

In Search of Distress Risk

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What is financial distress?

- The idea of financial distress is often invoked to explain anomalous patterns in stock returns
 - Chan and Chen (1991) argue that “marginal firms” among small stocks explain the size effect
 - Fama and French (1996) use the term “relative distress” to capture this idea
- Unanswered questions:
 - *How can we measure financial distress?*
 - *What explains variation in financial distress across firms and over time?*
 - *Do distressed stocks carry a risk premium?*

Our approach

- Measure financial distress as the probability of bankruptcy (Chapter 7 or Chapter 11) or of failure (bankruptcy, delisting, or default as defined by a credit rating agency) at some future date
- Use accounting and equity market data to estimate failure probabilities
- Sort stocks by these estimated probabilities
- Calculate average returns on distressed portfolios

Results

- Differences in accounting and market based firm characteristics explain much of variation in failure rate
- Distressed stocks have high standard deviation, market beta, and loadings on Fama-French HML (value) and SMB (size) factors
- However, they have low average returns

Related literature

- Bankruptcy prediction:
 - Altman (1968) Z-score, Ohlson (1980) O-score, Shumway (2001), Chava-Jarrow (2004), Hillegeist et al., Bharath-Shumway (2005), Duffie et al. (2006)
 - *We extend the horizon of failure prediction and directly predict failure for different horizons*
- Pricing of distressed firms:
 - Dichev (1998), Griffin-Lemmon (2002), Vassalou-Xing (2004), Garlappi-Shu-Yan (2005)
 - All except VX find low returns of distressed stocks
 - *We confirm results with superior measure of distress*

Data summary

- Chava-Jarrow (2004) bankruptcy indicator, Kamakura Risk Information Systems (KRIS) failure indicator
- Compustat accounting data and CRSP equity market data
- We have data on almost 1.7 million firm-months and 1600 failures from 1963-2003, but very little data before 1972

Explanatory variables

- We include refinements of existing variables and introduce new variables for failure prediction:
 - Profitability: **NITA** (net income to total assets) and **NIMTA** (net income to market value of total assets)
 - Leverage: **TLTA** (total leverage to total assets) and **TLMTA** (market value equivalent)
- *New*: we scale by market value of total assets - market value of equity plus book value of debt

Explanatory variables

- Excess return over the past month: **EXRET**
- Return volatility from daily data over the past three months: **SIGMA**
- Log market capitalization relative to the market value of the S&P 500 index: **RSIZE**
- Short-term assets to market value of total assets: **CASHMTA** (*new*)
- Market-book ratio: **MB** (*new*)
- Log share price up to \$15: **PRICE** (*new*)

Probability of failure

- Model probability of failure (indicator equal to 1)

$$P_t(Y_{t+1} = 1) = F(\alpha + X_t\beta)$$

- We find that firms with higher leverage, lower profitability, lower past stock returns, more volatile past stock returns, lower cash holdings, higher market-to-book ratios, and lower prices per share are more likely to fail
- We also use distance to default (DD) to predict the probability of failure - Merton (1974)

Failure prediction results

- Including refinements of existing variables and introducing new variables improves explanatory power by 16%.
 - The pseudo R^2 increases from 0.27 to 0.312
- Variables also explain failure at longer horizons
 - Volatility, the market-to-book ratio MB, and firm size become relatively more important at longer horizons
- Distance to default
 - Adding DD does not improve explanatory power
 - Our model doubles explanatory power relative to DD

Pricing of distressed stocks

- Should we expect high or low average returns on distressed equity?
- High: financial distress is a priced risk factor
- Low: Investors do not understand failure risk
 - Investors have been learning about the variables that predict failure
 - Investors overrate distressed stocks' prospects

How has distress risk been priced?

- We sort stocks by predicted failure risk each January from 1981 through 2003, using model estimated up to that date
- We form value weighted portfolios of stocks
- Distressed stocks have high standard deviation, market beta, and loadings on Fama-French HML (value) and SMB (size) factors
- So we expect them to have high average returns
- But they tend to have low average returns

Distressed stock returns

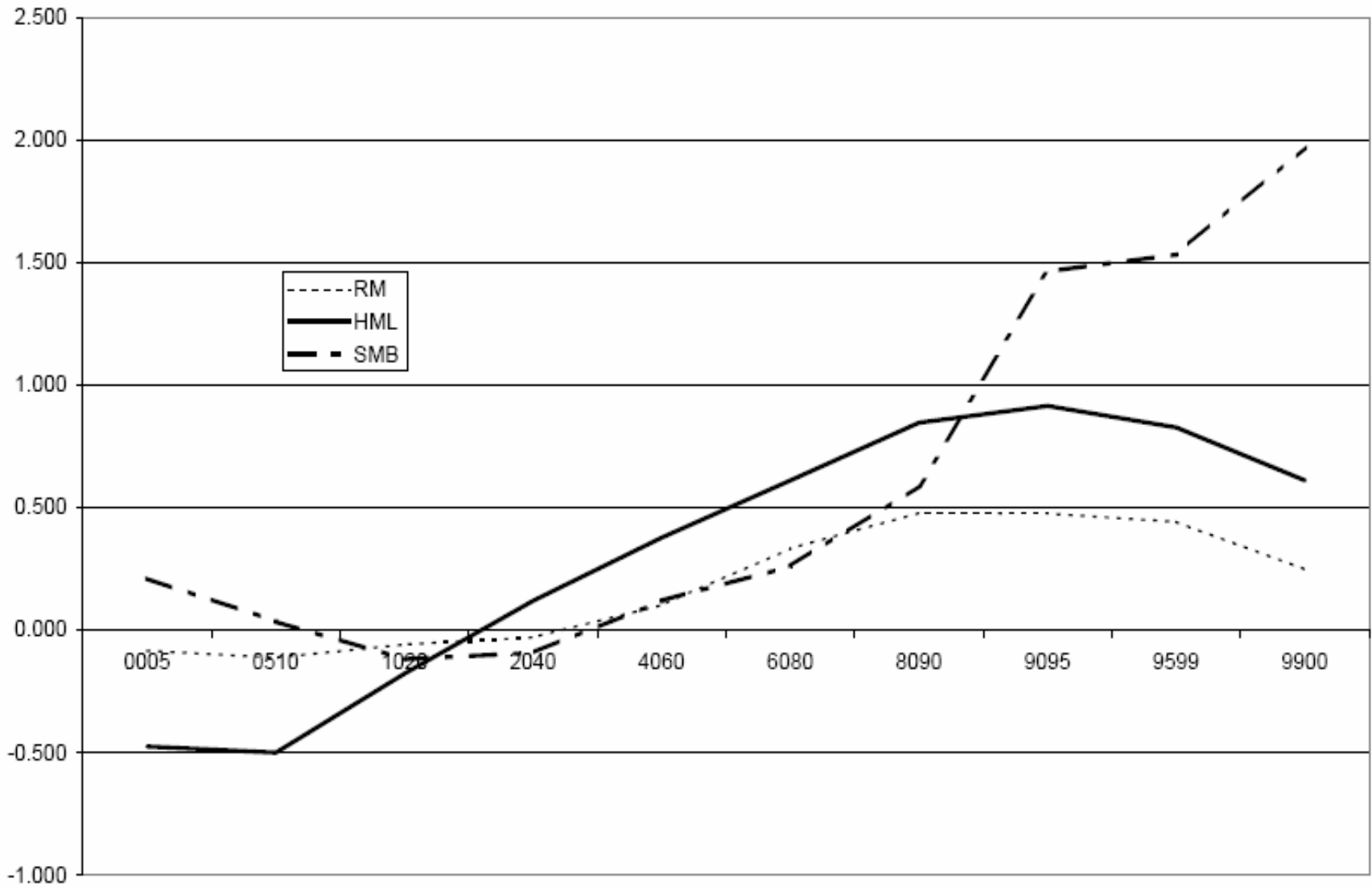
Panel A - Portfolio alphas

Portfolios	0005	0510	...	9095	9599	9900	LS1090
Excess return	3.39 (1.45)	2.36 (1.08)		-8.07 (1.72)	-6.63 (1.24)	-16.30 (1.98)*	10.1988 (1.90)
CAPM alpha	2.74 (1.17)	2.04 (0.92)		-10.96 (2.40)*	-9.45 (1.79)	-18.71 (2.27)*	12.5976 (2.36)*
3-factor alpha	5.70 (2.95)**	5.30 (2.85)**		-18.15 (5.75)**	-16.13 (3.93)**	-24.25 (3.35)**	22.8852 (6.15)**
4-factor alpha	2.37 (1.19)	2.66 (1.37)		-10.01 (3.26)**	-8.19 (1.96)	-20.39 (2.64)**	12.1752 (3.45)**

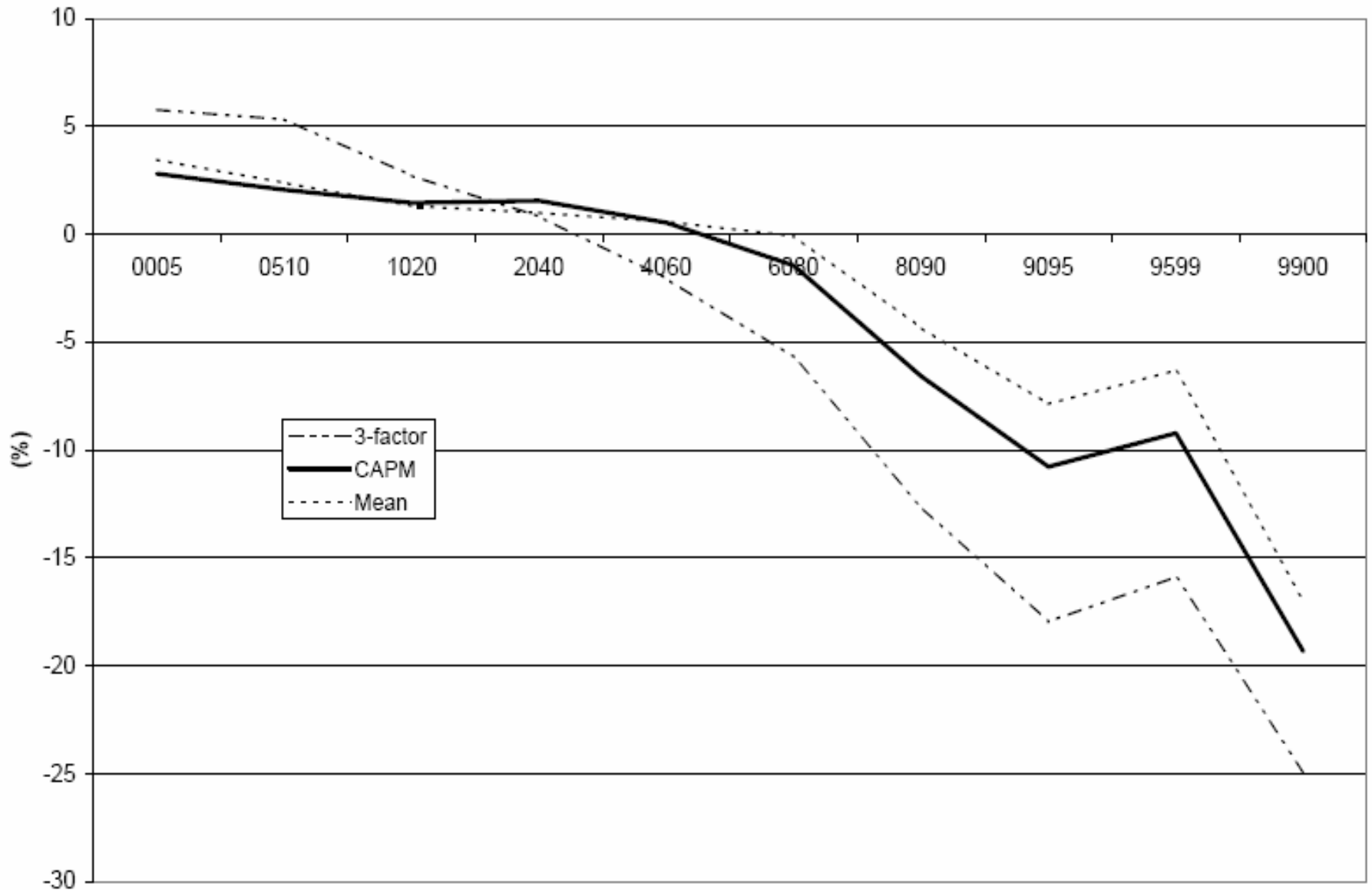
Panel B - 3-factor regression coefficients

Portfolios	0005	0510	9095	9599	9900	LS1090
RM	-0.083 (2.22)*	-0.111 (3.10)**	0.476 (7.81)**	0.431 (5.45)**	0.254 (1.82)	-0.563 (7.82)**
HML	-0.474 (9.68)**	-0.499 (10.61)**	0.918 (11.50)**	0.831 (8.02)**	0.608 (3.32)**	-1.396 (14.82)**
SMB	0.212 (3.89)**	0.037 (0.71)	1.466 (16.51)**	1.538 (13.34)**	1.964 (9.64)**	-1.394 (13.31)**

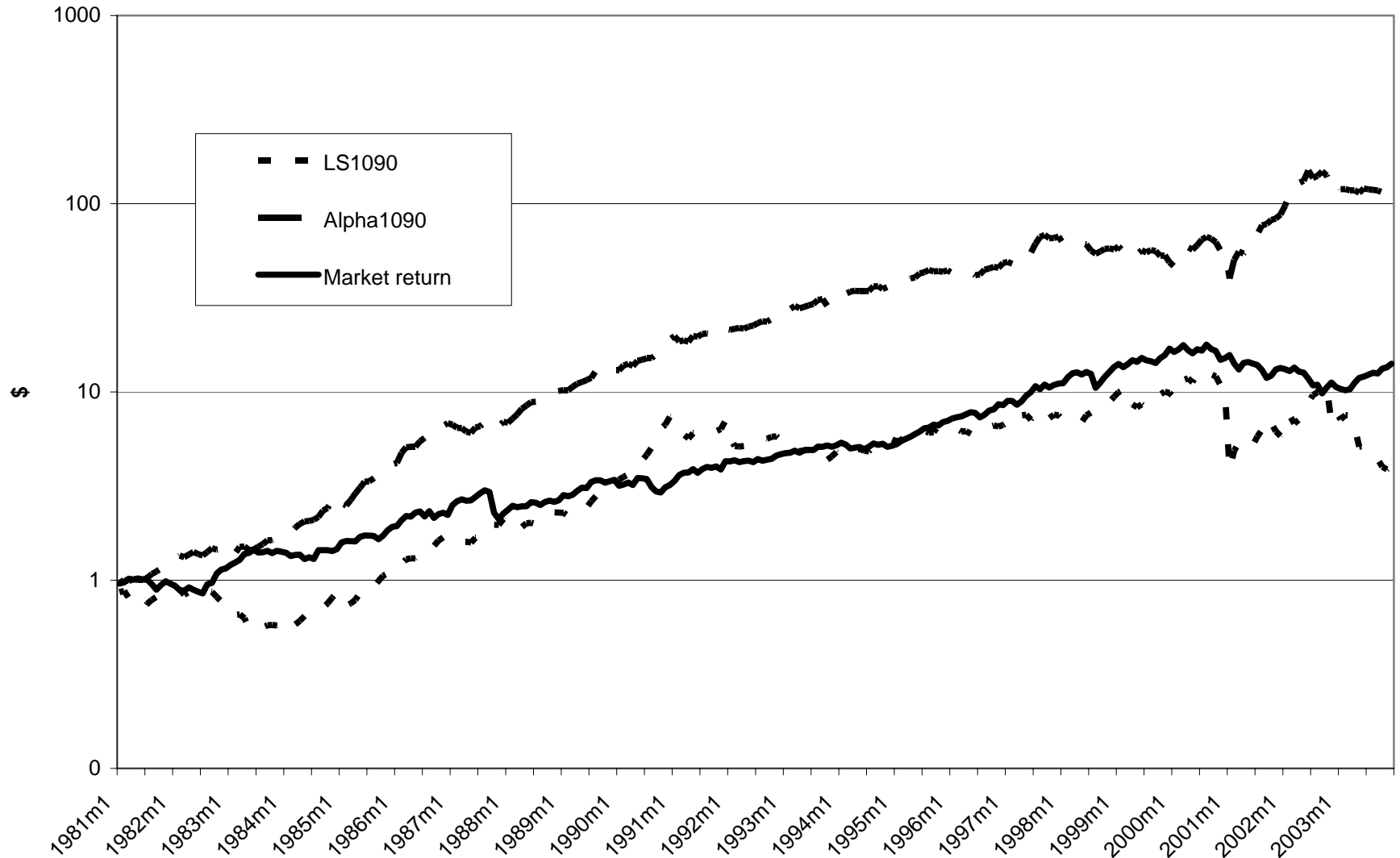
Factor loadings of distressed stocks



Alphas of distressed stocks



Returns on long-short portfolios



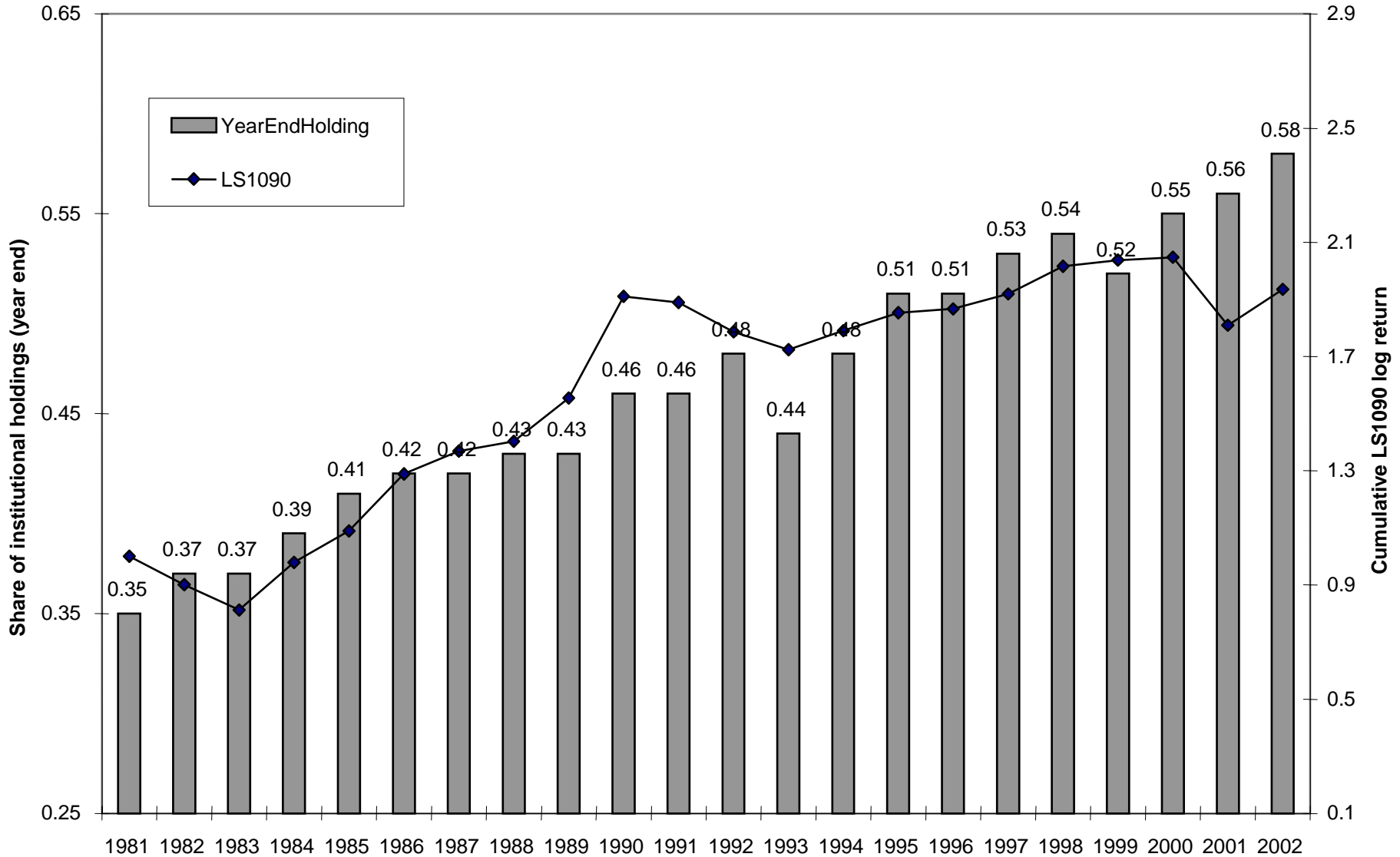
Sources of underperformance?

- Are return differences driven by differences in size and value?
 - *No: Underperformance of distressed stocks is present in all size and value quintiles*
 - *It is strongest in small stocks and growth stocks*
- Are negative returns to distressed stocks clustered around news events?
 - *No: We do not find negative excess returns on distressed stocks around earnings announcements*

Institutional holdings and returns

- The distress anomaly may result from the preferences of institutional investors
- If institutions prefer to hold safe stocks and sell stocks that enter financial distress we may observe underperformance of distressed stocks
 - *Returns to safe relative to distressed stocks are high when institutional holdings have large increases*
 - *The correlation of the return to the long-short portfolio and the change in holdings is 31%*

Institutional holdings and returns



Conclusions

- Failures can best be predicted using a reduced-form econometric model
- Distance to default does well given its tight theoretical structure, but does not capture all relevant data
- Distressed stocks have risk characteristics that normally imply high returns
- Yet they have delivered low average returns in 1981-2003
- The effect is present in all size and value quintiles and is not concentrated around earnings announcements

Conclusions

- It is hard to imagine a risk-based story that will explain this finding
- It may be an anomaly that will be corrected once widely understood
- It may also be a transitional effect of the shift to institutional investing, combined with institutions' preferences for safe stocks