Institutional Finance

Merger Arbitrage

February 28th, 2006

(based on slides by Coval and Stafford)

Merger Arbitrage

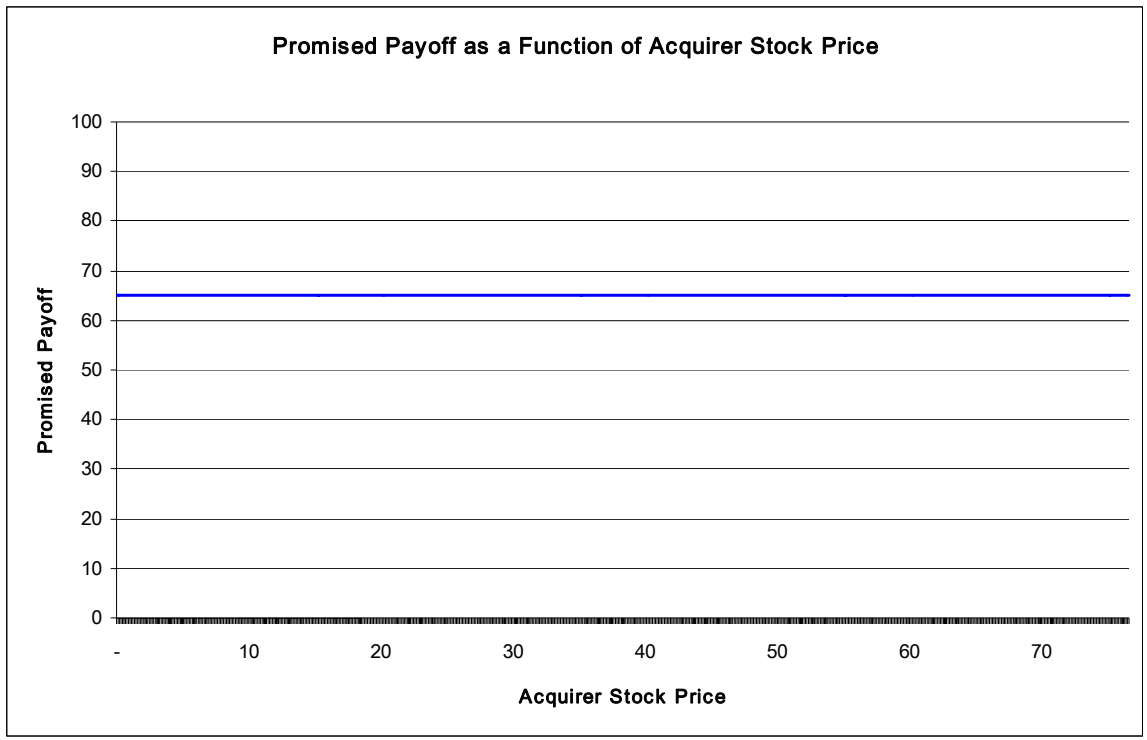
- Returns are generated by isolating and bearing deal risk
- Risky application of the Law of One Price
  - Conditional on deal success, there is a perfect substitute
  - If the deal fails, there is no opportunity

Isolating Deal Risk

- Cash merger
  - Buy target and wait
- Fixed-exchange ratio stock
  - Buy target
  - Short acquirer immediately
- Floating-exchange ratio stock
  - Buy target
  - Short acquirer during pricing period (not immediately)
- Collar stock merger
  - Buy target
  - Delta hedge acquirer stock

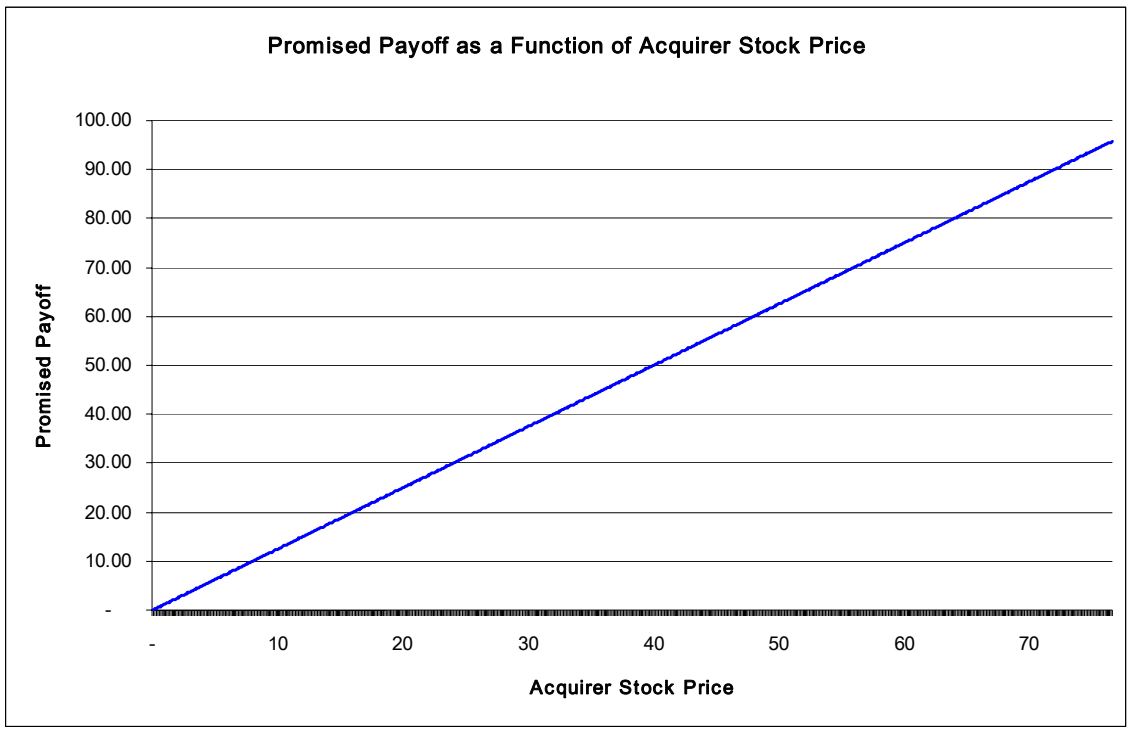
Cash Deal

- Promised Payoff = $65
  - Payoff is independent of acquirer stock price
  - Buy target
  - Do not take a position in the acquirer



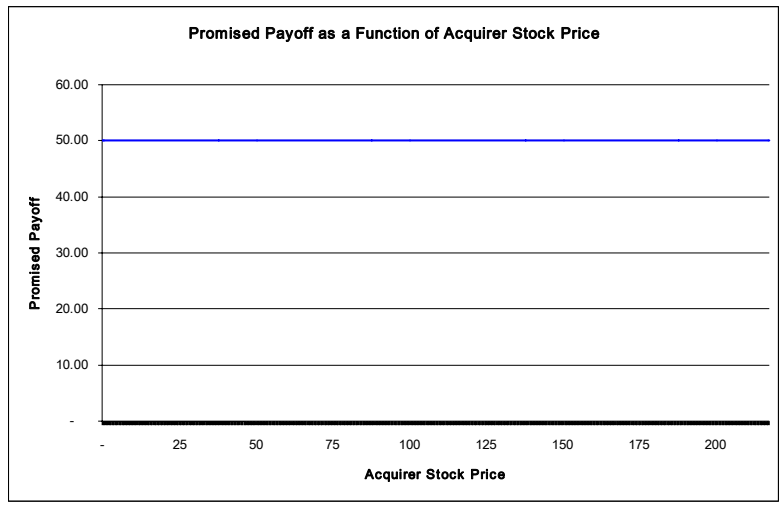
Fixed-Exchange Ratio

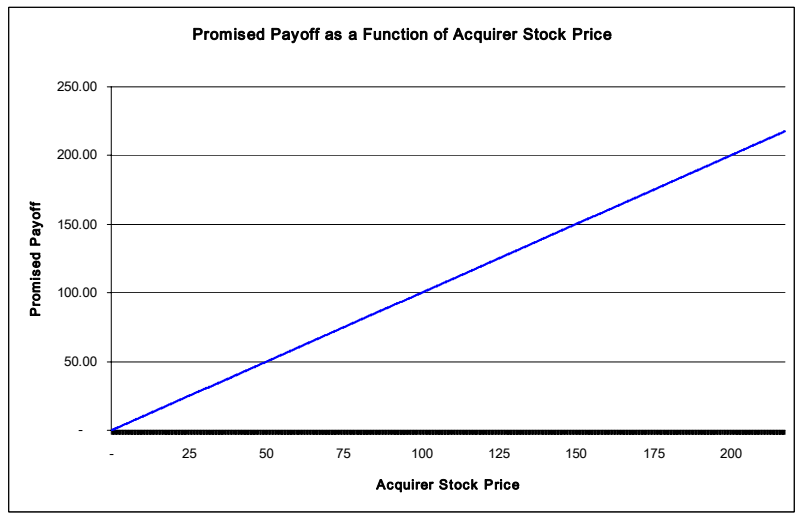
- Promised Payoff = 1.25 shares x $P_{Acquirer}$
  - Buy 1 share of target
  - Short sell 1.25 acquirer shares



Floating-Exchange Ratio

- Promised Payoff = $50 worth of acquirer shares, based on average price over a pricing period
  - Initially, just like a cash deal
  - After pricing period, just like a fixed-exchange ratio deal
  - Buy target
  - No initial position in acquirer
  - Short sell acquirer during the pricing period





Floating-Exchange Ratio Hedge

P_A = $40.00
P_T = $19.50

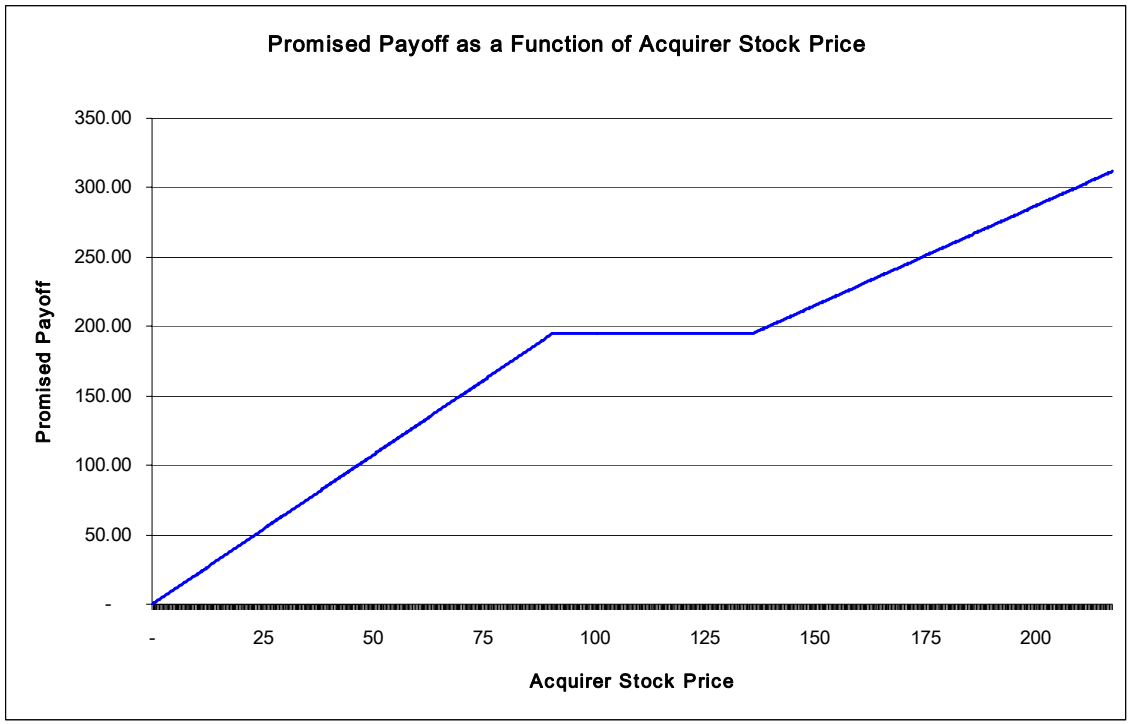
Strategy A (Immediate Hedge):
Short 0.5 acq. shares today

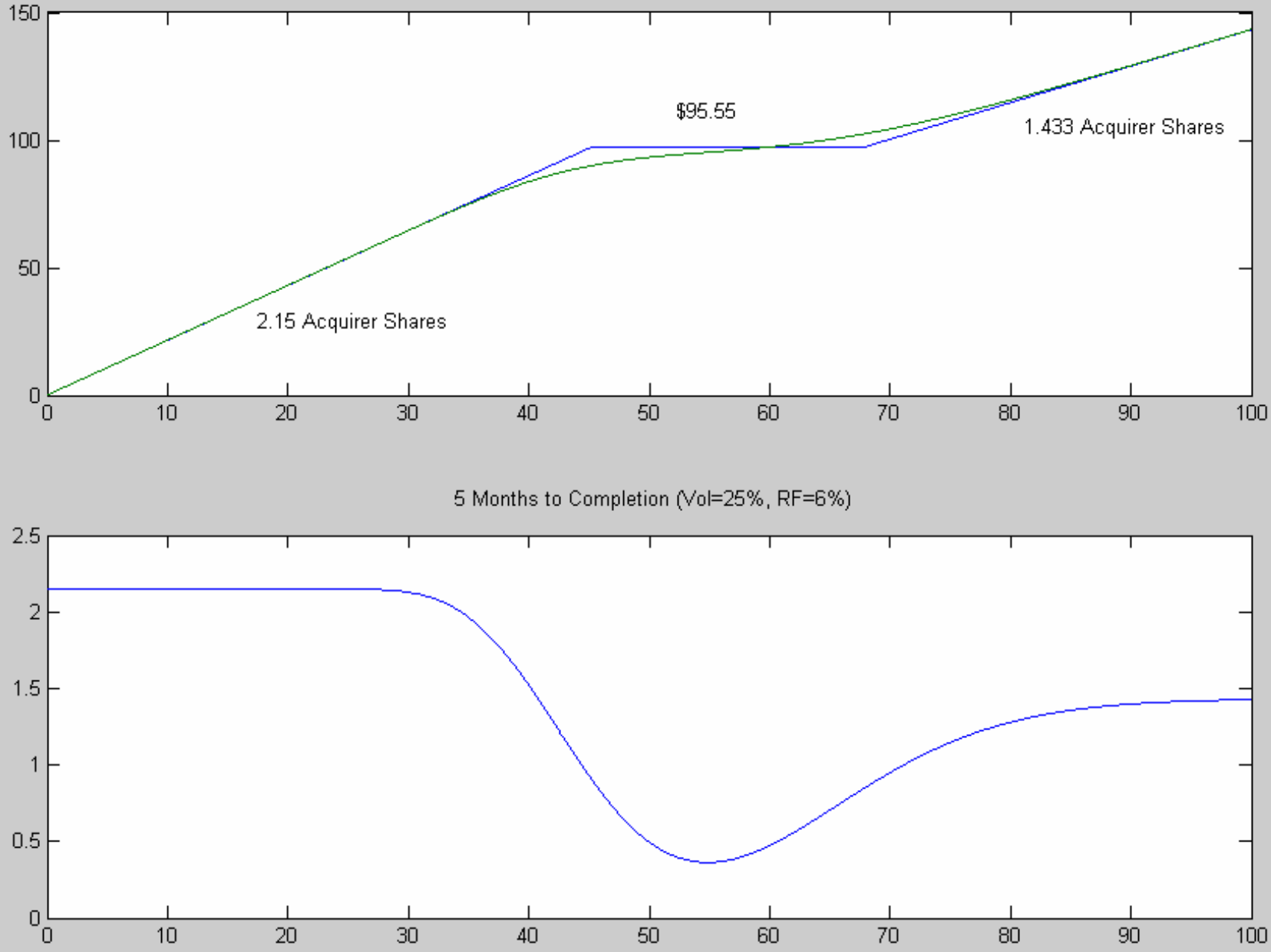
Strategy B (Late Hedge):
Short $20/$P_A$ shares during pricing period

	P_{AVG} = $20	P_{AVG} = $80
Strategy A	Profit = $20.00-$19.50 +(0.5)($40.00 - $20.00) = **$10.50**	Profit = $20.00-$19.50 +(0.5)($40.00-$80.00) = **-$19.50**
Strategy B	Profit = $20.00-$19.50 +($20/$20)($20.00 - $20.00) = **$0.50**	Profit = $20.00-$19.50 +($20/$80)($80.00-$80.00) = **$0.50**

Collar Deal

- Promised Payoff
  - $P_{Acquirer} < \$90.74$: 1 target = 2.15 acquirer
  - $\$90.74 < P_{Acquirer} < \$136.14$: 1 target = $195.10
  - $P_{Acquirer} > \$136.14$: 1 target = 1.433 acquirer




150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
$95.55
1.433 Acquirer Shares
2.15 Acquirer Shares
5 Months to Completion (Vol=25%, RF=6%)
2.5
2
1.5
1
0.5
0

Merger Arbitrage Portfolios

- Managers tell you the strategy comes down to figuring out which deals are going to blow-up
- Ask them the following:
  - How many deals are out there?
  - How many are in your portfolio?
  - What is your maximum weight?

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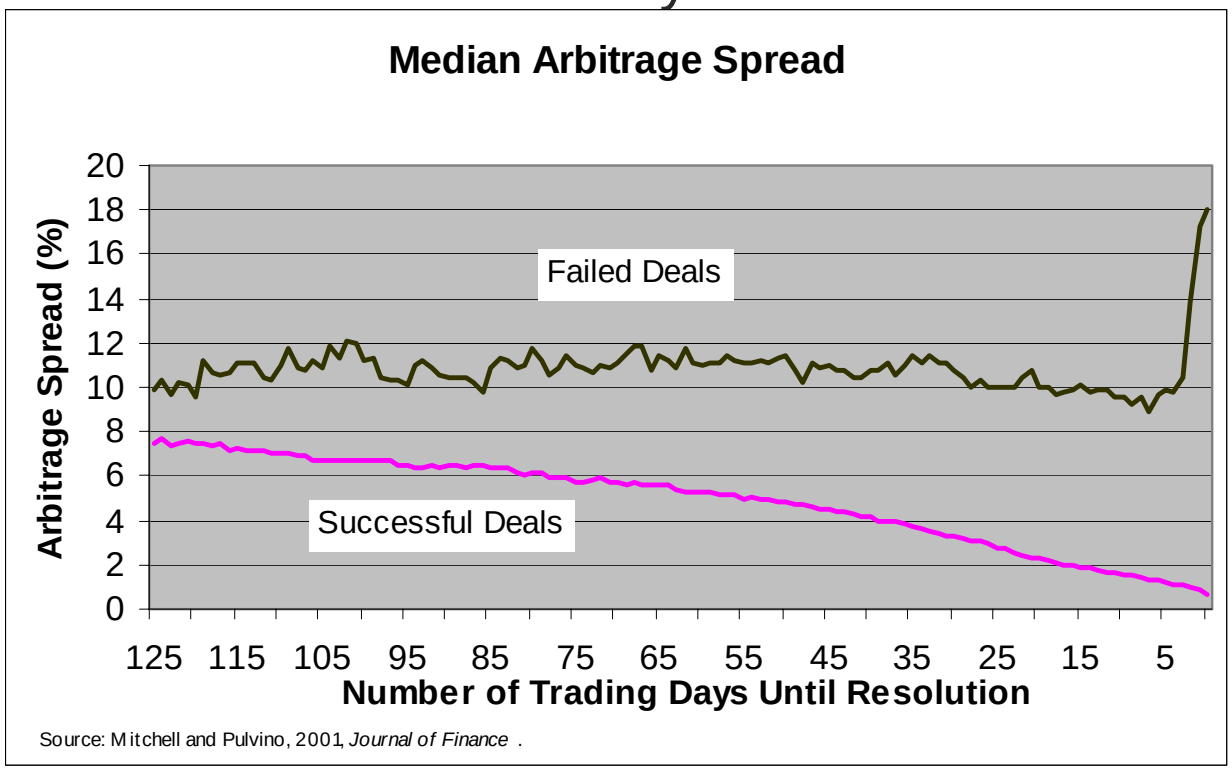
  - What is your maximum weight?
    - **About 2%**

Which Deals Blow-Up?

- Deals with big spreads!
- Market distinguishes good and bad deals, *ex ante*
  - About 10% of all deals fail
- Hostile deals are more likely to fail



Historical Performance

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD	RF	Excess
2005	-0.03	0.72	0.12	-1.42	1.62	1.14	1.12	0.74	0.69	-0.48			4.26	2.06	2.20
2004	1.02	0.59	0.07	-0.85	-0.14	0.32	-1.02	0.2	0.59	0.54	1.62	1.1	4.08	1.19	2.89
2003	0.15	-0.01	-0.1	1.29	1.76	0.43	0.71	0.69	0.63	0.72	0.29	0.69	7.47	1.02	6.45
2002	0.86	-0.36	0.56	-0.04	-0.25	-1.23	-1.9	0.5	-0.44	0.36	0.59	0.52	-0.87	1.63	-2.50
2001	1.1	0.44	-0.75	0.23	1.69	-0.84	0.93	0.87	-2.72	0.84	0.23	0.78	2.76	3.86	-1.10
2000	1.63	1.88	0.82	2.47	1.51	1.58	1.19	1.34	1.44	0.48	1.2	1.16	18.02	5.88	12.14
1999	0.71	0.25	1.05	1.31	2.04	1.61	1.38	0.52	1.25	0.69	2.23	0.46	14.34	4.69	9.65
1998	0.96	1.89	1.05	1.59	-0.6	0.5	-0.57	-5.69	1.74	2.14	2.33	1.94	7.23	4.85	2.38
1997	1.04	0.39	1.05	-0.7	1.92	2.13	1.6	1.04	2.13	0.84	2.02	1.9	16.44	5.25	11.19
1996	1.57	1.29	1.51	1.62	1.46	0.78	0.81	1.64	0.81	1.23	1.38	1.37	16.61	5.20	11.41
1995	0.86	1.45	1.49	0.35	1.26	2.47	1.35	1.35	1.63	0.91	2.13	1.31	17.86	5.60	12.26
1994	1.5	-0.41	1.37	-0.25	1.22	0.89	0.68	1.99	0.59	-0.26	-0.22	1.48	8.88	3.91	4.97
1993	2.12	1.64	0.49	1.3	1.17	2.25	1.54	1.67	1.85	2.05	0.86	1.65	20.24	2.90	17.34
1992	1.96	0.96	1.34	0.14	0	0.3	1.45	0.12	1.34	0.4	-2.22	1.91	7.9	3.50	4.40
1991	0.01	1.59	2.3	2.83	1.55	1.12	1.44	0.64	1.1	1.41	1.38	1.2	17.86	5.60	12.26
1990	-6.46	1.71	2.9	0.98	2.28	0.73	0.02	-0.82	-4.58	0.73	2.19	1.21	0.44	7.84	-7.40

Mean	10.22	4.06	6.16
Std	7.05	1.92	6.62
Sharpe			0.93

Source: Hedge Fund Research Inc. - © 2005 HFR Inc. - www.hedgefundresearch.com

Distribution of Monthly Returns

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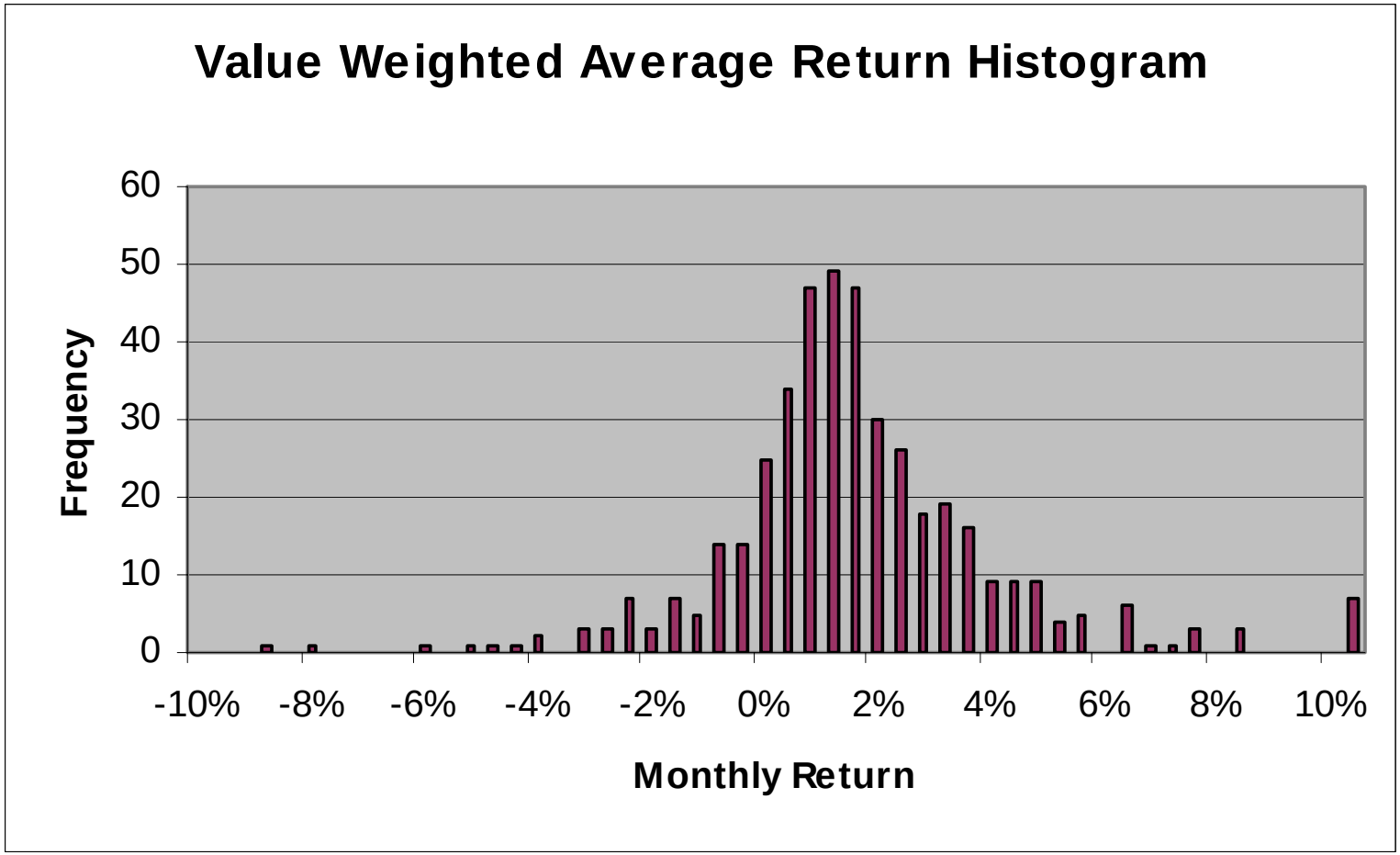


Distribution has “Thick Tails”

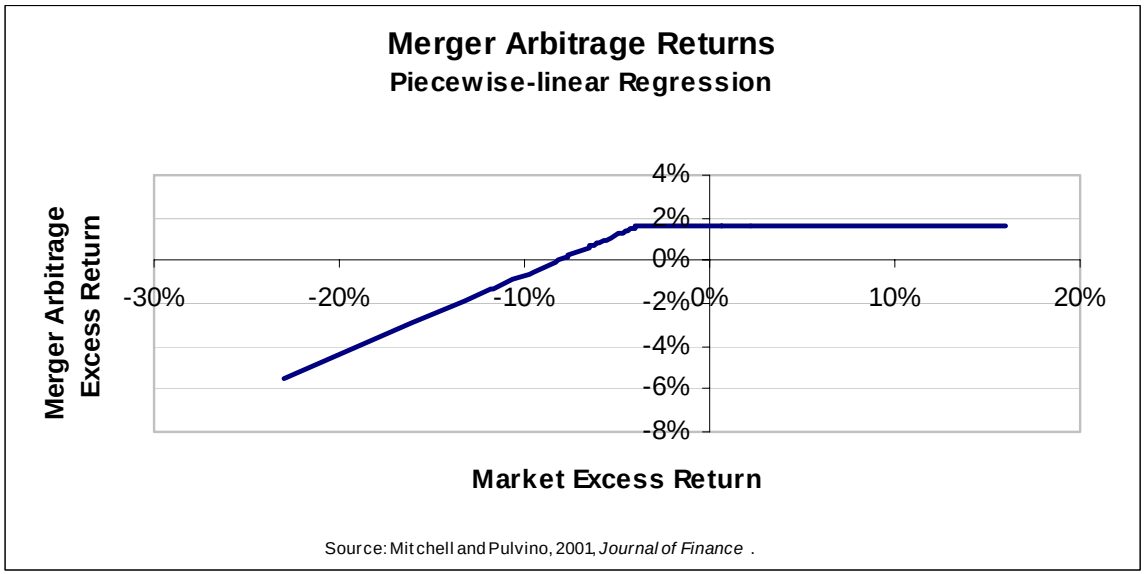
- 2 Types of Shocks
  - Bidding contests are great news
    - Higher than expected payoffs for target shares
    - Tend to be idiosyncratic
    - Recently, few of these
  - Failures are bad news
    - Very negative returns on failed deals
    - Tend to be correlated with the market (and each other)
    - Recently, lots of these

Appropriate discount rate?

- If deal risk is idiosyncratic
  - Rf is appropriate rate to compensate for time
- If deal risk is systematic
  - Additional compensation is required

Market Risk in Merger Arbitrage

- Merger arbitrage returns are largely uncorrelated with the market in neutral and bull markets. However, correlations increase significantly in bear markets



Evaluating Portfolios (& Managers)

- Beta is different in up and down markets
- Cannot use standard methods to evaluate risk arbitrage performance
  - Linear asset pricing models do not apply
  - “Alpha” may not reflect excess return
- Risk Arbitrage is like selling out-of-the-money index put options

Is Merger Arb Dead?

- Simple, entry-level strategy
- Capital tends to chase performance
  - Lots of money flowed into strategy over the past 5 years
- Recent returns have been modest

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- But, providing a service
  - Offering liquidity to target shareholders

Merger Arbitrage Today

- Definitely more competitive
- Expected excess returns of 2% - 4%
  - Rf = 4%
  - $E[R_{MA}]$ = 6% - 8%
- Recent performance has been heavily influenced by an unusual number of bad outcomes (deal failures)
- Currently, few bidding wars (positive shocks)
  - Merger activity is highly cyclical
- Recent entry by several quantitative funds
- Many merger arbs have expanded into other asset classes (convertible bonds, credit)
  - Can create problems for investors who already have exposure