The Distress Puzzle and Credit Forbearance

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January 7, 2022

Keywords: Anomalies, Financial Distress

JEL Classification: G10, G11, G12

I wish to thank Assaf Eisdorfer, Lingling Wang, Hang Bai, Iulian Obreja, and seminar participants at the 2021 FMA annual meeting, the University of Connecticut, and Hofstra University for many helpful comments.

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Overview

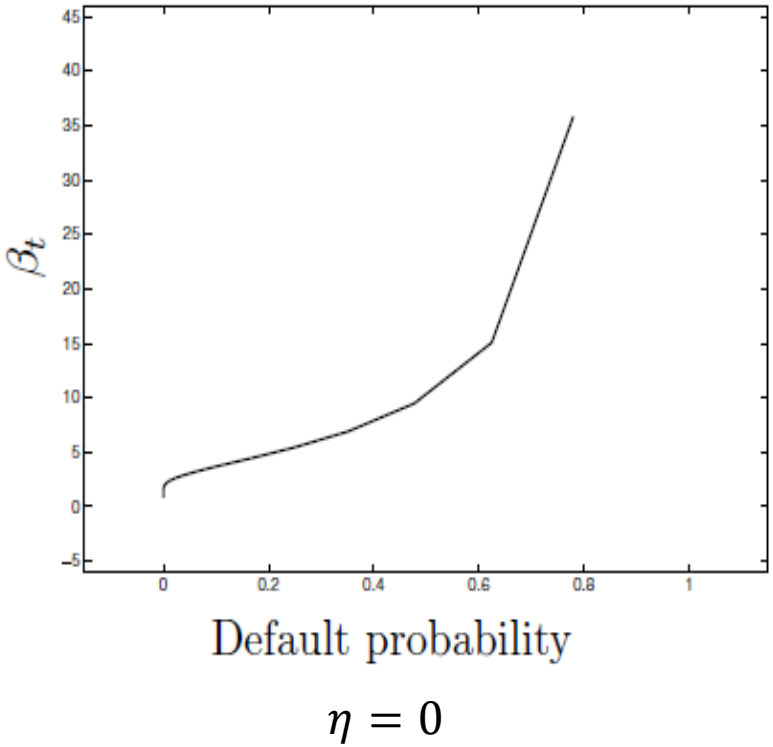
- The distress puzzle is the well-documented anomaly that distressed firms earn lower returns than financially healthy firms, despite having higher betas
  - Among others, Dichev (1998), Griffin and Lemmon (2002), and Campbell, Hilscher, and Szilagyi (2008) identify this anomaly
- Garlappi and Yan (2011) propose a model in which expected shareholder recoveries following default reduce firm risk and expected returns
- Credit Forbearance occurs when lenders choose not to fully exercise their rights at default
- Using credit forbearance as a measure of higher expected post-default shareholder recovery, I employ three empirical approaches to test the Garlappi and Yan (2011) theory:
  - Portfolio sort analysis
  - Fama-MacBeth regression of firm returns on firm characteristics
  - Difference-in-Difference Analysis

Key Findings

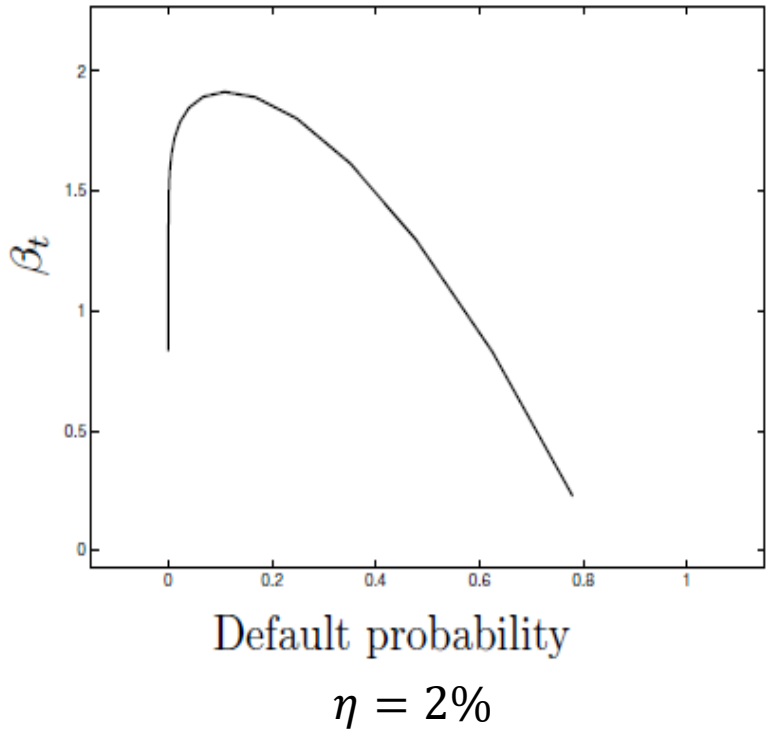
- A zero-investment, healthy-minus-distressed (HMD) portfolio that first sorts on financial distress and then on entrance into a forbearance agreement earns statistically and economically significant six-factor alpha and outperforms other HMD strategies
- Fama-MacBeth and difference-in-difference provide evidence that firm returns and beta are lower following entrance into a forbearance agreement
- The forbearance effect is stronger for firms with recent forbearance agreements (within the prior five years) and among the most distressed firms

Hypothesis

- Garlappi and Yan (2011) derive a model that shows firm beta rises when expected post-default recovery is zero, but falls when expected recovery is positive



$\eta = 0$



$\eta = 2\%$

Source: Garlappi and Yan (2011)

Hypothesis

- Garlappi and Yan's (2011) empirical results do not differentiate between higher or lower levels non-zero expected recoveries
  - Prior figure holds η constant at 0% or 2%
  - Unconditionally, $E(\eta) > 0$, and several empirical studies support this expectation
- Applying their model, beta decreases as expected recoveries rise

$$\frac{\partial \beta_t}{\partial \eta} < 0$$

- Unlike measures of financial distress alone, credit forbearance identifies a default event and a concession from the lender
- Credit forbearance indicates higher expected post-default shareholder recovery relative to other distressed firms.

Credit Forbearance Data

- I begin by using EdgarEngine software to search the SEC's EDGAR database and identify all 8-K filings with "forbearance agreement"
- Following a similar method used by Nini et al (2012), I use a Python script to read each document and determine if it discloses entrance into a forbearance agreement
  - Script finds the term "forbearance agreement" and then searches nearby lines for additional phrases that indicate disclosure, such as "entered into" and "executed"
  - If an agreement is identified, the script assigns a value of 1 to a forbearance agreement dummy variable with a date of the 8-K filing
- I manually review a random sample of 250 documents to evaluate effectiveness of script
- The raw sample consists of 1,423 forbearance agreements executed by 933 firms

Financial Data

- I merge the forbearance agreement data with CRSP and COMPUSTAT financial data
- I drop all observations in which firms do not have valid market capitalization and CHS default probability in the month of portfolio formation
- I assign a dummy variable equal to one to two forbearance agreement variables:
  - *Prior_FA*: FA during the FA sample period (April 1996 through December 2018)
  - *Prior5_FA*: FA in the prior five years
- The portfolio sample period begins in March 2001 because this is the first period in which there are enough FA firms to form the FA-only HMD portfolio
  - I require at least three stocks in the relevant decile to form the HMD portfolio

Summary Statistics – Full Data Set

	Full Sample			Healthy			Distress
	N	Mean	Std Dev	D1	D2-D5	D6-D9	D10
Market Value of Equity ($ millions)	1,057,762	3,939	18,085	6,455	5,907	2,268	238
Market-to-Book Ratio	1,057,762	2.08	1.55	2.13	2.23	1.85	2.40
Book Leverage	1,049,697	0.22	0.22	0.08	0.21	0.25	0.33
Monthly Excess Return (%)	1,054,205	0.85	16.90	0.98	0.92	0.77	0.72
CHS Default Probability (%)	1,057,762	0.11	0.22	0.01	0.03	0.10	0.58
Investment (%)	894,031	5.26	14.45	4.36	6.52	5.25	1.22
6-Month Past Return (%)	1,031,670	5.51	37.04	16.41	11.51	2.86	-19.11
Profitability (%)	1,006,757	-3.77	43.46	14.76	10.28	-6.81	-68.06
Value-Weighted Mean Beta	1,057,762	1.00	0.03	0.95	0.94	1.19	1.57
Idiosyncratic Volatility	1,057,755	0.02	0.02	0.02	0.02	0.03	0.05
% of Firms with FA	1,057,762	1.34	1.00	0.87	1.04	1.29	3.20
% of Firms with FA in prior 5 years	1,057,762	0.82	0.84	0.42	0.50	0.80	2.63

Summary Statistics – FA Firms

	Non-FA in Sample		Firms with FA in Sample		
	N	Mean	N	Mean	diff
Panel A - Full Data Set					
Market Value of Equity ($ millions)	1,043,599	3,955	14,163	2,792	1,163
Market-to-Book Ratio	1,043,599	2.08	14,163	2.13	(0.05)
Book Leverage	1,035,711	0.22	13,986	0.29	(0.06)
Monthly Excess Return (%)	1,040,165	0.85	14,040	0.63	0.22
CHS Default Probability (%)	1,043,599	0.11	14,163	0.21	-0.10
Investment (%)	881,514	5.30	12,517	2.46	2.84
6-Month Past Return (%)	1,017,696	5.53	13,974	4.32	1.20
Profitability (%)	992,948	-3.58	13,809	-17.53	13.94
Beta	1,043,599	1.14	14,163	1.23	-0.09
Idiosyncratic Volatility	1,043,592	0.02	14,163	0.03	-0.006
Panel B - Distressed Decile					
Market Value of Equity ($ millions)	102,326	237	3,382	288	(51)
Market-to-Book Ratio	102,326	2.39	3,382	2.52	(0.12)
Book Leverage	100,677	0.33	3,297	0.41	(0.08)
Monthly Excess Return (%)	100,959	0.75	3,293	-0.14	0.89
CHS Default Probability (%)	102,326	0.57	3,382	0.68	-0.10
Investment (%)	93,037	1.32	3,206	-1.88	3.20
6-Month Past Return (%)	99,637	-19.17	3,347	-17.35	-1.82
Profitability (%)	96,293	-67.79	3,273	-75.97	8.18
Beta	102,326	1.57	3,382	1.56	0.01
Idiosyncratic Volatility	102,324	0.05	3,382	0.05	-0.001

Portfolio Sort Analysis

- Each month I sort all firms into deciles using the Campbell, Hilscher, and Szilagyi (2011) 12-month default probability, where the first decile represents the healthiest firms and the tenth decile the most distressed
- After sorting, I form three HMD portfolios each month:
  - All-firm HMD
  - No-FA HMD – short positions in non-FA firms
  - FA-only HMD – short positions only in FA firms
- I measure portfolio returns during the following month and regress the excess returns on the Fama and French (2015) five factor model plus momentum:

$$R_{it} = \alpha + \beta_1 EMKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 MOM_t + \varepsilon_t$$

Portfolio Sort Analysis

	(1) All-Firm Healthy	(2) All-Firm Distressed	(3) No-FA Distressed	(4) FA-Only Distressed	(5) diff (4) - (5)	(6) All-Firm HMD	(7) No-FA HMD	(8) FA-Only HMD
PANEL A - Forbearance Agreement in Sample								
Mean Excess Return (%)	0.65	-0.89	-0.85	-1.66	0.80	1.54	1.50	2.30
	(2.46)	(-1.06)	(-1.01)	(-1.48)	(0.82)	(2.13)	(2.06)	(2.18)
6-Factor Alpha (%)	0.15	-1.20	-1.15	-2.52	1.37	1.36	1.30	2.68
	(1.48)	(-2.97)	(-2.84)	(-2.45)	(1.36)	(3.14)	(3.03)	(2.58)
N	214	214	214	214	214	214	214	214
PANEL B - Forbearance Agreement in prior Five Years								
Mean Excess Return (%)	0.65	-0.89	-0.85	-2.23	1.38	1.54	1.50	2.88
	(2.46)	(-1.06)	(-1.01)	(-1.9)	(1.39)	(2.13)	(2.07)	(2.58)
6-Factor Alpha (%)	0.15	-1.20	-1.15	-3.38	2.23	1.36	1.30	3.53
	(1.48)	(-2.97)	(-2.85)	(-3.17)	(2.18)	(3.14)	(3.03)	(3.29)
N	214	214	214	214	214	214	214	214

- The FA-only HMD portfolio earns higher six-factor alpha than both the all-firm and no-FA HMD portfolios
- The outperformance is entirely attributable to the most distressed firms
- The difference in six-factor alpha is statistically significant for firms with forbearance agreements in the prior five years

CAPM Beta and Six-Factor Loadings

	(1) Distressed All Firms	(2) Distressed No FA	(3) Distressed FA Only	(4) diff (1) - (2)	(5) diff (1) - (3)	(6) diff (2) - (3)
Panel A - FA During Sample						
CAPM Beta	2.27	2.28	1.72	-0.01	0.55	0.56
	(18.22)	(18.19)	(7.25)	(-0.80)	(2.47)	(2.44)
6-Factor Model						
EMKT	1.41	1.41	1.25	0.01	0.16	0.16
	(12.12)	(12.11)	(4.22)	(0.32)	(0.58)	(0.55)
SMB	0.35	0.35	0.92	0.01	-0.57	-0.58
	(2.15)	(2.11)	(2.20)	(0.33)	(-1.44)	(-1.41)
HML	-0.09	-0.05	-0.33	-0.04	0.24	0.28
	(-0.46)	(-0.25)	(-0.69)	(-1.47)	(0.54)	(0.61)
RMW	-1.32	-1.35	-0.24	0.03	-1.08	-1.11
	(-5.81)	(-5.95)	(-0.41)	(0.87)	(-1.98)	(-1.97)
CMA	0.59	0.57	1.16	0.02	-0.57	-0.59
	(2.19)	(2.13)	(1.70)	(0.47)	(-0.89)	(-0.89)
MOM	-0.92	-0.94	-0.60	0.01	-0.33	-0.34
	(-9.67)	(-9.84)	(-2.46)	(0.95)	(-1.42)	(-1.43)

- CAPM beta is lower for the FA-only most-distressed decile relative to both the all-firm and No-FA most distressed decile
- Individual factor loading differences in six-factor model do not explain lower returns

CAPM Beta and Six-Factor Loadings

	(1) Distressed All Firms	(2) Distressed No FA	(3) Distressed FA Only	(4) diff (1) - (2)	(5) diff (1) - (3)	(6) diff (2) - (3)
Panel B - FA in Prior 5 Years						
CAPM Beta	2.27	2.28	1.84	-0.01	0.43	0.43
	(18.22)	(18.25)	(7.41)	(-0.57)	(1.88)	(1.86)
6-Factor Model						
EMKT	1.41	1.41	1.41	0.00	0.00	0.00
	(12.12)	(12.15)	(4.61)	(0.26)	(0.00)	(-0.02)
SMB	0.35	0.34	1.00	0.01	-0.65	-0.66
	(2.15)	(2.08)	(2.31)	(0.56)	(-1.6)	(-1.59)
HML	-0.09	-0.04	-0.57	-0.04	0.48	0.52
	(-0.46)	(-0.23)	(-1.15)	(-1.58)	(1.05)	(1.11)
RMW	-1.32	-1.35	0.34	0.04	-1.66	-1.70
	(-5.81)	(-6.00)	(0.57)	(1.05)	(-2.98)	(-2.96)
CMA	0.59	0.57	1.49	0.02	-0.90	-0.92
	(2.19)	(2.13)	(2.11)	(0.53)	(-1.37)	(-1.36)
MOM	-0.92	-0.93	-0.86	0.00	-0.07	-0.07
	(-9.67)	(-9.76)	(-3.41)	(0.23)	(-0.29)	(-0.30)

- CAPM beta is lower for the FA-only most-distressed decile relative to both the all-firm and No-FA most distressed decile
- Individual factor loading differences in six-factor model do not explain lower returns

Fama-MacBeth Regressions

	FA in Sample				FA in Prior 5 Years			
	Full Sample		Distress Decile		Full Sample		Distress Decile	
Intercept	0.92	2.03	0.94	5.10	0.92	2.03	0.93	5.06
	(1.90)	(3.72)	(0.93)	(4.44)	(1.90)	(3.71)	(0.92)	(4.40)
Forbearance Agreement	-0.26	-0.34	-1.25	-1.65	-0.59	-0.58	-1.46	-1.77
	(-1.03)	(-1.74)	(-1.99)	(-2.68)	(-1.60)	(-2.21)	(-2.19)	(-2.70)
Log(Size)		-0.19		-0.99		-0.19		-0.99
		(-4.13)		(-6.79)		(-4.12)		(-6.77)
Log(Market-to-Book)		-0.19		-0.24		-0.19		-0.24
		(-1.60)		(-1.50)		(-1.60)		(-1.49)
Past Return		0.05		-0.99		0.05		-0.99
		(0.14)		(-1.92)		(0.15)		(-1.92)
Profitability		1.10		0.97		1.09		0.96
		(4.60)		(3.62)		(4.59)		(3.62)
Investment		-1.08		-1.78		-1.08		-1.76
		(-3.29)		(-2.11)		(-3.29)		(-2.08)
Beta		-0.08		0.12		-0.08		0.11
		(-1.06)		(1.35)		(-1.06)		(1.34)
Idiosyncratic Volatility		-1.97		-6.86		-1.89		-6.71
		(-0.38)		(-1.10)		(-0.36)		(-1.07)
R-Squared	0.001	0.039	0.002	0.044	0.001	0.039	0.003	0.044
N	847,122	847,122	89,147	89,147	847,122	847,122	89,147	89,147

* Coefficients multiplied by 100 and reported *t-statistics* are corrected using Newey and West (1987) procedure

Difference-in-Difference Regression

	Full Sample		Distressed Subset	
Forbearance Agreement	-0.07	-0.02	-0.10	-0.04
	(-4.12)	(-0.91)	(-4.30)	(-1.98)
Book Leverage		0.14		0.21
		(14.34)		(14.59)
Log Size		0.11		0.12
		(61.06)		(47.00)
R-Squared	0.168	0.171	0.147	0.150
Observations	1,047,129	1,047,129	557,296	557,296

- The table presents results from the following difference-in-difference regression of firm beta on firm characteristics

$$\beta_{it} = \alpha + \xi FA_{it} + \upsilon_t + \eta_i + \delta X_{it} + \varepsilon_{it}$$

- Firm beta is lower following a forbearance agreement
- For firms in the distressed subset, beta is lower following forbearance agreement even after controlling for book leverage and firm size

Conclusion

- Entrance into a forbearance agreement reduces firm risk (beta) and returns
  - Forbearance effect is stronger among the most distressed firms and for firms with recent forbearance agreements
- A trading strategy that first sorts by financial distress and then by entrance into a forbearance agreement earns significant six-factor alpha relative to traditional HMD strategies
- The results provide evidence to support the hypothesis that post-default shareholder bargaining power contributes to the distress puzzle