Discussion

Understanding the Behavior of Distressed Stocks

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Minnesota Macro Asset Pricing Conference

May 9, 2015

The distress risk puzzle

Ten failure probability portfolios (Chen, Hou, and Zhang '15)

	Low	2	3	4	5	6	7	8	9	High
m	0.81	0.61	0.63	0.62	0.58	0.59	0.61	0.65	0.62	0.14
α	0.27	0.09	0.11	0.07	0.03	0.01	0.00	−0.03	−0.16	−0.78
α_{FF}	0.39	0.14	0.12	0.08	0.02	−0.02	−0.08	−0.14	−0.31	−1.05
α_C	0.18	0.01	0.04	0.05	0.06	0.10	0.12	0.13	0.02	−0.49
t_m	3.53	2.88	3.01	2.89	2.71	2.61	2.43	2.25	1.84	0.31
t	2.94	1.26	1.73	1.20	0.48	0.19	−0.02	−0.30	−1.22	−3.34
t_{FF}	4.52	2.18	1.99	1.35	0.25	−0.35	−1.20	−1.48	−2.91	−5.92
t_C	2.32	0.15	0.77	0.93	0.94	1.92	2.04	1.71	0.21	−3.43

- Links to the value premium
  At adds with Fama and French '92 conjecture (Griffin and Lemmon '02)

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Context: facts and explanations

- Still a puzzle
  - Campbell, Hilscher, and Szilagyi '08, Gao, Parsens, and Shen '12, Avramov, Chordia, Jostova, and Philipov '12
- Not a puzzle: credit risk is mis-measured
  - Chava and Purnanandam '10, Friewald, Wagner, and Zechner '13, Anginer and Yildizhan '14
- Theoretical explanations
  - George and Huang '10, Garlappi and Yan '12, etc
- Contribution: Not a puzzle. Non-linearity in returns is responsible for the distress risk puzzle

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Summary of the paper's findings

- Model predicts that expected returns are not well captured by factor models and the biases leads to alphas in factor models

- Empirical results show that the biases in alphas are large and can accout for the distress portfolio returns.

The Model

Use as few equations as possible. Use words bullet points to describe the model

1. General equilibrium model

   Return dynamics

$$\frac{dS_i}{S_i} = \mu dt + \sigma_0 \sqrt{\lambda} dz + \sigma_1 \sqrt{\lambda_i} dz_i + \Gamma dq_i$$

   Expected excess return

$$\lim_{N\to\infty} (\mu - r) = \gamma cov_t \left(\frac{dS_i}{S_i}, \frac{dW}{W} \right) - bcov_t \left(d\lambda, \frac{dW}{W} \right) + \lambda_i \Gamma$$

2. Empirical implications

$$\lim_{N\to\infty} (\mu - r) = \underbrace{\sigma_0^2 \gamma . \beta_i}_{\text{Usual risk compensation}} - \underbrace{\sigma_0^2 b . \beta_\lambda}_{\text{Slope bias}} + \underbrace{\lambda_i \Gamma}_{\text{Intercept bias}}$$

   - Implication for alphas in factor models

$$\alpha_p = -\lambda_i \Gamma$$

Empirical implementation

Correction

$$\tilde{r}_t = r_t - r_{ft} + (\Gamma + r_{ft}) * \text{default probability}$$

where

$$\text{correct return } (\tilde{r}_t) = \beta' \text{Factors}_t (1 - \text{default probability}) + \epsilon_t$$

A Before correction

Portfolio	Mean excess return	CAPM alpha	3-factor alpha	4-factor alpha
0005	0.80	1.60**	2.41***	0.46
0510	-0.04	0.38	0.64	0.81
1020	0.56	0.09	-0.54	0.91
2040	0.62	-0.52	-1.46	0.28
4060	-0.14	-1.90	-3.83***	-1.55*
6080	-0.71	-3.22	-5.85***	-2.57**
8090	-2.11	-5.22*	-7.91***	-3.70*
9095	-2.93	-6.62	-9.15***	-3.11
9500	-6.28	-9.87*	-13.47***	-8.89**

B After correction

Portfolio	Mean excess return	CAPM alpha	3-factor alpha	4-factor alpha
0005	0.81	1.62**	2.42***	0.47
0510	-0.02	0.40	0.66	0.83
1020	0.59	0.12	-0.51	0.94
2040	0.70	-0.45	-1.39	0.35
4060	0.07	-1.68	-3.62***	-1.34
6080	0.08	-2.45	-5.07***	-1.77
8090	0.30	-2.84	-5.50**	-1.21
9095	2.10	-1.64	-4.15	2.07
9500	3.43	-0.24	-3.79	1.12

Outline

1. Non-learity or ROE
2. Alphas in single aggregate shock model
3. Measurement of default probability

Comment 1: Profitability and the distress risk puzzle

- Profitability is relevant to understand the distress risk puzzle (Avramov, Chordia, Jostova, and Philipov '12, Chen, Hou, and Zhang '15)
- ROE factor and the 10 failure probability portfolios

The q-factor model regressions

α_q	0.14	−0.12	−0.09	−0.01	0.04	0.13	0.18	0.29	0.28	−0.03
β_{MKT}	0.91	0.96	0.98	0.99	0.97	1.00	1.04	1.12	1.21	1.35
β_{ME}	0.13	−0.03	−0.07	−0.10	−0.07	−0.07	−0.05	0.04	0.25	0.55
$\beta_{\mathrm{I/A}}$	−0.29	0.06	0.15	0.08	0.10	0.05	0.09	0.02	−0.08	−0.12
β_{ROE}	0.36	0.27	0.21	0.10	−0.07	−0.18	−0.31	−0.51	−0.68	−1.25
t_q	1.14	−1.65	−1.60	−0.15	0.72	2.05	2.10	2.67	2.45	−0.13
$t_{\beta_{\mathrm{MKT}}}$	33.56	40.59	60.65	58.24	56.54	58.64	41.03	41.60	44.44	26.54
$t_{\beta_{\mathrm{ME}}}$	1.98	−0.83	−2.55	−3.20	−2.86	−2.31	−1.27	0.56	3.25	4.67
$t_{\beta_{\mathrm{I/A}}}$	−2.95	1.05	3.57	1.74	2.48	1.13	1.44	0.25	−0.78	−0.61
$t_{\beta_{\mathrm{ROE}}}$	6.34	7.88	8.10	3.21	−2.35	−5.24	−5.82	−7.38	−10.63	−9.12

Characteristics in the q-factor model

ME	3.27	3.88	3.28	2.83	2.23	1.80	1.40	1.03	0.53	0.19
I/A	11.35	9.94	9.06	9.38	8.60	8.80	8.32	9.45	8.59	7.44
ROE	4.74	4.21	3.69	3.19	2.83	2.51	2.13	1.56	0.45	−4.00

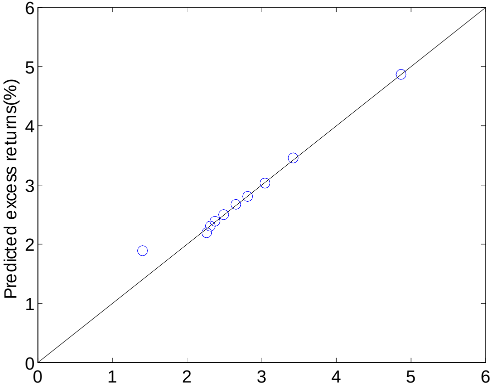
Non-linearity or/and ROE

1. Default probability and ROE are negatively correlated
2. Nonlinarity $\lambda_i\Gamma$ in returns may capture ROE
3. Useful to understand the distress jump risk $\lambda_i\Gamma$ together with profitabililty related anomalies.

2. Avramov, Chordia, Jostova, and Philipov 2012: financial distress is crucial in explaining the profitability of prominent market anomalies. In particular, price momentum, earnings momentum, credit risk, dispersion, and idiosyncratic volatility effects in the cross-section of stock returns arise in periods of deteriorating credit conditions and are nonexistent in stable or improving credit conditions.
3. May want to look at these three anomalies together...

Comment 2: Alphas in single factor model

Failure of factor models is hard to generate in single aggregate shock model



Ten book-to-market portfolios in a standard investment-based model with one aggregate shock

- Lewellen and Nagel critique

Comment 2: Alphas in single factor model

This model does lead to alpha spread, however market betas...

PANEL B

Portfolio	Mean excess return	CAPM alpha	3-factor alpha	4-factor alpha
1	-0.18	0.41	0.99	-0.69
2	-0.44	-0.09	0.14	0.42
3	0.21	-0.30	-0.93	0.52
4	1.22	0.30	-0.80	0.46
5	2.05	0.52	-1.55**	0.58
6	0.34	-1.74	-4.40***	-0.95
7	0.20	-2.47	-5.15***	-0.83
8	-0.83	-3.79	-6.29***	-0.18
9	0.95	-2.19	-5.48***	-0.30

PANEL B

Portfolio	MKT	SMB	HML	MOM
1	-0.08	-0.16	-0.05	0.14
2	-0.03	-0.15	-0.03	-0.02
3	0.08	0.00	0.06	-0.15
4	0.08	0.46	0.01	-0.13
5	0.10	0.75	0.10	-0.18
6	0.15	1.09	0.12	-0.32
7	0.14	1.42	0.01	-0.42
8	0.17	1.61	-0.07	-0.54
9	0.14	1.95	0.02	-0.47

Can the model result generalize to other anomalies, at least profitability related anomalies?

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3	0.21	-0.30	-0.93	0.52
4	1.22	0.30	-0.80	0.46
5	2.05	0.52	-1.55**	0.58
6	0.34	-1.74	-4.40***	-0.95
7	0.20	-2.47	-5.15***	-0.83
8	-0.83	-3.79	-6.29***	-0.18
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4	0.08	0.46	0.01	-0.13
5	0.10	0.75	0.10	-0.18
6	0.15	1.09	0.12	-0.32
7	0.14	1.42	0.01	-0.42
8	0.17	1.61	-0.07	-0.54
9	0.14	1.95	0.02	-0.47

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Comment 3: Physical default probability or credit risk based default probability

- The distress puzzle is based on physical default probability
- Once sorted on credit spread based measures, the distress risk puzzle disappears
- Can this model say something on this "deep" puzzle?

Conclusion

Very nice paper!

Would be nice to link the model predictions to ROE.