b8)

(2

()

(e4, e5)

(3

(Cluster Analysis)

(5)

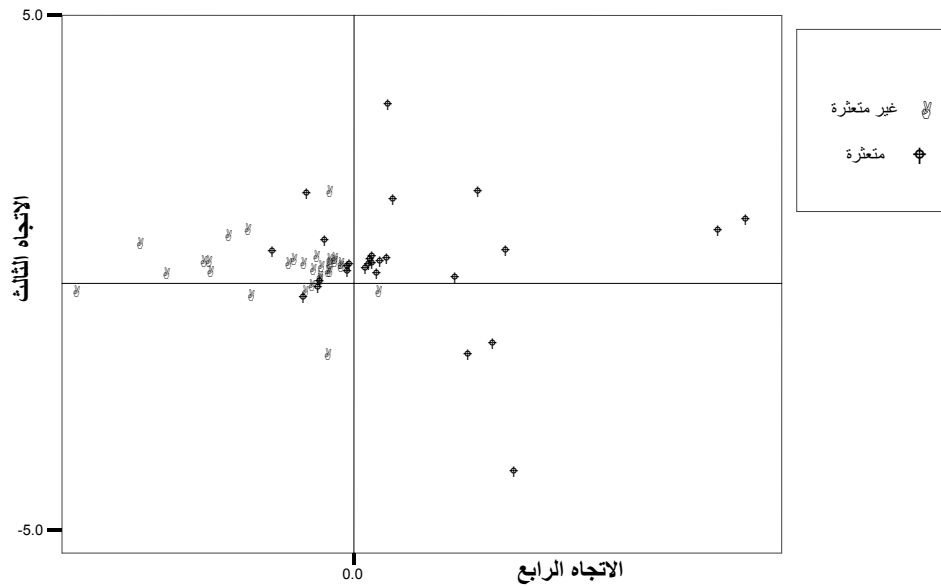
:

(b4, b5, b6)

(1

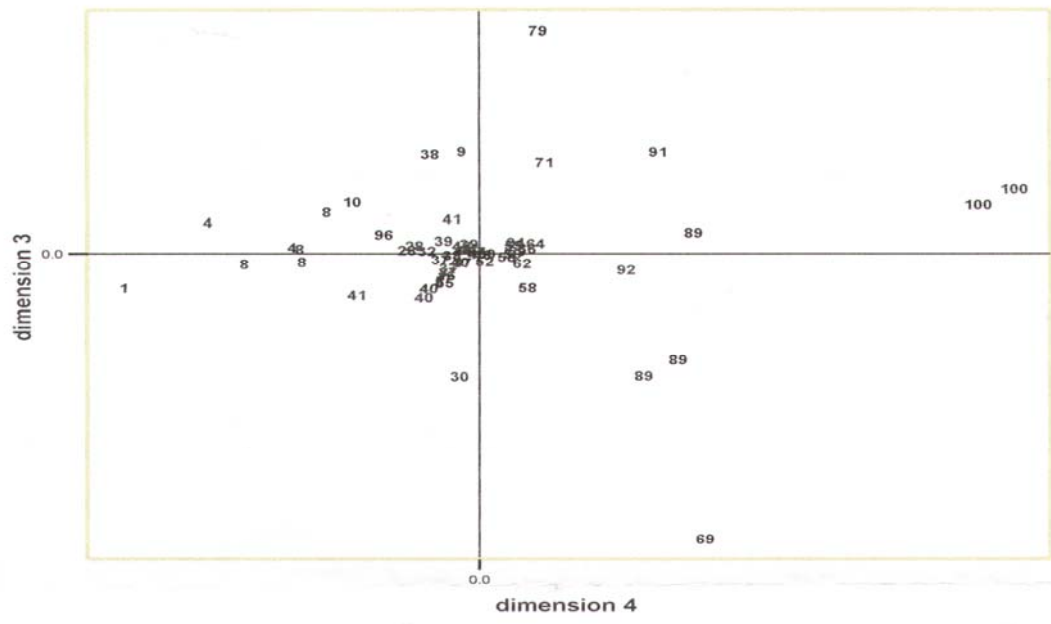
(7)

	2.215	.392
	.048	.938
	3.050	.041
	5.207	.002
	-1.272	.089
	2.176	.091
	.575	.271

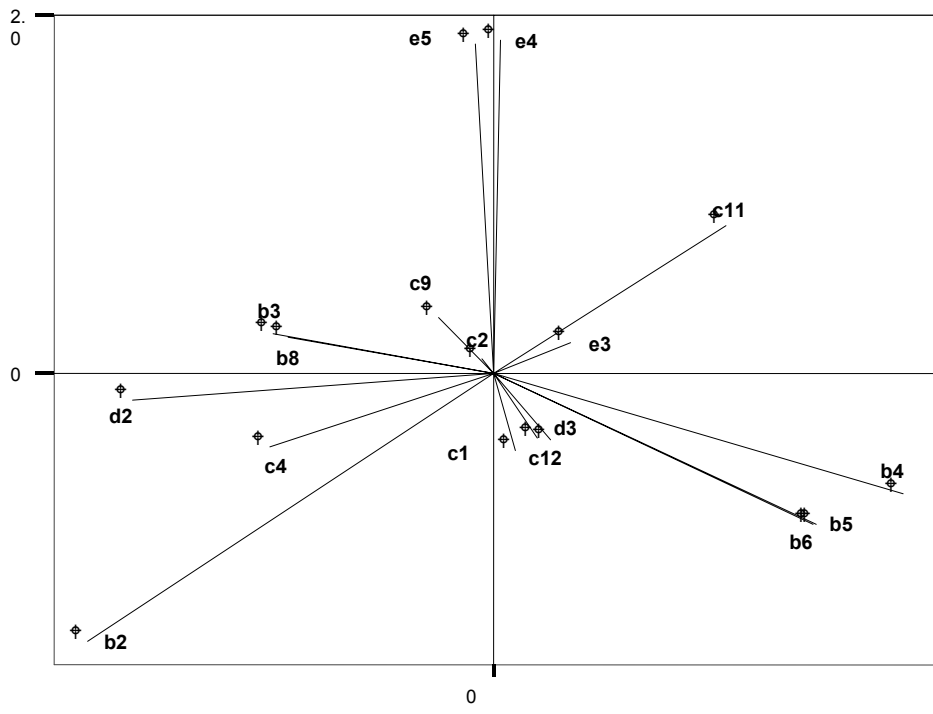


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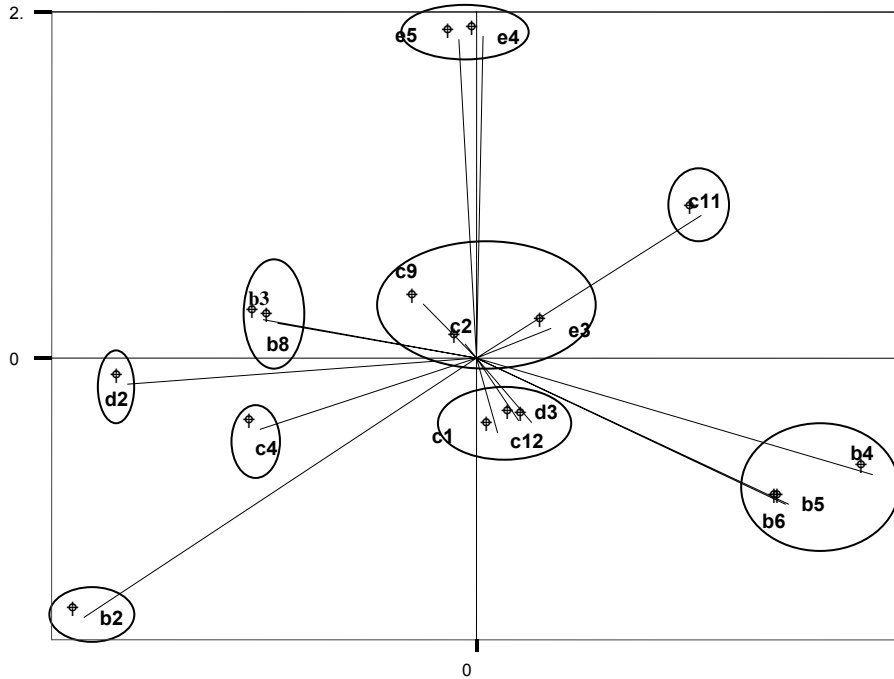
:(2)



(%) : (3)



() : (4)



:(5)

(8)

	Variable	R ² %	Constant	Dim1	Dim2	Dim3	Dim4	Dim5	Dim6
1	A1	56.3 Sig	10.925 .000	-.951 .516	-5.327 .008	2.517 .273	16093 .000	-4.890 .065	-4.354 .099
2	A2	42.6 sig	7.612 .000	-.485 .609	-3.875 .003	2.517 .273	6.580 .000	-2.178 .202	-3.779 .029
3	A3	54.1 Sig	3.330	-.319 .602	.188 .817	-1.143 .442	.950 .326	3.129 .006	7.658 .000
4	A4	14.9 Sig	151.545 .000	26.305 .299	20.892 .533	.327 .732	-75.368 .061	-20.152 .654	-52.044 .249
5	B1	27.5 Sig	-2.207 .202	.061 .960	2.639 .108	56.041 .158	-.227 .905	8.922 .000	.314 .885
6	B2	72.9 Sig	-.0103 .740	.027 .901	-.183 .000	.649 .733	-.109 .003	.290 .000	-.151 .000
7	B3	97.2 Sig	-.583 .000	-3.067 0	-.168 .094	.0587 .092	.670 .000	.209 .120	.022 .865
8	B4	71.8 Sig	-.266 .003	-.348 .000	.078 .327	-.142 .225	-.812 .000	.046 .668	.018 .859
9	B5	78.9 Sig	-.0793 .172	-.326 .000	.011 .838	-.311 .002	-.646 .000	.030 .683	-.055 .447
10	B6	74.8 Sig	-.126 .045	-.320 .000	.033 .577	-.180 .007	-.603 .000	.010 .905	-.063 .419
11	B7	64.6 Sig	.409 .000	-.281 .000	-.105 .017	-.189 .008	-.058 .256	-.0661 .254	.005 .920

	Variable	R ² %	Constant	Dim1	Dim2	Dim3	Dim4	Dim5	Dim6
12	B8	97.2 Sig	-.575 .000	-3.070 .000	-.169 .091	.131 .012	.650 .000	.202 .130	.018 .890
13	C1	97.0 Sig	.616 .000	1.424 .000	.198 .000	-.140 .228	-.389 .000	.0568 .381	.086 .184
14	C2	88.0 Sig	.928 .000	-.161 .054	1.998 .000	.159 .007	-.052 .686	.155 .291	-.698 .000
15	C3	20.6 Sig	-5.798 .118	-.275 .916	-.155 .964	-.112 .381	-8.144 .051	-3.871 .406	-5.380 .249
16	C4	73.0 Sig	1.570 .000	-.168 .346	2.182 .000	10.564 .012	-.343 .223	1.463 .000	-1.682 .000
17	C5	29.9 Sig	.004 .939	-.016 .642	.172 .001	.220 .429	.011 .832	-.112 .078	.038 .541
18	C6	47.9 Sig	16.842 .000	.780 .753	-10.100 .003	-.095 .088	17.909 .000	-5.416 .224	-7.906 .078
19	C7	49.8 Sig	32.408 .000	-7.927 .153	-22.844 .003	-11.030 .006	-39.265 .000	-42.290 .000	-3.045 .756
20	C8	56.2 Sig	.285 .000	.003 .051	-.265 .001	-5.545 .519	-.059 .487	.477 .000	-.384 .000
21	C9	86.2 Sig	1.419 .000	-.192 .031	1.958 .000	.188 .030	.241 .081	.128 .409	-.568 .000
22	C10	63.9 Sig	.627 .000	-.047 .375	.617 .000	-.087 .521	.134 .110	.129 .175	.046 .619
23	C11	78.1 Sig	.419 .000	-.064 .206	.794 .000	-.186 .022	.005 .949	-.420 .000	.103 .257
24	C12	97.2 Sig	8.274 .000	39.664 .000	1.947 .132	1.618 .284	-9.111 .000	-2.581 .136	-.503 .769
25	D1	34.5 Sig	4.012 .000	-.702 .199	-1.533 .037	.431 .611	-3.383 .000	-1.710 .080	-1.019 .294
26	D2	74.7 Sig	-2.602 .115	.930 .423	.950 .538	.475 .793	.545 .764	-9.222 .000	-23.261 .000
27	D3	95.9 Sig	.475 .000	1.029 .000	.130 .002	.045 .349	-.244 .000	-.027 .622	.0317 .562
28	E1	51.3 Sig	.251 .564	-.179 .563	.016 .968	3.089 .000	-.746 .129	-1.205 .032	.813 .144
29	E2	48.1 Sig	.063 .418	.015 .776	-.165 .028	-.415 .000	-.223 .013	-.263 .010	.237 .019
30	E3	81.7 Sig	.050 .000	.096 .000	-.004 .696	-.058 .000	-.034 .003	-.006 .608	.015 .231
31	E4	87.4 Sig	.428 .016	.110 .370	-.571 .001	-3.392 .000	.084 .664	.185 .399	-.387 .081
32	E5	84.4 Sig	.481 .011	.085 .514	-.374 .035	-3.145 .000	.159 .438	.475 .045	-.722 .003
33	E6	36.6 Sig	.366 .278	.076 .752	-.014 .963	.316 .403	.332 .382	-.635 .144	-2.174 .000

.6

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(Neophytou and Molinero, 2004)

(2004)

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2000

2003

1987

1992

2001

.67-33 (8)14

2004

.106-51 (1) 41

2004

2000

.232-209 (2)31

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Predicting Corporate Distress in Jordan: A Multidimensional Scaling Approach

*Samar Alawi and Fawzi Gharaibeh **

ABSTRACT

This study attempted to predict companies distress using financial ratios. The study sample was composed of 27 distressed companies and 30 healthy ones during the period 1994 - 2003, all were in the services sector.

Thirty three financial ratio were computed and categorized in five groups: Liquidity, profitability, Capital structure and financial leverage, Activity, and cash flow from operations.

A Multidimensional Scaling Approach was used to distinguish between distressed and healthy companies by plotting them on the same map. It was shown that the distressed companies were concentrated in a certain area of the map, while the healthy ones covered another area. It was found that the profitability and cash flow from operations ratios were most capable of predicting companies' distress one year before.

Keywords: Financial Analysis, Corporate Distress, Maps.

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