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Bankruptcy Resolution: Misery or Strategy

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Key Contributions

- We explore the explanatory power of a set of covariates relating to *firm*, *judicial*, *case*, *geographic*, and *macroeconomic* characteristics in explaining the likelihood of successful **bankruptcy resolution**.

- We investigate the effect of **strategic behaviour** (proxied by *financial benefits*) on firms' likelihood of emerging from bankruptcy, and whether financial benefits are endogenous to the emergence likelihood.

Why Modelling Bankruptcy Resolution?

- After **bankruptcy filing**, the immediate concern that comes to the mind of related stakeholders (like investors, creditors, financial analysts, bankruptcy courts etc.) is whether the bankruptcy filing firm will be able to **emerge** and **operate profitably**.

- We propose a regression model to **predict** the **likelihood of bankruptcy emergence** to aid stakeholders in gauging the probability of bankruptcy emergence for relevant decision making.

List of Covariates (1)

No.	Characteristic Group	Variable	Description	BRD Name
1	Firm	CSIZE	The debtor's size, measured as the log of the debtor's total assets in current dollars, as reported on the debtor's last annual report before bankruptcy.	AssetsCurrDollar
2		TATL	Ratio of Total Assets to Total Liabilities before filing bankruptcy.	AssetsBefore/LiabBefore
3		PEBIT	Dummy variable, which equals 1 for EBIT>0 and 0 otherwise.	EbitBefore
4		EMP	Natural logarithm of the number of persons employed by the debtor as of the last 10-K before filing.	EmplBefore
5		INDUSTRY	This is a factor variable built using Standard Industrial Classification Code of firms. "0" represents the reference category, while "4" and "6" represent manufacturing and retail firms respectively.	SICDivision
6	Judicial	JEXP	Natural logarithm of the number of cases the judge has completed at confirmation of the instant case.	JudgeDisposition
7		JEXPD	Dummy variable equalling 1 if the Judge has completed more than 5 cases; 0 otherwise	JudgeDisposition
8		AEXP	Natural logarithm of the number of cases the lead counsel (who represented the DIP in filing of the bankruptcy case) or the Attorney has handled before this case.	DipAtty
9	Case	CEOR	Dummy variable equalling 1 if the CEO at filing was replaced after the date on which the debtor's CEO at filing ceased to be the CEO by another CEO or another manager; and 0 otherwise.	CeoReplaced
10		CEODA	Number of days (expressed in years) in which the CEO filing bankruptcy ceased to be the CEO from the day in which the bankruptcy case was filed.	(DateCeoEnd - DateFiled)/365
11		SALEINT	Dummy variable equalling 1 if - at the time of filing - the debtor publicly indicated an intention to sell or liquidate all or substantially all of its assets (including maybe cases).	SaleIntended

List of Covariates (2)

No.	Characteristic Group	Variable	Description	BRD Name
12	Case	PREAGR	Dummy variable equalling 1 for a prepackaged or prenegotiated case, and 0 for a free fall case.	Prepackaged
13		DURATION	Number of years between the filing date (DateFiled) and the confirmation date of a Chapter 11 re-organisation (DateConfirm) or the date on which the Chapter 11 case was converted to Chapter 7 or dismissed (DateConvDismiss), whichever is applicable.	DaysIn/365
14		CCOM	Dummy variable equalling 1 if the U.S. Trustee appointed a creditors' committee to represent the unsecured creditors prior to case disposition; 0 otherwise.	CommCred
15		DIPL	Dummy variable equalling 1 if the court approved DIP borrowing outside the ordinary course of business; 0 otherwise	DipLoan1Total
16		DIPTA	Ratio of total DIP loan received to total assets before bankruptcy filing.	(DipLoan1Total+DipLoan2Total)/ AssetsBefore
17	Geographic	CFILE	CityFiled, categorised as Wilmington (DE, 1), New York (NY, 2) or all other cities (OT, 3).	DENYOther
18		HCCTODE	Natural logarithm of the number of miles from the debtor's bankruptcy court to which the debtor's case has been assigned (HeadCourtCity) to Wilmington, DE, measured as the crow flies.	HeadCourtCityToDE
19		BSHOP	Dummy variable equalling 1 if the city in which the case was filed does not match the location of the bankruptcy court to which the debtor's case has been assigned; 0 otherwise.	Shop
20	Economic Environment	PRIME1	Prime rate of interest one year before case filing.	Prime1YearBefFile
21		PRIMEF	Prime rate of interest on the bankruptcy filing date.	PrimeFiling

Empirical Methods

- **Data:** Compustat & UCLA-LoPucki Bankrupcty Research Database (BRD)
- **Sampling Period:** Annual;1994 and 2017
- **Econometric Model:** Probit & IV Probit Regression
- **DV:** Emergence
- **IVs:** firm, judicial, case, geographic, and macroeconomic characteristics.
- **CVs**: AGE and INDRISK
- Assets at least $100 million in 1980 $; **401** Chapter 11 filings with **264** emergence

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Univariate Probit Regression

Variable	Sign	Coefficient	Standard Error	AME in %	Rank of AME
CSIZE	+	0.2219[a]	0.0721	7.98[a]	14
TATL	-	-0.6350[a]	0.1345	-21.77[a]	7
PEBIT	+	0.3462[a]	0.1302	12.52[a]	11
EMP	+	0.0885[b]	0.0423	3.22[b]	20
INDUSTRY-M	+	0.3592[a]	0.1321	12.98[a]	------
INDUSTRY-R	-	-0.6345[a]	0.1726	-22.63[a]	6
JEXP	+	0.1733[a]	0.0598	6.25[a]	16
JEXPD	+	0.3167[b]	0.1397	11.50[b]	13
AEXP	+	0.1990[a]	0.0538	7.10[a]	15
CEOR	+	1.9302[a]	0.1544	44.61[a]	2
CEODA	+	0.4544[a]	0.0823	15.06[a]	10
SALEINT	-	-1.0868[a]	0.1467	-35.15[a]	3
PREAGR	+	0.8725[a]	0.1557	29.80[a]	4
DURATION	-	-0.1068[b]	0.0438	3.87[b]	18
CCOM	-	-0.7716[a]	0.2067	-27.43[a]	5
DIPL	+	0.5707[a]	0.1435	20.24[a]	8
DIPTA	+	2.7448[a]	0.6823	96.89[a]	1
CFILE	-	-0.4305[a]	0.1325	-15.46[a]	9
HCCTODE	-	-0.2522[b]	0.0975	-5.60[a]	17
BSHOP	+	0.3413[b]	0.1416	12.38[b]	12
PRIME1	-	-0.0894[a]	0.0289	-3.22[a]	19
PRIMEF	-	-0.0584[b]	0.0280	-2.12[b]	21

Multivariate Probit Regression

Variable	Probit Model			Logit Model		
	Coefficient	Standard Error	AME in %	Coefficient	Standard Error	AME in %
DIPTA	3.6088[a]	1.1447	58.41[a]	6.5445[a]	2.0980	58.44[a]
CEOR	2.2561[a]	0.2161	36.52[a]	4.0217[a]	0.4233	35.91[a]
SALEINT	-1.0020[a]	0.2622	-16.22[a]	-1.7639[a]	0.3924	-15.75[a]
PREAGR	0.9561[a]	0.2573	15.48[a]	1.7150[a]	0.4583	15.31[a]
INDUSTRY-R	-0.7160[a]	0.2608	-11.59[a]	-1.2932[a]	0.4604	-11.54[a]
TATL	-0.3280[a]	0.1681	-5.31[b]	-0.6438[b]	0.3059	-5.74[b]
BSHOP	0.4417[b]	0.2090	7.15[b]	0.7816[b]	0.3779	6.97[b]
DURATION	-0.1357[b]	0.0664	-2.20[b]	-0.2448[b]	0.1171	-2.18[b]
Model's goodness of fit and classification performance measures						
Log likelihood	-116.5264			-116.4806		
LR Chi2	281.93[a]			282.02[a]		
Pseudo R^2	0.5475			0.5480		
AUROC	0.9398			0.9397		
N = 1	264			264		
N = 0+1	401			401		

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Bankruptcy Resolution: Misery or Strategy

- Bankruptcy may be used as a **strategic weapon** by corporations to use their power in order *to avoid current financial burdens and shift future financial risk towards more vulnerable groups in society*.
- Such strategic behaviour shall be **highly desirable** in the presence of a higher likelihood of bankruptcy emergence. i.e. in the presence of a **positive** relationship between strategic behaviour and the likelihood of successful bankruptcy resolution.
- Thus, we cannot rule out the possibility that all bankruptcy filings might not be due to '**misery**', but might well be a '**strategy**'.

Financial Benefit and its Role in Bankruptcy Resolution

$$\textit{Financial Benefit}_{it} = \text{maximum } [(TL_{it} - TA_{it}), 0]$$

- Intuitively, it appears that **higher** the amount of debt the **lower** shall the likelihood of a successful bankruptcy resolution.
- Otherwise, a **positive** relationship between emerging from bankruptcy and financial benefit from filing, *ceteris paribus*, is taken as evidence of **strategic behaviour**.
- In the analysis of financial benefit from filing, we take a one-year lag of the natural logarithm of $\textit{Financial Benefit}_{i,t}$; that is, $\ln(Fb_{i,t-1} + 1)$.

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Strategic Behaviour in Bankruptcy Resolution

Variable	With TATL		Without TATL	
	Coefficient	Standard Error	Coefficient	Standard Error
(1)	(2)	(3)	(4)	(5)
Financial Benefit	0.0959[b]	0.0498	0.1155[a]	0.0465
DIPTA	3.7453[a]	1.1701	3.8622[a]	1.1792
CEOR	2.2687[a]	0.2218	2.2712[a]	0.2219
SALEINT	-0.9790[a]	0.2176	-1.0161[a]	0.2153
PREAGR	0.9475[a]	0.2609	0.9801[a]	0.2601
INDUSTRY-R	-0.6473[b]	0.2659	-0.6618[a]	0.2664
TATL	-0.1878	0.1769	------	------
BSHOP	0.4078[b]	0.2127	0.4151[b]	0.2123
DURATION	-0.1546[b]	0.0685	-0.1558[b]	0.0683
Model's goodness of fit and classification performance measures				
Log likelihood	-114.5213		-115.1855	
LR Chi2	273.98[a]		272.66[a]	
Pseudo R^2	0.5447		0.5420	
AUROC	0.9385		0.9379	
N = 1	260		260	
N = 0+1	393		393	

What constitutes a strategic bankruptcy resolution? (1)

- Existing literature **does not** provide a clear definition of what constitutes a **strategic bankruptcy resolution**.
- Conscious decision of a firm to **benefit** from the bankruptcy laws at the expense of losses to its creditors.
- Strategic behaviour may be considered as a **two-step** decision making process.
- In the first step, the firm receives adverse noisy **signal(s)** or **shock(s)** of experiencing bankruptcy in the near future.
- Then it evaluates the **likelihood** of emerging from bankruptcy, and **updates** its debt level to **maximise** its gain from any subsequent bankruptcy filing.

What constitutes a strategic bankruptcy resolution? (2)

- Thus, a **strategic** firm is **rational** and takes decisions to maximise its benefit.
- On the other hand, a **non-strategic** firm chooses debt level without conditioning on the signal; it plans to repay its debt in the absence of any adverse event(s).
- If the strategic behaviour hypothesis is **true**, *ceteris paribus*, the coefficients of financial benefit should be **positive** and **significant** while the adverse event/shock variables should **not** be **significant**.
- If the non-strategic behaviour hypothesis is **true**, then adverse event variables should be positive and significant while the coefficient of financial benefit should be **insignificant**.

Altman Z-Score

$$\boldsymbol{Z\text{-}Score_{it}} = 1.2\frac{WC_{it}}{TA_{it}} + 1.4\frac{RE_{it}}{TA_{it}} + 3.3\frac{EBIT_{it}}{TA_{it}} + 0.6\frac{E_{it}}{D_{it}} + 0.999\frac{S_{it}}{TA_{it}}$$

- Thus, there exists a **negative** relationship between firms' likelihood of entering financial distress or bankruptcy and Z-Score.
- Similarly, among the firms which filed for Chapter11 bankruptcy, a firm with a **lower** value of Z-Score must find emerging from bankruptcy more **difficult** than one with a **higher** value of Z-Score.
- Thus, intuitively, there should be a **positive** relationship between Z-Score and firms' likelihood of emerging from bankruptcy.

Univariate Probit Estimates for Z-Score

Variable	Coefficient	Standard Error
Z-Score (T-1)	-0.3510[a]	0.0666
Z-Score (T-2)	-0.1410[a]	0.0459
Z-Score (T-3)	-0.1135[a]	0.0401
Z-Score (T-4)	-0.0872[a]	0.0354
Z-Score (T-5)	-0.0958[a]	0.0409

The **negative** coefficients appear to be counterintuitive. This may be possible if firms strategically update their leverage level **upward** upon receiving an adverse signal in the form of a lower Z-Score (a value **below 1.81** signals financial distress), and simultaneously show **optimism** toward successful bankruptcy resolution in the event of any future bankruptcy filing.

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Strategic Behaviour in BR with Adverse Event

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
(1)	(2)	(3)	(4)	(5)	(6)
Financial Benefit	0.0591 (0.0522)	0.1043[b] (0.0487)	0.0947[b] (0.0479)	0.0799[c] (0.0483)	.0605 (.0488)
Z-Score (T-1)	-0.1315[b] (0.0566)				
Z-Score (T-2)		0.0061 (0.0371)			
Z-Score (T-3)			-0.0168 (0.0332)		
Z-Score (T-4)				-0.0297 (0.0284)	
Z-Score (T-5)					-0.0127 (0.0344)
DIPTA	3.5755[a] (1.1567)	3.8981[a] (1.2444)	3.8361[a] (1.2364)	3.6703[a] (1.2491)	3.5198[a] (1.2682)
CEOR	2.2881[a] (0.2229)	2.2587[a] (0.2299)	2.1847[a] (0.2304)	2.1147[a] (0.2330)	2.0699[a] (0.2405)
SALEINT	-0.9980[a] (0.2193)	-0.9947[a] (0.2230)	-1.0440[a] (0.2260)	-1.0078[a] (0.2321)	-0.9826[a] (0.2430)
PREAGR	0.8403[a] (0.2669)	0.9485[a] (0.2713)	0.8896[a] (0.2702)	0.8345[a] (0.2785)	0.9231[a] (0.2981)
INDUSTRY-R	-0.4787[c] (0.2754)	-0.6768[b] (0.2828)	-0.6678[b] (0.2835)	-0.7771[a] (0.3006)	-0.8055[b] (0.3319)
BSHOP	0.4226[b] (0.2168)	0.3782[c] (0.2181)	0.3933[c] (0.2226)	0.4111[c] (0.2282)	0.3066 (0.2377)
DURATION	-0.1599[b] (0.0681)	-0.1523[b] (0.0690)	-0.1508[b] (0.0695)	-0.1266[c] (0.0717)	-0.0926 (0.0739)
Model's goodness of fit and classification performance measures					
Log likelihood	-111.9497	-108.3952	-105.919	-99.8865	-88.8330
LR Chi2	279.13[a]	244.96[a]	230.79[a]	208.35[a]	185.98[a]
Pseudo R^2	0.5549	0.5305	0.5214	0.5105	0.5114
N = 1	260	253	240	228	206
N = 0+1	393	370	353	330	296

Endogeneity of FB (1)

- We test for **endogeneity** of financial benefit and bankruptcy resolution likelihood by using **Z-Score** as an *instrumental variable*.
- Companies behaving **strategically** determine their debts in order to maximise the financial benefit they can obtain in the bankruptcy resolution process.
- We expect that companies undertaking these strategies have a **higher** likelihood of emergence from bankruptcy. *Testing this hypothesis corresponds to testing whether financial benefit is endogenous*.

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Endogeneity of FB (2)

- In this model, **adverse events** (Z-score at different lags) no longer directly impacts a firm's bankruptcy resolution likelihood.
- It serves as an **instrumental variable** that directly affects financial benefits. As adverse events are exogenous to companies' likelihood of emerging from Chapter 11, it operates more as a shock to firms.

SB in BR with Endogenous Regressors

Variable	IVModel 1	IVModel 2	IVModel 3	IVModel 4	IVModel 5
(1)	(2)	(3)	(4)	(5)	(6)
Correlation (Ω)	-0.6578[a] (0.1692)	-0.5058[a] (0.1996)	-0.5376[b] (0.1947)	-0.3541[c] (0.1757)	-0.2306 (0.2077)
Emergence Equation					
Financial Benefit	0.3494[a] (0.0647)	0.2804[a] (0.0781)	0.2868[a] (0.0763)	0.2103[a] (0.0737)	0.1369 (0.0847)
DIPTA	2.4253[a] (1.1183)	2.9378[b] (1.2208)	2.8863[b] (1.2021)	3.2048[a] (1.2278)	3.2968[a] (1.2763)
CEOR	1.5862[a] (0.4044)	1.8473[a] (.3593)	1.7760[a] (0.3524)	1.9243[a] (0.2642)	1.9734[a] (0.2670)
SALEINT	-0.6011[b] (0.2604)	-0.7386[a] (0.2576)	-0.7415[a] (0.2628)	-0.8303[a] (0.2484)	-0.8862[a] (0.2602)
PREAGR	0.5363[c] (0.2868)	0.6532[b] (0.2923)	0.6122[b] (0.2861)	0.7186[a] (0.2808)	0.8477[a] (0.3087)
INDUSTRY-R	-0.1764 (0.2832)	-0.3161 (0.3082)	-0.3068 (0.3141)	0.5761[c] (0.3238)	-0.7200[b] (0.3545)
BSHOP	0.1773 (0.2023)	0.2290 (0.2156)	0.2060 (0.2174)	0.2743 (0.2743)	0.2621 (0.2383)
DURATION	-0.1472[b] (0.0592)	-0.1551[b] (0.0631)	-0.1548[b] (0.0624)	-0.1358[b] (0.0685)	-0.0985 (0.0727)
Financial Benefit Equation					
Z-Score (T-1)	-.3250[a] (.0452)	-0.3943[a] (0.0606)	-0.3855[a] (0.0626)	-0.4322[a] (0.0671)	-0.4836[a] (0.0776)
Z-Score (T-2)		-0.0266 (0.0515)	0.0433 (0.0667)	-0.0665 (0.0749)	-0.1493[c] (0.0879)
Z-Score (T-3)			-0.0883[c] (0.0523)	-0.0581 (0.0704)	0.0336 (0.0907)
Z-Score (T-4)				-0.0945[b] (0.0437)	-0.2212[b] (0.0901)
Z-Score (T-5)					0.1269[b] (0.0595)
SD of error terms	2.1577 (0.0769)	2.1551 (0.0792)	2.1558 (0.0812)	2.0708 (0.0810)	2.0842 (0.0859)
Model's goodness of fit measures					
Log likelihood	-971.8358	-915.2914	-873.3631	-800.4516	-721.1457
Wald Chi2	162.27[a]	125.84[a]	125.03[a]	103.38[a]	90.48[a]
Wald Exogeneity test Chi2	6.99[a]	4.31[b]	4.81[b]	3.39[c]	1.15
N = 1	260	253	240	228	206
N = 0+1	393	370	353	330	296

Conclusions

- We identify eight factors that best explain a firm's likelihood of emerging from Chapter 11 bankruptcy with a within-sample classification accuracy of about 94%.
- Firms start acting strategically from one up to four years before filing for bankruptcy in the presence of (repeated) adverse event(s).

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