The Distress Anomaly Puzzle

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The Distress Anomaly Puzzle

- **Financial Distress**
  - When firms are unable to meet their financial obligations

- **Anomalies**
  - Returns are not consistent with asset pricing models - CAPM
  - Momentum, reversal, value, asset growth, profitability, etc…

- **Puzzle** (dictionary – something difficult to understand or explain)
  - Basic finance paradigm
  - higher risk ➜ higher expected returns

	Credit Rating Deciles									
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Equity and Firm-Level Data										
S&P issuer credit rating: letter	AA−	A	BBB+	BBB	BBB−	BB+	BB	B+	B	CCC+
S&P issuer credit rating: numeric	4.20	6.47	7.78	8.66	9.82	11.12	12.46	13.65	14.67	16.65
Failure Probability (%)	0.00	0.00	0.04	0.02	0.02	0.08	0.18	0.41	1.31	5.41
Market capitalization ($bln)	33.05	10.95	6.78	4.40	3.46	2.65	1.53	1.08	0.89	0.61
Dispersion in analyst forecasts	0.05	0.05	0.08	0.13	0.15	0.21	0.27	0.37	0.54	0.70
Idiosyncratic volatility (% per month)	1.11	1.22	1.32	1.46	1.58	1.75	2.09	2.43	2.83	4.16
Amihud illiquidity	0.00	0.01	0.01	0.01	0.01	0.02	0.04	0.22	0.40	3.11
Asset growth (% growth in TA)	11.15	11.06	12.26	12.94	13.77	17.85	22.91	31.33	40.82	39.58
SUE	1.20	0.79	0.56	0.40	0.48	0.46	0.28	0.07	−0.09	−0.46
Fraction SUE≤ 0	0.28	0.32	0.35	0.36	0.36	0.36	0.39	0.43	0.45	0.50
Institutional ownership (% of shares outst.)	57.74	59.13	61.56	59.88	62.07	61.91	59.33	53.77	48.97	39.94
Number of institutional owners	501.16	315.98	253.53	203.71	181.43	155.66	113.91	89.15	80.62	63.94
Coverage (# of analysts)	19.43	16.14	13.91	12.84	11.94	10.92	8.67	7.32	6.72	5.87
Bond Data										
Average S&P bond credit rating: letter	AA−	A−	BBB+	BBB	BBB−	BB+	BB−	B	B	CCC+
Average S&P bond credit rating: numeric	4.44	6.56	7.76	8.74	9.89	11.46	13.34	14.50	15.35	16.92
Number of bond issues per firm	10.83	7.34	6.10	5.26	3.60	3.08	2.12	1.71	2.00	1.90
Amount outstanding ($millions/issue)	320.35	228.31	215.36	202.01	209.48	209.03	215.32	209.73	229.66	225.35
Age (years)	5.80	5.56	5.42	5.61	5.05	4.46	4.91	4.75	3.89	4.29
Time to maturity (years)	6.95	7.39	6.92	6.05	6.23	5.37	4.71	4.21	4.14	4.27
Duration (years)	6.61	6.45	6.16	5.90	5.73	5.23	4.61	4.15	4.06	3.62
STD of monthly returns (%)	1.93	2.07	2.17	2.42	2.62	3.00	3.60	4.16	4.90	5.87
Number of covenant violations per stock	0.01	0.01	0.03	0.05	0.07	0.16	0.22	0.33	0.34	0.39
Number of renegotiations per stock	0.18	0.34	0.17	0.39	0.36	0.63	0.53	0.78	0.46	0.33

	Credit Rating Deciles		
	C1	C5	C10
S&P Issuer Rating	AA-	BBB-	CCC+
Failure Probability	0.00	0.02	5.41
Market Cap ($ billions)	33.05	3.46	0.61
Amihud Illiquidity	0.00	0.01	3.11
Coverage (# analysts)	19.43	11.94	5.43
Forecast Dispersion	0.05	0.15	0.70
IVOL (% per month)	1.11	1.58	4.16
Number of Covenant violations	0.01	0.07	0.39

Puzzle

	Credit Rating Deciles										
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C10-C1
Panel B: Value-weighted portfolio returns											
CAPM Alphas											
All stocks	0.20 (2.08)	0.29 (2.89)	0.19 (1.90)	0.17 (1.35)	0.14 (1.05)	−0.04 (−0.24)	−0.29 (−1.64)	−0.58 (−2.55)	−0.67 (−1.92)	−1.58 (−3.79)	−1.78 (−3.94)
Stocks w/ bonds	0.18 (1.82)	0.32 (3.14)	0.25 (2.13)	0.24 (1.74)	0.14 (0.91)	0.22 (1.11)	−0.47 (−1.69)	−0.57 (−1.87)	−0.94 (−2.31)	−1.36 (−2.77)	−1.53 (−2.95)
Bonds w/stocks	0.25 (3.64)	0.27 (3.84)	0.24 (3.57)	0.34 (4.32)	0.26 (3.67)	0.24 (3.25)	0.17 (1.85)	−0.02 (−0.13)	0.12 (0.90)	−0.44 (−1.70)	−0.69 (−2.59)
CAPM betas											
All stocks	0.87 (41.18)	0.91 (41.48)	0.98 (43.60)	0.99 (36.03)	1.05 (35.99)	1.20 (35.88)	1.40 (35.90)	1.52 (30.24)	1.77 (22.65)	1.83 (19.69)	0.96 (9.54)
Stocks w/ bonds	0.88 (40.75)	0.91 (40.59)	0.94 (36.81)	0.94 (32.06)	1.04 (31.19)	1.22 (27.62)	1.47 (23.56)	1.54 (22.38)	1.75 (19.12)	1.86 (17.05)	0.98 (8.50)
Bonds w/stocks	0.11 (5.07)	0.12 (5.50)	0.15 (7.34)	0.17 (7.39)	0.21 (9.98)	0.26 (11.52)	0.27 (9.70)	0.39 (10.40)	0.40 (9.46)	0.49 (6.16)	0.38 (4.61)

Remove Distress Period (negative earnings or downgrades)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C10-C1
CAPM Alphas											
All stocks	0.22 (2.41)	0.29 (3.00)	0.21 (1.97)	0.15 (1.19)	0.16 (1.22)	0.12 (0.83)	−0.11 (−0.61)	−0.34 (−1.72)	−0.49 (−1.56)	−0.28 (−0.71)	−0.50 (−1.24)
Stocks w/ bonds	0.21 (2.26)	0.32 (3.29)	0.26 (2.23)	0.20 (1.44)	0.21 (1.31)	0.40 (2.10)	−0.21 (−0.76)	−0.13 (−0.53)	−0.65 (−1.35)	0.63 (1.26)	0.48 (0.95)
Bonds w/stocks	0.26 (3.72)	0.28 (3.89)	0.26 (3.74)	0.35 (4.47)	0.27 (3.76)	0.29 (4.15)	0.32 (4.70)	0.22 (2.49)	0.21 (1.04)	0.37 (2.24)	0.10 (0.61)

Puzzle resolved
not yet

	Monthly Value Weighted Portfolios			
	C1	C5	C10	C10-C1
Stock Betas	0.87	1.05	1.83	0.96
Stock Alphas	0.20	0.14	-1.58	-1.78
Bond Alphas	0.25	0.26	-0.44	-0.69
	Remove Distress Period (Downgrades or negative earnings)			
Stock Alphas	0.22	0.16	-0.28	-0.50
Bond Alphas	0.26	0.27	0.37	0.10

Puzzle Resolved?
Not Yet

Region/country	INDV	CR	Return	FF4-α	HKK4α
Emerging markets			−0.40%	−0.41%	−0.41%
Argentina	46	1	2.59%	1.68%	1.26%
Brazil	38	1	1.07%	0.77%	0.96%
Chile	23	2	*−1.43%*	−0.99%	−1.17%
China	20	2	−0.25%	−0.13%	−0.20%
India	48	2	−0.58%	−0.54%	−0.49%
Indonesia	14	2	1.54%	1.89%	1.62%
Israel	54	3	−1.34%	−0.97%	−1.06%
Malaysia	26	3	−0.46%	−0.58%	−0.57%
Mexico	30	0	0.91%	−1.56%	−1.40%
Pakistan	14	1	0.55%	−0.12%	−0.25%
Philippines	32	1	0.55%	1.02%	1.20%
Poland	60	1	−1.16%	−0.15%	0.02%
South Africa	65	3	0.85%	1.45%	1.33%
South Korea	18	3	*−1.14%*	*−1.05%*	−0.46%
Taiwan	17	2	−0.22%	−0.15%	−0.16%
Thailand	20	2	0.04%	−0.51%	−0.59%
Turkey	37	2	0.40%	−0.45%	−0.26%
Developed Asia-Pacific markets (ex. Japan)			−0.18%	−0.21%	−0.04%
Australia	90	3	−0.81%	−0.38%	−0.40%
Hong Kong	25	4	0.28%	0.27%	0.51%
New Zealand	79	4	*−1.99%*	*−2.37%*	*−2.56%*
Singapore	20	3	−0.77%	−0.62%	−0.79%

Gao, Parsons, Shen (2018)

Plot A: S&P credit rating (numeric,IA)

Plot E: Fraction with covenant violations in past 12 mo

Plot B: Fraction downgraded this month (IA)
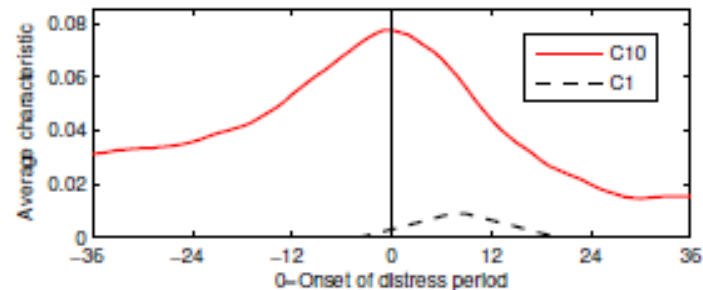
Plot F: Fraction with renegotiations in past 12 mo

Plot C: Fraction downgraded in past 12 mo (IA)
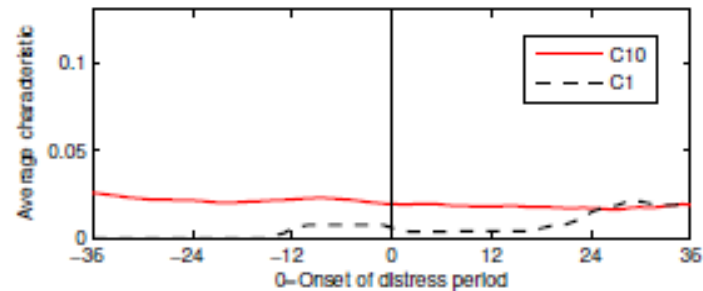
Plot G: Duration of renegotiations (months)

Plot D: Failure Probability (IA)
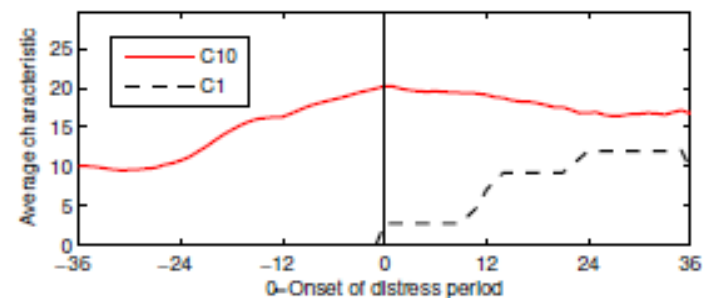
Plot H: Tobin Q (IA)
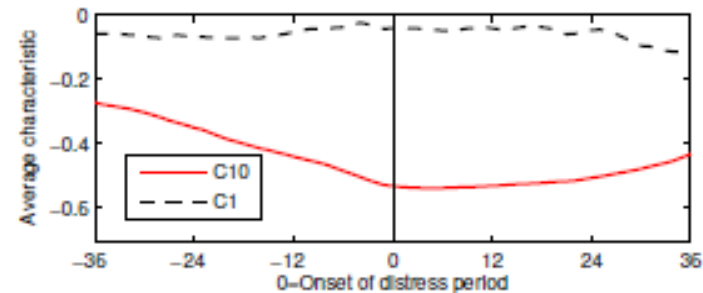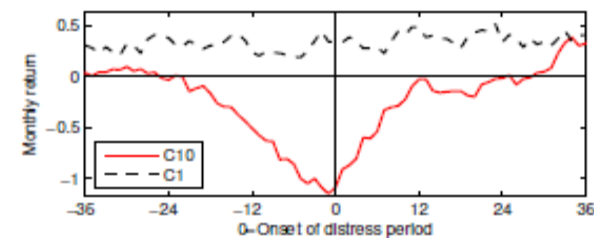
Plot I: O-score (IA)
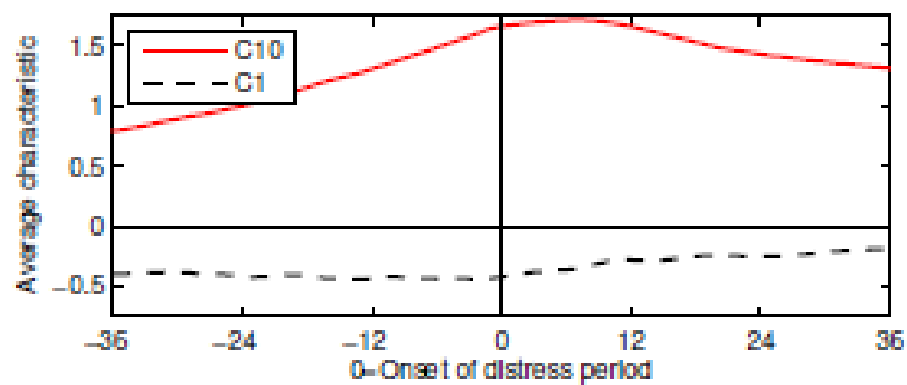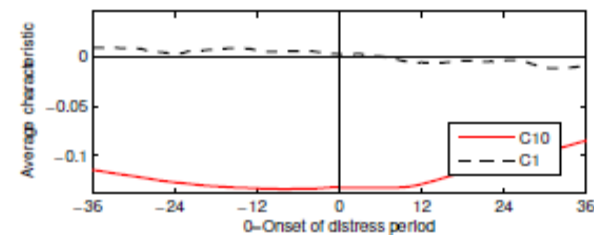

Plot K: Fraction delisted
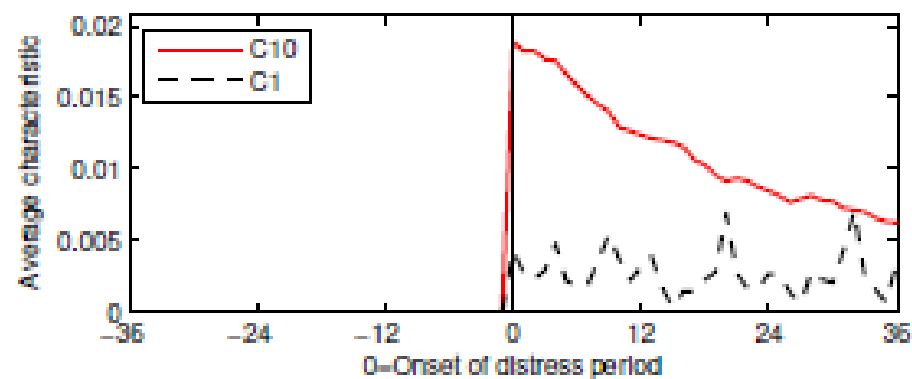
Plot J: Z-score (IA)
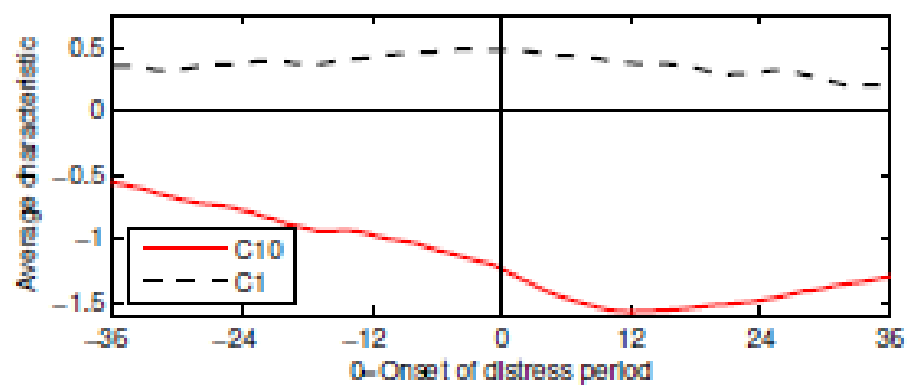
Plot A: Risk-adjusted stock return (%, CAPM)

Plot F: Net income growth (IB,IA)

Plot B: Risk-adjusted bond return (%, CAPM)
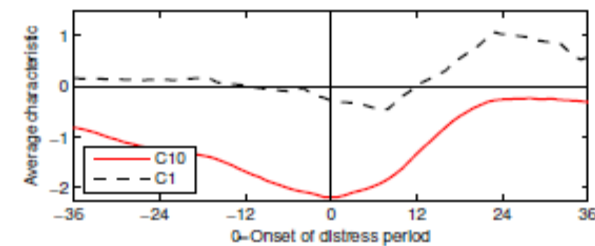
Plot G: Operating profits growth (EBIT,IA)

Plot C: Gross profitability[a] (Novy-Marx (2013), IA)
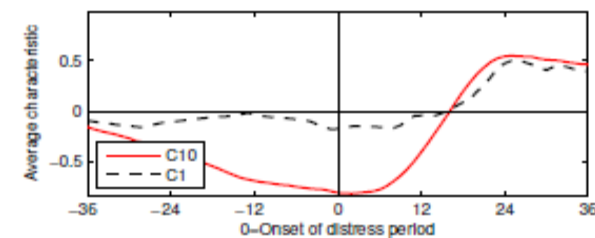
Plot H: Free Cash Flows[d] growth (IA)

Plot D: Operating profitability[b] (IA)
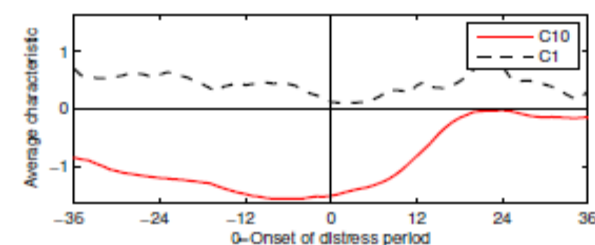
Plot I: Profit Margin (NI/Sale, IA)

Plot E: Cash-based operating profitability[c] (IA)
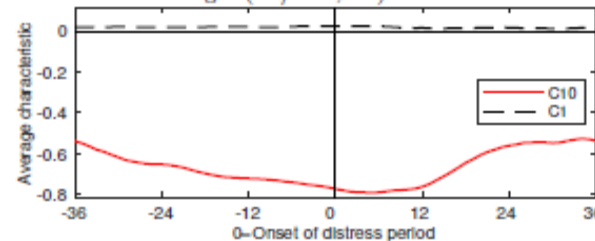
Explanation for Default Anomaly Puzzle

- Risk
  - Low rated firms are riskier
    - Higher betas
    - Lower market capitalization
    - Lower analyst following, higher dispersion in forecasts
    - Higher IVOL
    - Higher illiquidity

  - But could they provide a hedge against adverse market conditions?
    - Low rated firms perform poorly during recessions and market downturns

  - What about conditional betas?
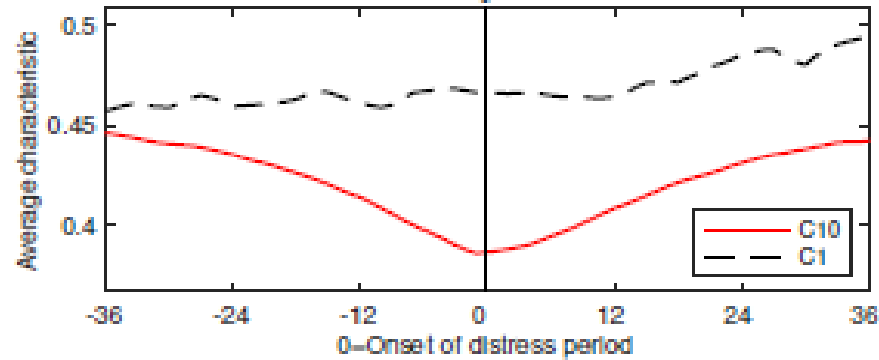   - Cannot explain puzzle

Explanation: Wealth Transfer

- Stockholders extract value from bondholders during renegotiation of debt contracts in distress periods
  - Violations of absolute priority ➡stocks overpriced ➡ low returns
  - ➡bonds underpriced ➡ high returns
  - ➡negative correlation in bond and stock returns during distress

- But
  - Both bonds and stock have low returns during distress
  - Bonds and stocks correlations are positive
  - Correlations are higher for worst rated firms

Explanation: Biased Earnings Expectations

- Anomalies driven by biased earnings expectations
    - Anomaly returns are six times higher on earnings release days
    - McLean and Pontiff (2018)

- Repeat analysis after eliminating months with quarterly and annual earnings announcements
    - Results essentially remain same as before
    - Results almost exactly the same when annual earnings announcement months are excluded from sample

Explanation: Institutional Ownership

Plot A: Institutional ownership ratio

Plot D: Inst.own. Herfindahl-Hirschman Idx (IA)
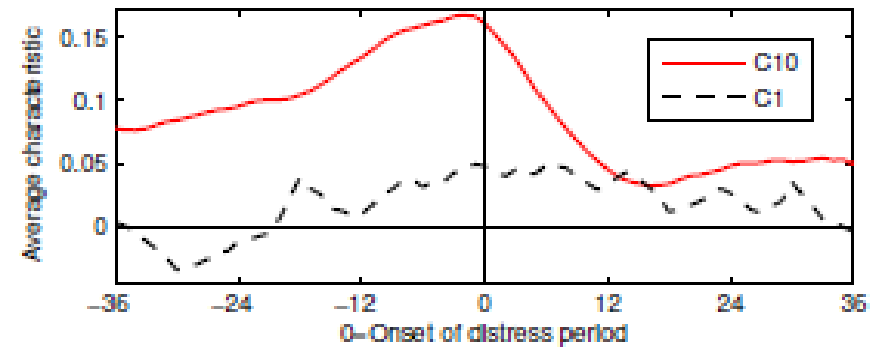
Plot B: Institutional ownership ratio (IA)
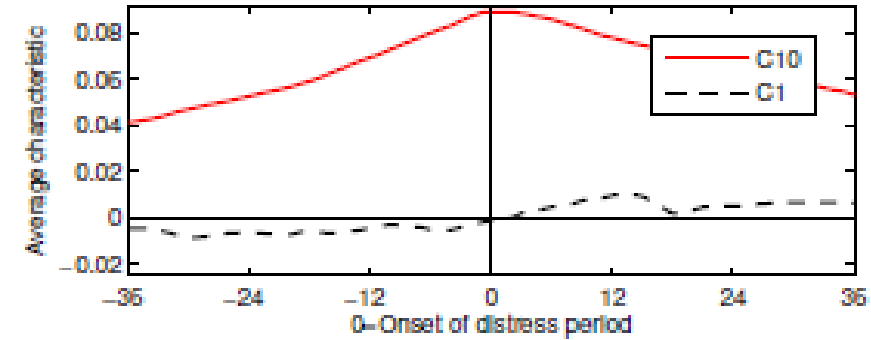
Plot E: Inst.own. HHI growth (IA)

Plot C: Institutional ownership growth (IA)

Explanation: Lottery-Type Preferences

- **Preference for low probability windfalls**
    - Investors willing to accept lower expected returns for extreme positive returns if distressed firm survives bankruptcy or is acquired at a premium
    - Purchase of illiquid securities by skewness preferring investors leads to overpricing ➔ subsequent low returns

- But bonds at best get principal back and earn interest
    - No extreme upside in bonds – 90th, 95th, 99th percentile returns in bonds - 5%, 8%, 21% and in stocks - 21%, 32%, 69%. Skewness preferring investors should prefer stocks
    - Also, bond market is mainly institutional
        - But institutions can also be subject to biases
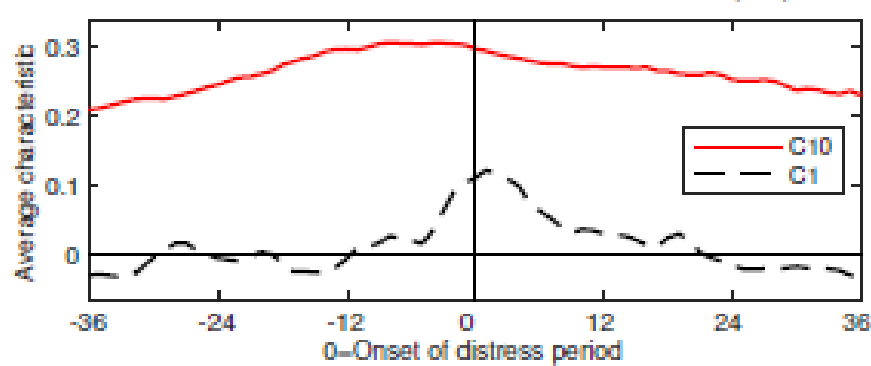
Explanation: Limits to Arbitrage and Trading Frictions
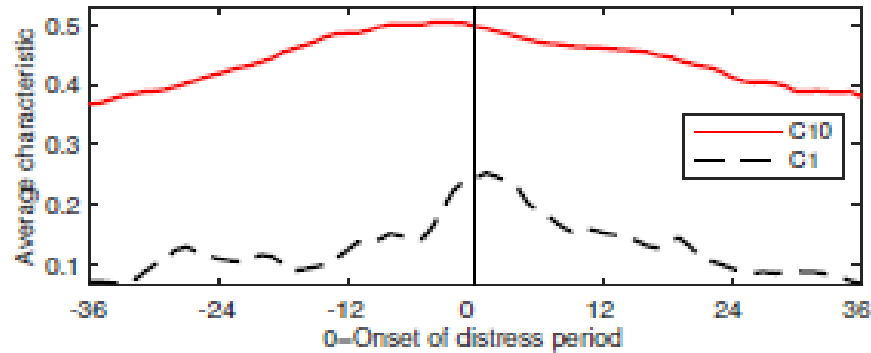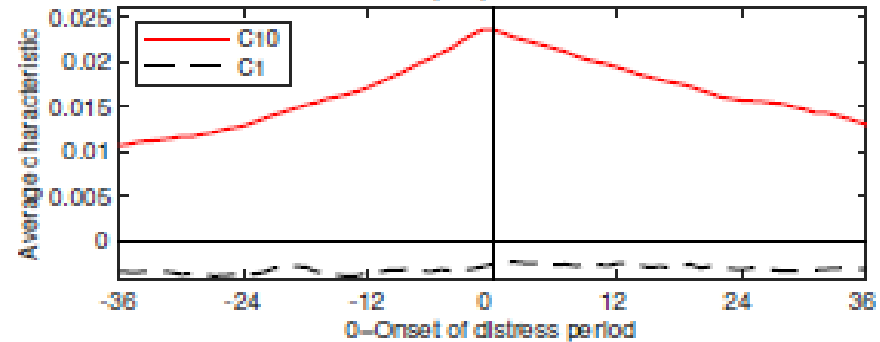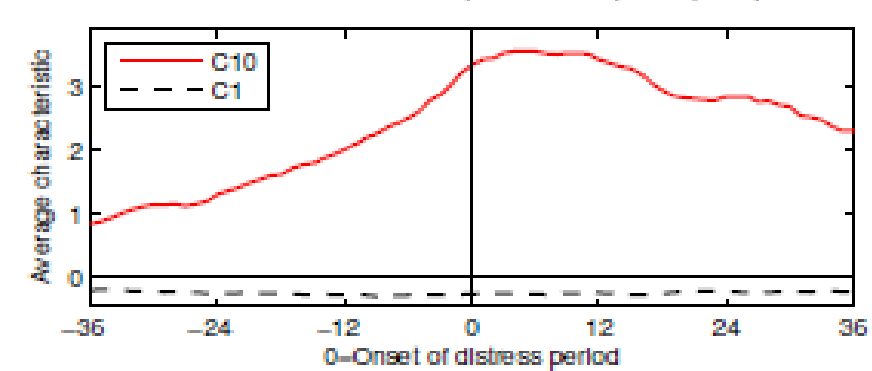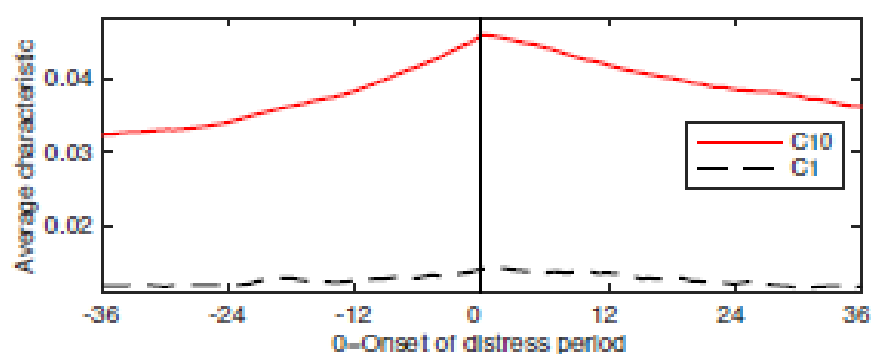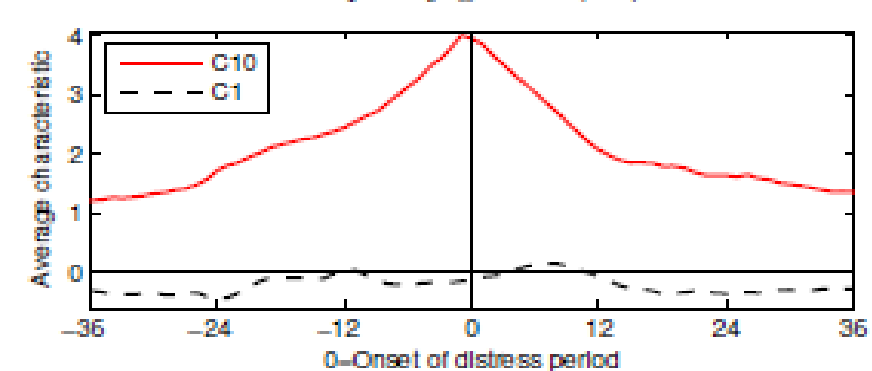
Explanations

- Risk – unconditional and conditional
- Wealth transfer from bondholders to stockholders
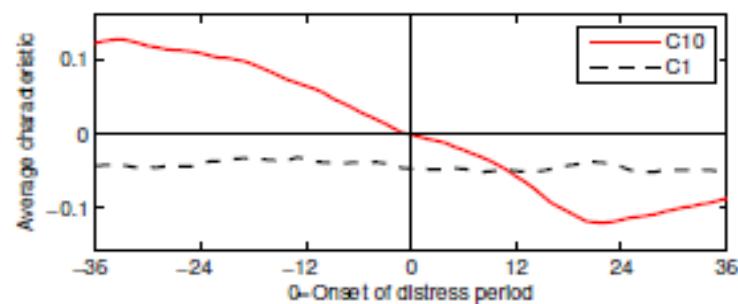- Earnings expectation errors
- Institutional trading
- Lottery-type preferences
- Limits to arbitrage and trading frictions

- Biased beliefs
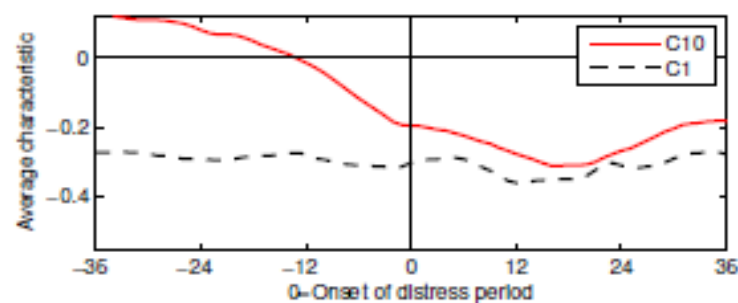 - Anchoring by investors – Sticky expectations

Real Impact of Distress

- Negative growth in TA (CAPX) after t=0 (t-14) through t+36
  - Possibly due to write-down of assets and investments < depreciation
- Negative growth in Advertising and R&D after t+4 and t=0
  - Above negative growth will hurt future earnings and future growth
- Sales growth turns negative after t+12
  - Possibly delayed due to discounting – evidence low profit margins
- Firms try to conserve cash
  - Negative growth - cash & short-term investments (after t+6), inventory (t-5), and cash dividends (t-24)
  - Preferred dividends in arrears reaches maximum at t-3
- Raising funding becomes much harder
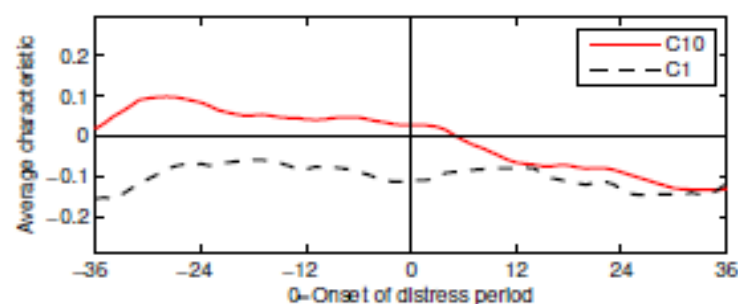 - Negative growth – A/P (t-5), LT debt (t=0), equity (t-24)

Plot A: Total assets growth (AT,IA)

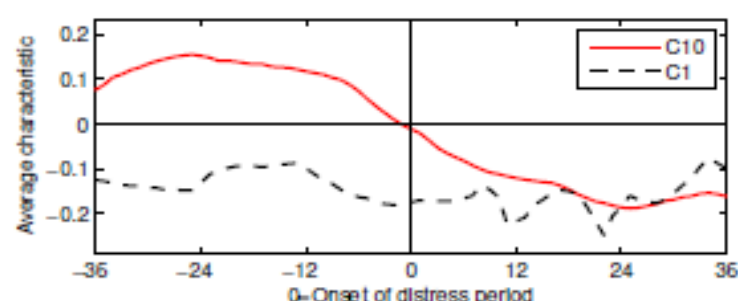Plot E: Sales growth (SALE, IA)

Plot B: Investments growth (CAPX,IA)
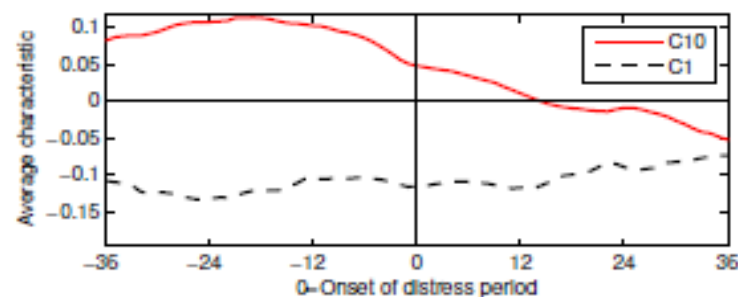
Plot F: Cash and ST investments growth (CHE, IA)

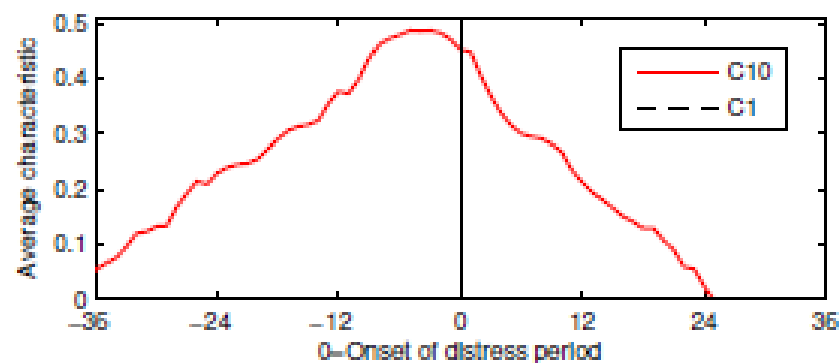Plot C: R&D growth (XRD,IA)
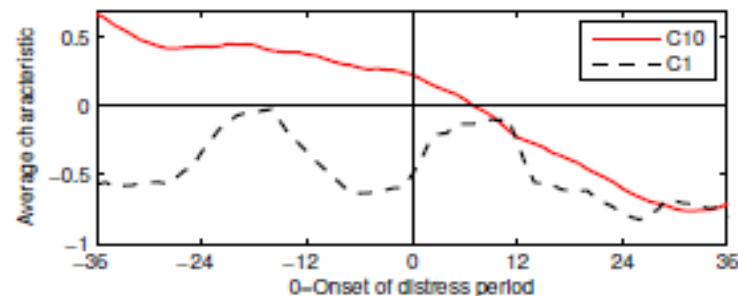
Plot G: Inventory growth (INVT, IA)

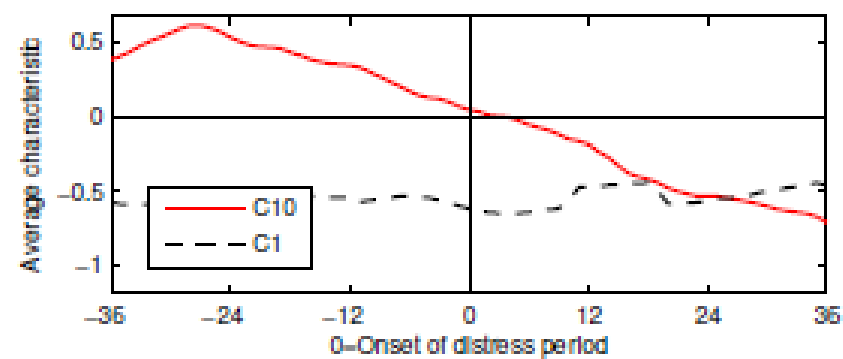Plot D: Advertising growth (XAD,IA)
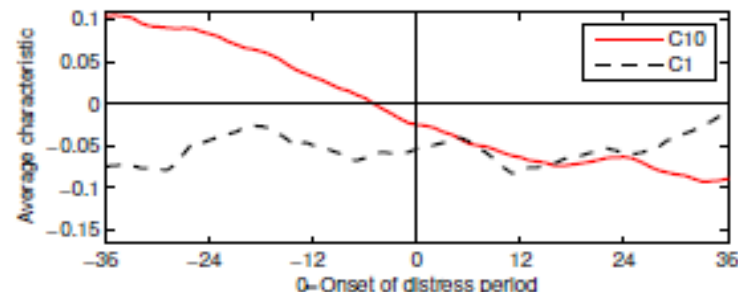
Plot H: Cash dividends growth (DV,IA)
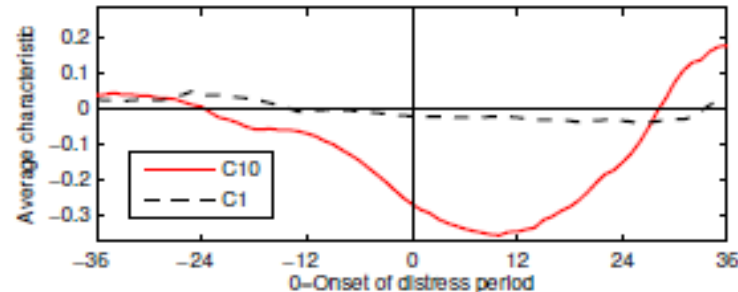
Plot I: Pref. divid. in arrears growth (DVPA,IA)

Plot K: LT debt growth (DLTT,IA)

Plot J: Accounts payable growth (AP, IA)
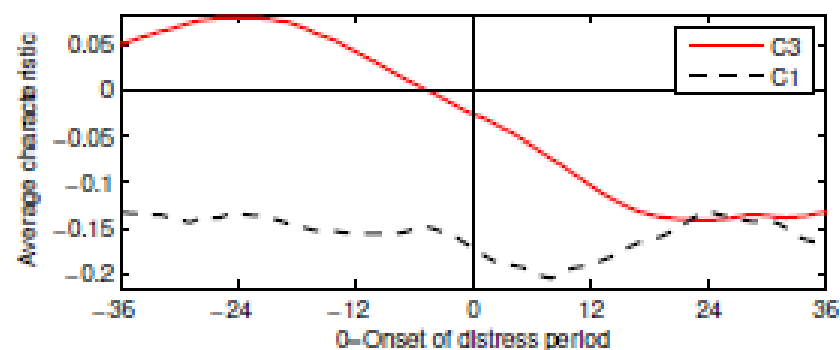
Plot L: Stockholders equity growth (SEQ,IA)
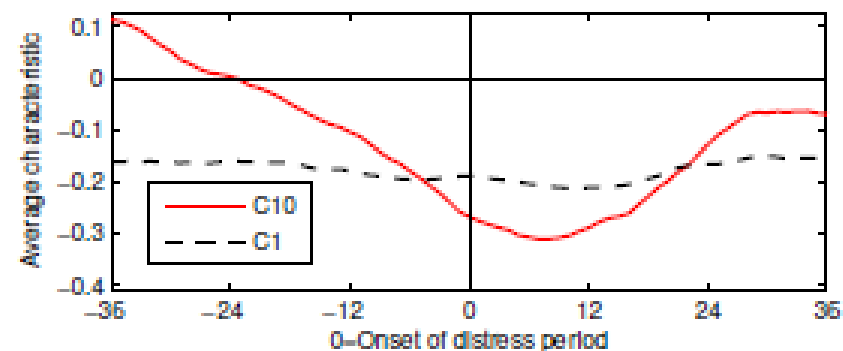
Plot M: Preferred stock growth[a] (IA)
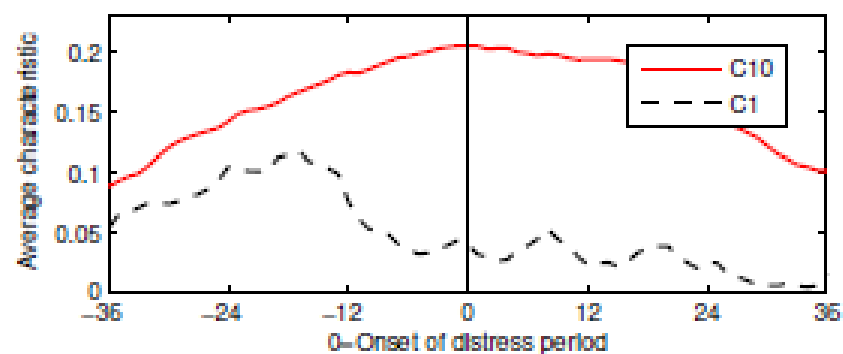
Real Distortions

	Overpriced based on		
	Stocks	Bonds	Both
Panel A: Y = Investments (CAPX) growth (in %)			
WorstRated × *Distress* × *Overpriced*	17.50	17.24	27.44
	(2.23)	**(2.27)**	**(3.45)**
WorstRated × *Distress*	−30.55	−27.52	−27.23
	(−5.25)	**(−4.56)**	**(−4.53)**
WorstRated	38.29	35.88	34.68
	(6.49)	**(6.02)**	**(6.02)**
Distress	−8.66	−11.61	−12.05
	(−2.38)	**(−3.18)**	**(−3.60)**
Overpriced	−5.18	0.03	−6.74
	(−4.31)	(0.03)	**(−3.00)**
WorstRated × *Overpriced*	−14.08	−20.42	−27.61
	(−2.94)	**(−2.73)**	**(−4.78)**
Distress × *Overpriced*	−12.23	−8.76	−8.94
	(−4.28)	**(−2.08)**	(−1.79)
lagged(Y)	2.57	2.58	2.59
	(2.87)	**(2.90)**	**(2.92)**
Constant	−50.69	−51.39	−51.33
	(−11.29)	**(−11.43)**	**(−11.36)**

Real Distortions

	Overpriced based on		
	Stocks	Bonds	Both
Panel B: Y = Total assets (AT) growth (in %)			
WorstRated × Distress × Overpriced	5.24	6.88	11.46
	(2.46)	(3.29)	(5.02)
WorstRated × Distress	−7.85	−7.69	−7.49
	(−2.69)	(−2.70)	(−2.75)
WorstRated	0.39	−0.45	−0.80
	(0.27)	(−0.30)	(−0.54)
Distress	−12.65	−13.76	−13.82
	(−7.23)	(−7.69)	(−8.11)
Overpriced	−2.22	−0.47	−2.14
	(−4.72)	(−0.96)	(−2.72)
WorstRated × Overpriced	−5.14	−5.25	−7.27
	(−3.38)	(−2.77)	(−2.15)
Distress × Overpriced	−5.05	−3.81	−7.00
	(−4.28)	(−2.26)	(−2.78)
lagged(Y)	8.13	8.04	8.07
	(4.50)	(4.49)	(4.48)
Constant	−8.18	−8.43	−8.47
	(−6.69)	(−7.00)	(−6.98)

Real Distortions

	Overpriced based on		
	Stocks	Bonds	Both

Panel C: Y = Long Term Debt (DLTT) growth (in %)

	Stocks	Bonds	Both
WorstRated × Distress × Overpriced	9.91 (2.02)	14.83 (2.44)	15.15 (2.33)
WorstRated × Distress	2.59 (0.54)	7.77 (0.68)	6.12 (0.61)
WorstRated	−10.34 (−1.82)	−2.00 (−0.21)	−0.58 (−0.06)
Distress	−20.16 (−6.68)	−14.17 (−5.05)	−13.15 (−4.54)
Overpriced	0.44 (0.27)	4.58 (2.61)	−0.14 (−0.05)
WorstRated × Overpriced	−2.38 (−0.65)	−11.27 (−1.70)	−10.54 (−1.41)
Distress × Overpriced	−12.10 (−3.40)	−2.82 (−0.82)	−6.71 (−1.12)
lagged(Y)	0.67 (1.21)	0.64 (1.13)	0.69 (1.20)
Constant	−64.63 (−14.25)	−74.42 (−14.96)	−73.46 (−15.02)

Real Distortions

	Overpriced based on		
	Stocks	Bonds	Both

Panel D: Y = Common Equity (CEQ) growth (in %)

	Stocks	Bonds	Both
WorstRated × Distress × Overpriced	8.63 (3.96)	6.16 (2.41)	9.15 (3.36)
WorstRated × Distress	−18.29 (−9.58)	−17.71 (−9.98)	−17.12 (−9.81)
WorstRated	16.91 (14.08)	13.54 (11.42)	13.65 (12.18)
Distress	−14.48 (−10.54)	−15.86 (−11.04)	−16.15 (−11.76)
Overpriced	−2.90 (−5.46)	−0.95 (−2.42)	−2.66 (−3.18)
WorstRated × Overpriced	−10.52 (−8.17)	−3.10 (−1.27)	−5.22 (−1.85)
Distress × Overpriced	−7.00 (−5.57)	−5.47 (−3.68)	−8.31 (−4.36)
lagged(Y)	3.83 (2.71)	3.69 (2.64)	3.71 (2.65)
Constant	−6.66 (−4.74)	−7.00 (−5.04)	−7.12 (−5.08)

Takeaways

- **Distress Anomaly Puzzle obtains over a small sample of firms in the cross-section and the time series**
  - Due to low rated firms in financial distress
  - Cannot be captured by the standard explanations
  - Probably due to biased beliefs of investors – anchoring / sticky expectations
- Distress has real consequences
  - Customers, suppliers, creditors, and investors distance themselves from distressed firms
  - Decrease in capital expenditures, R&D, and advertising may be particularly harmful for long-term growth and earnings
- Distress Anomaly leads to real distortions
  - Excess investment (or too little divestment)
  - Growth in bonds outstanding and common equity