

Leverage and Pricing in Buyouts: An Empirical Analysis

Ulf Axelson

Stockholm School of Economics and SIFR

Tim Jenkinson

Oxford University and CEPR

Per Strömberg

Stockholm School of Economics, SIFR, CEPR and NBER

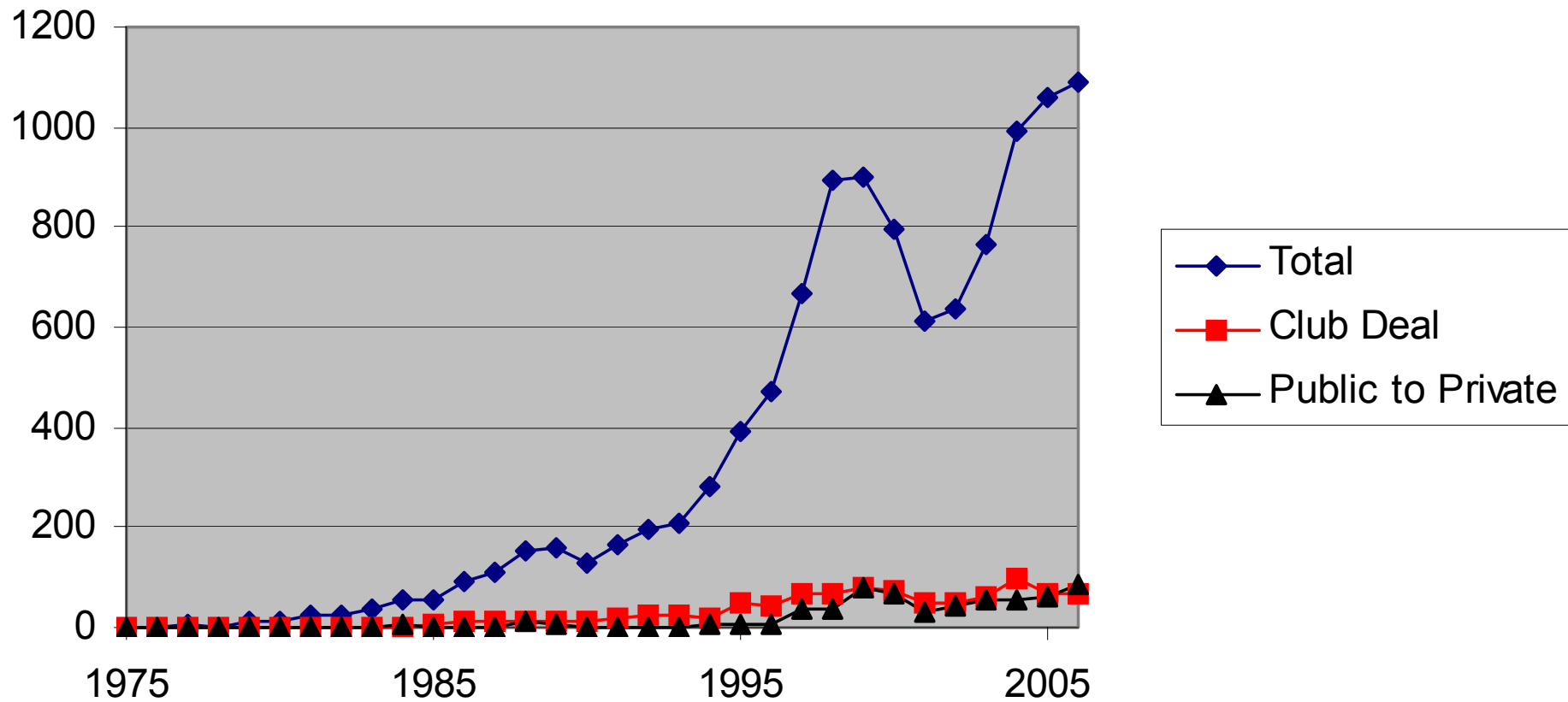
Michael S. Weisbach

University of Illinois and NBER

Facts about the leveraged buyout industry

- PE fund acquires firm, public or private
 - Equity from own fund capital ($\approx 25\%$)
 - Borrow rest ($\approx 75\%$)
- Fund holds firm for 2-10 years, then exit
- LBO transactions values reached around \$400 billion worldwide in 2006

LBO transactions 1975-2005

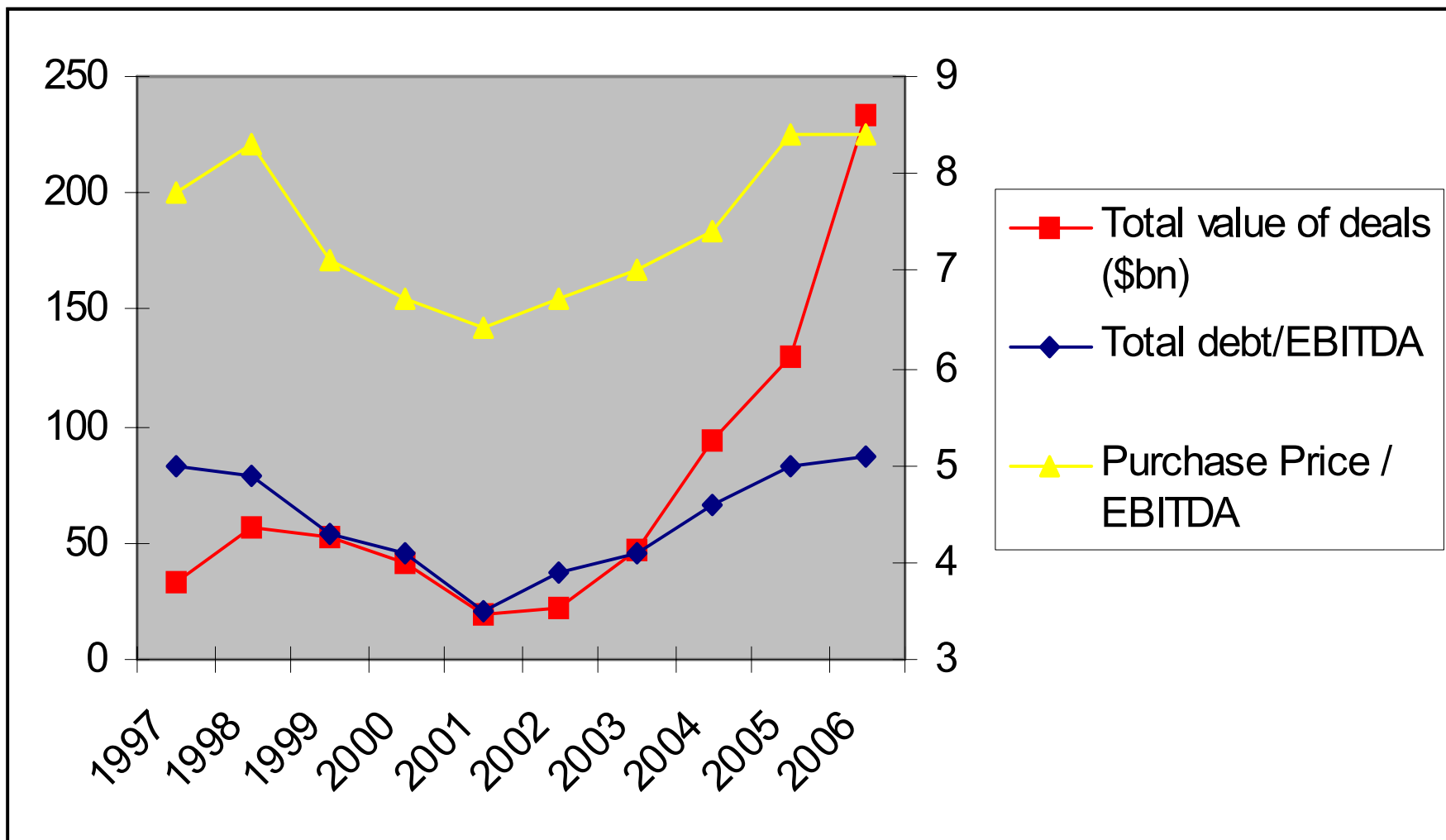


■ Data source: Capital IQ

the paper has 3 goals

- describe the financial structure of LBO deals
 - using novel data set
 - beyond U.S. Public-to-Private deals
- understand the cross-sectional determinants of capital structure
 - relate leverage in LBOs to leverage in public firms
 - how do LBO funds “optimize” their capital structure?
- understand the relation between leverage and transaction prices
 - does leverage “drive” the buyout market?
 - implications for July 2007 “Credit Crisis”?

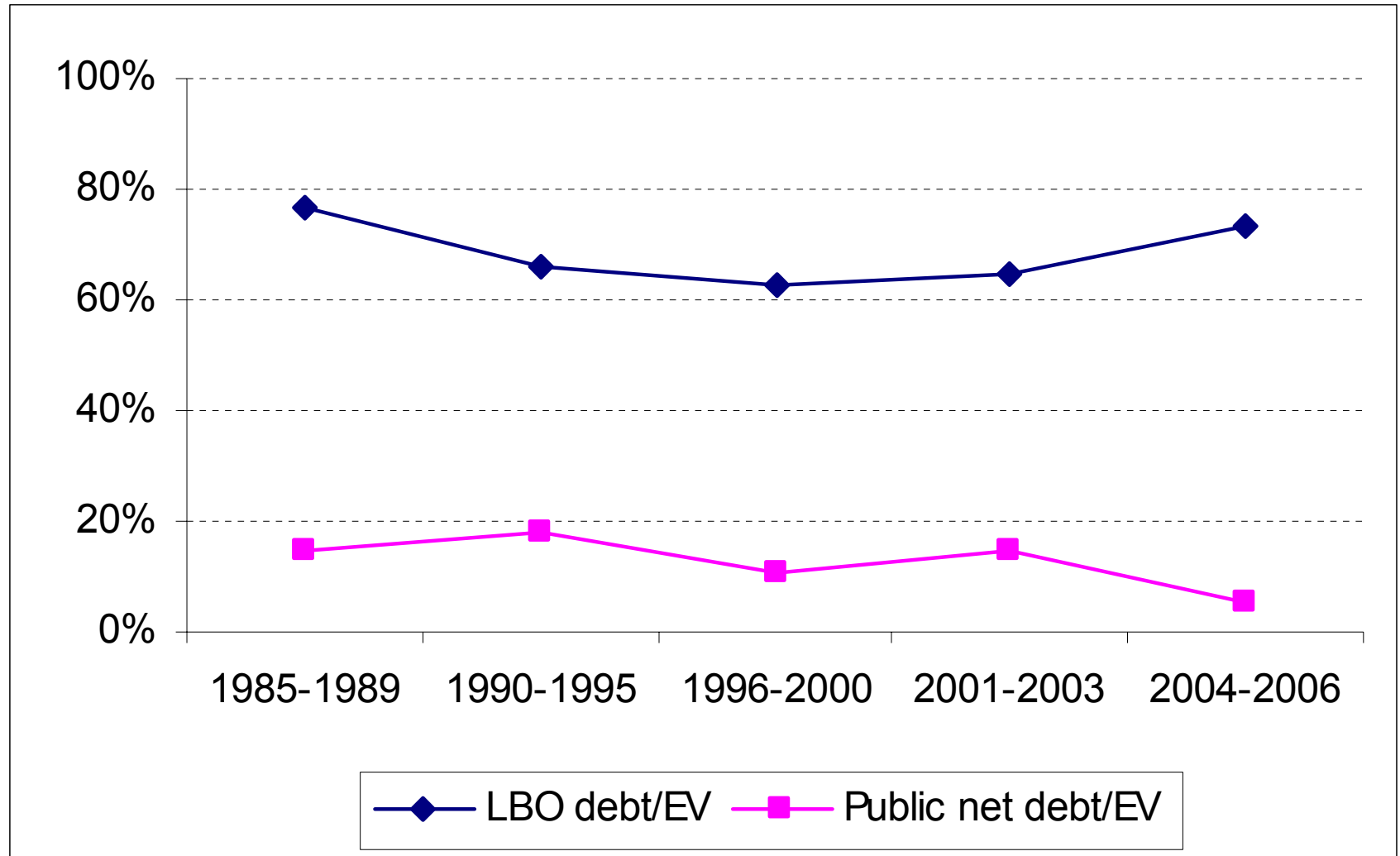
leverage, pricing, and LBO activity comove



This figure is based on US from Table 2, Panel B of the paper.

Source: S&P Leveraged Buyout Review, 2006 Q4 and own calculations

leverage in LBOs and public companies are unrelated



LBOs and leverage: View 1:

- **Capital structure in LBOs more likely to be optimal**
 - LBO sponsors are well-informed, value-maximizing principals
 - Measure leverage at time of LBO deal, when it is actively chosen
 - Caveat: May be temporary capital structure
- ➔ Cross-section of LBOs good place to test trade-off and pecking order theory
- Or less standard theories, like arbitraging mispricing in debt/equity markets

LBOs and leverage: View 2

- **GP – LP agency problems drive leverage in LBOs**
(Axelson, Strömberg & Weisbach (2007))
 - Access to credit crucial for buyout funds - LBOs cannot fund their acquisitions only with fund equity
 - Compensation structure may bias GP incentives
 - 20% “carry” is like an option
- ➔ When access to credit “too easy”, overleverage and overpricing may result

our data

- data is a huge challenge
- we are building up deal-level data on financial structure of 153 deals from 5 large LBO firms 1985 – 2006
 - **deal types:** Public-to-Private (16%), Independent Private (21%), Divisional (50%), Secondary (13%)
 - **countries:** 78 USA or Canada, 72 Europe, 3 rest of world (15 countries total)
 - **industries:** from 20 of the (48) Fama-French industries
 - **size and biases:** we are actively working to expand the sample, there is currently a bias to larger deals and more successful PE houses
- data sources:
 - **LBO deals** from CapitalIQ
 - **leverage** information from LPC Dealscan
 - **private company financials:** Amadeus and Edgar
 - **public company financials:** Worldscope and Datastream

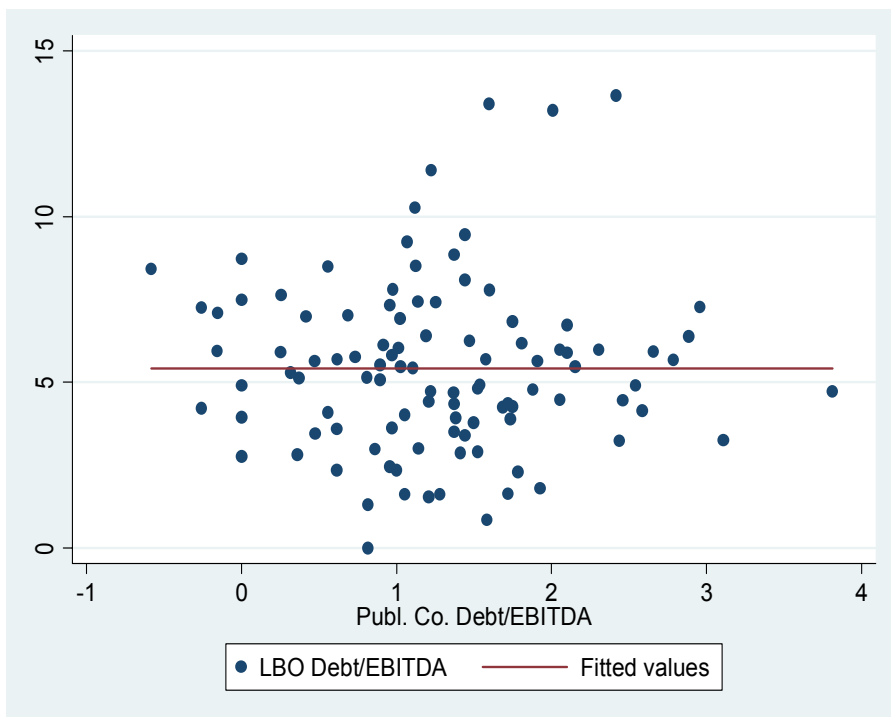
the sort of data we have – the 2005 Kwik-Fit LBO

	Amount (£m)	Terms	Pricing (spread over LIBOR)	Multiple of EBITDA
Enterprise Value	773.5			8.1 x
Equity	191.0 (25%)			2.0 x
Debt				
Term Loan A	140	7 year amortizing	2.25%	
Term Loan B	135	8 year bullet	2.50%	
Term Loan C	135	9 year bullet	3.00%	
<i>Total Senior Debt</i>	<i>410.0</i>			<i>4.3 x</i>
2 nd Lien	75	9.5 year	5.00%	
Mezzanine	97.5	10 year	4.5% + 5% PIK	
Total Debt	582.5 (75%)			6.1 x
Revolving credit facility	40	7 year	2.25%	
Capex facility	50	7 year	2.25%	

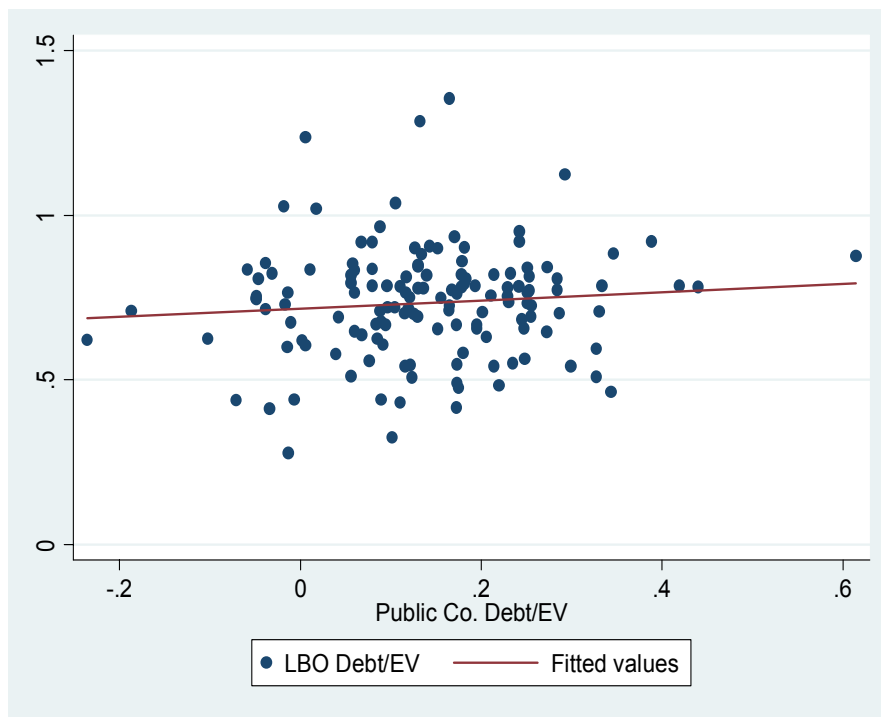
LBO vs. public matched leverage

First exercise: Does the cross-section of leverage in LBOs line up with cross-section of leverage in public matches?

LBOs are matched by industry, continent and year, and median leverage compared



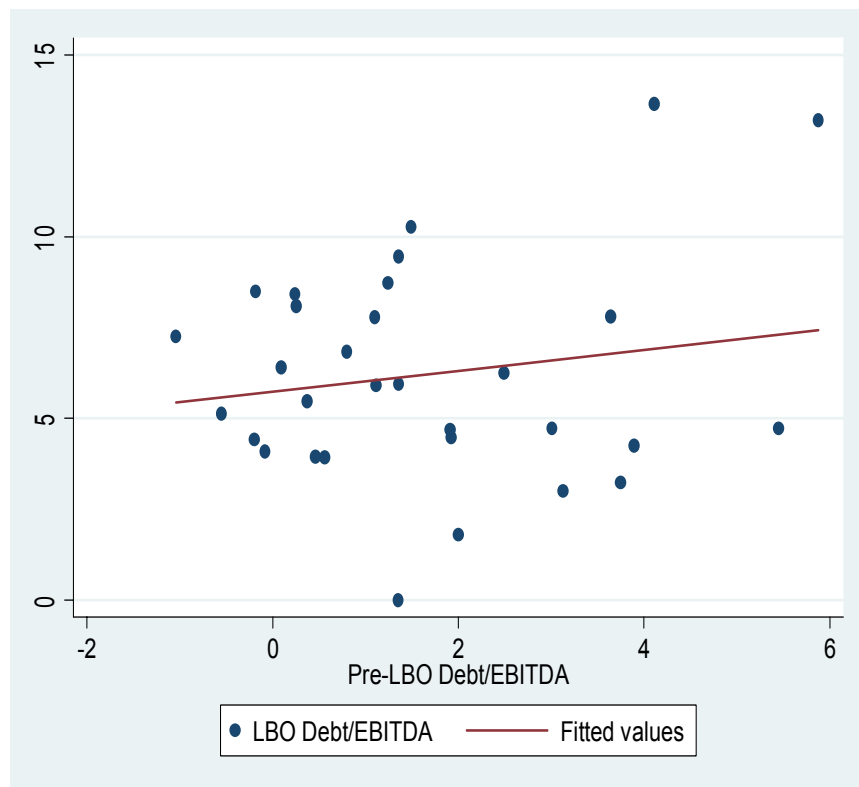
D/EBITDA: slope = -0.002 t = -0.01



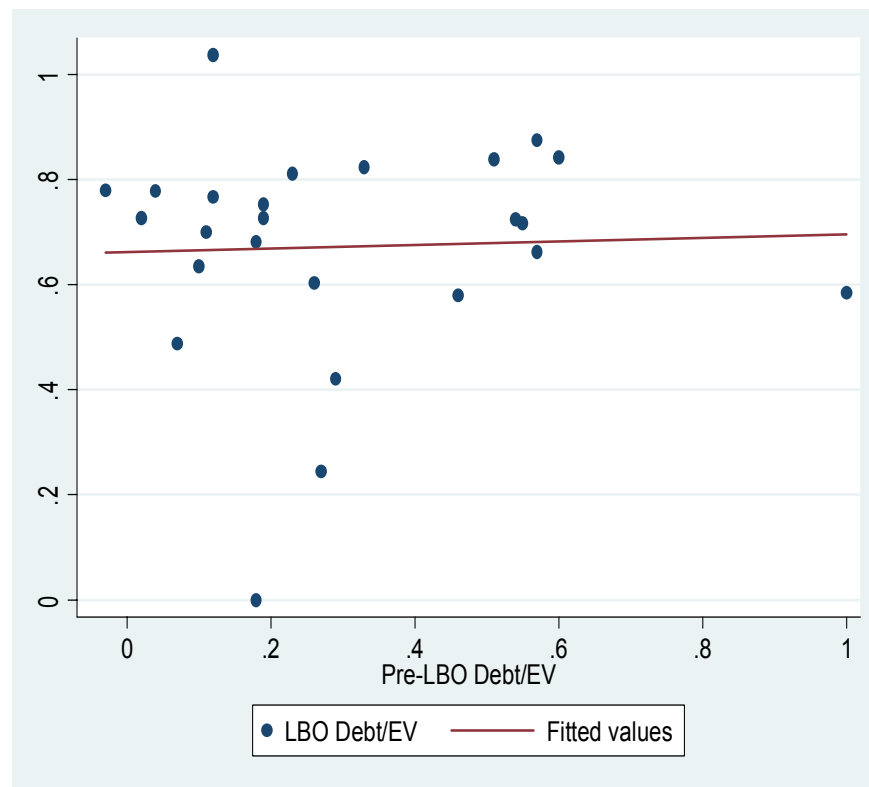
D/EV: slope = 0.18 t = 1.50

LBO vs. pre-LBO leverage

What if LBO firms are different from industry median? Look at LBO leverage compared with pre-LBO: small sample of 28 public-to-private deals – no relation



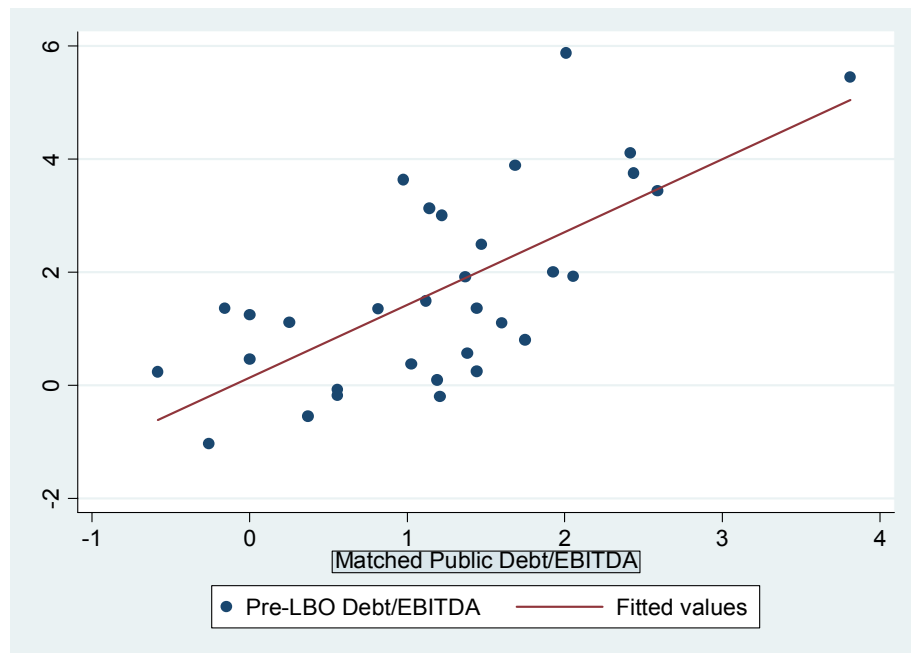
D/EBITDA: slope = 0.29 t = 0.73



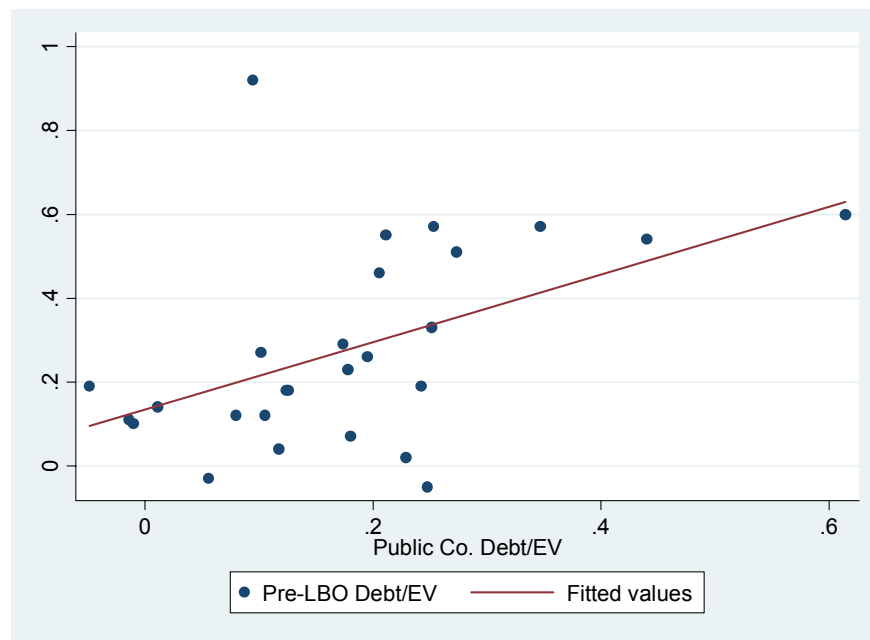
D/EV: slope = 0.03 t = 0.27

pre-LBO vs public firm match

And compare these pre-LBO firms with their public firm matches – highly related



D/EBITDA: Slope = 1.28 $t = 7.0$



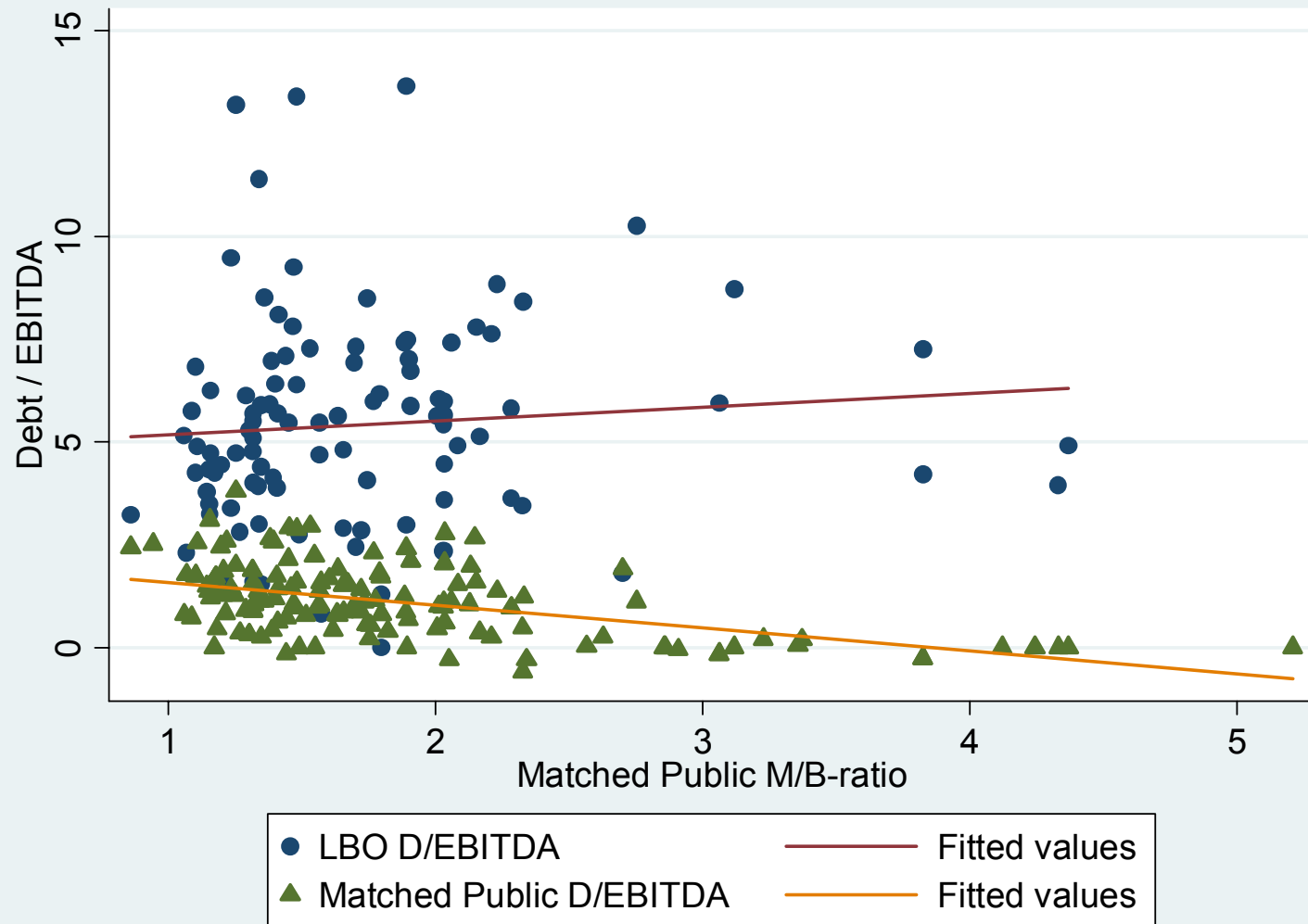
D/EV: slope = 0.91 $t = 6.2$

These, and other, comparisons suggest the sample is not unrepresentative and the results are not being driven by bad matching

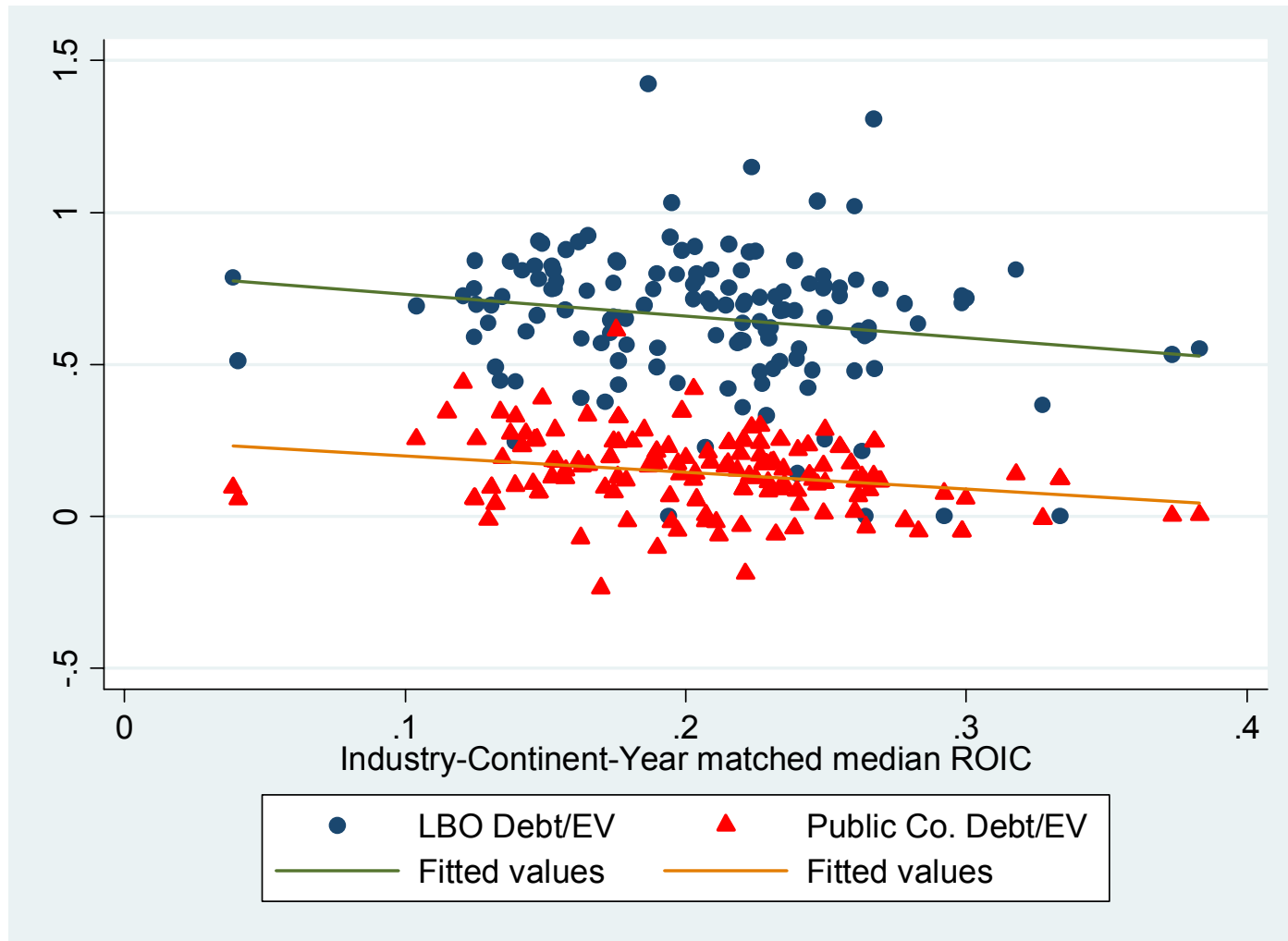
standard determinants of leverage

- trade-off theory
 - PV (tax benefits)
 - tax rates + ; profitability +
 - PV (costs of financial distress)
 - Pr(FD): Volatility of CF +
 - C(FD): growth/investment opp's + ; specific assets +
- pecking order
 - past profits decrease leverage – but not likely to be relevant to initial capital structure at time of transaction
- these standard determinants work reasonably well for the public matches
- but not much evidence that LBO choice of leverage is driven by trade-off considerations
- although empirical proxies for trade-off theory could be flawed – an area we will continue to focus on

leverage vs. market/book ratio

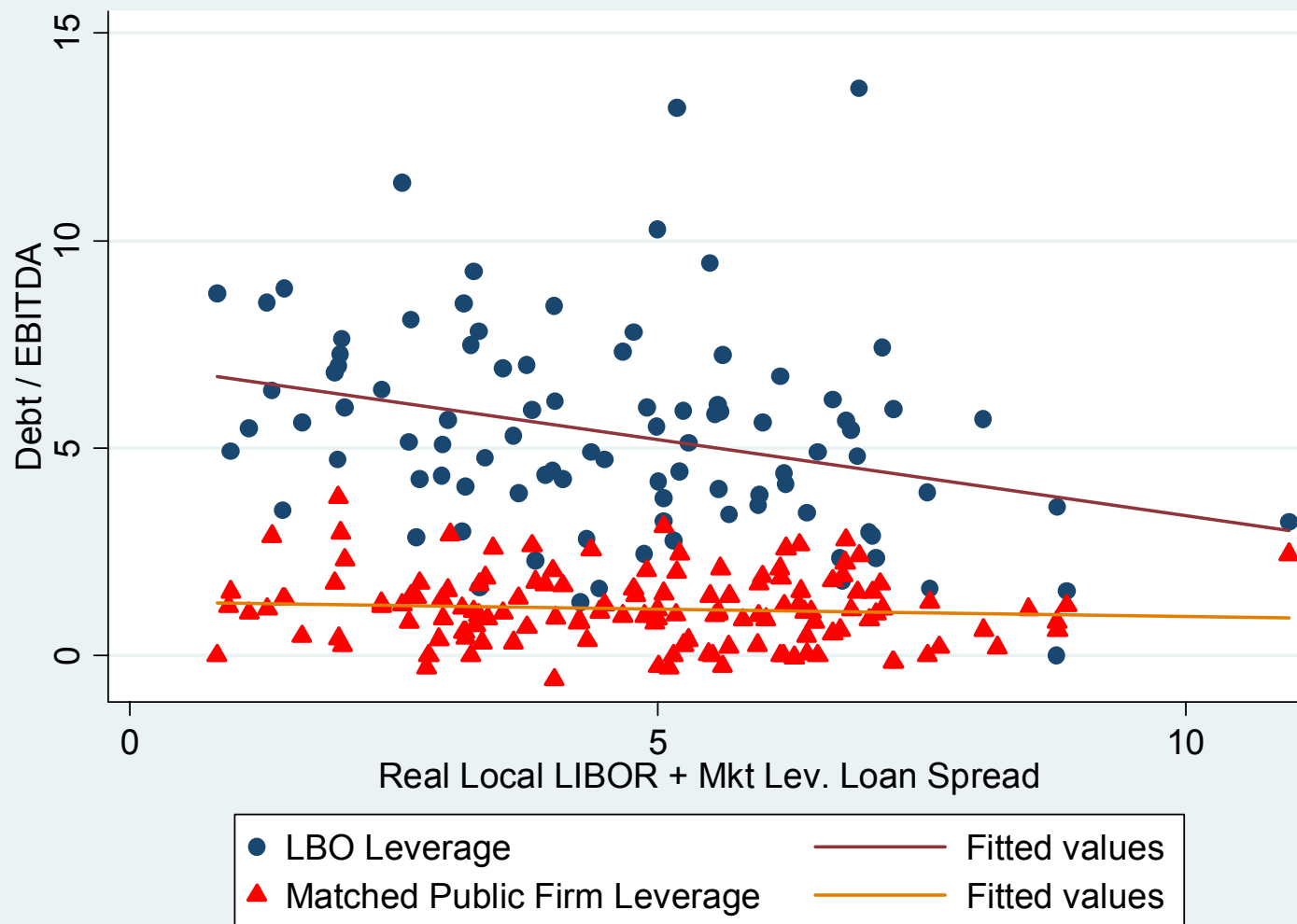


Leverage vs. Profitability of industry



is leverage influenced by debt mkt conditions?

Our main measure for interest rates is local LIBOR + market blended leveraged loan spread – local inflation (12 month ahead)



LBO & public leverage

	LBO D/EV	LBO Log D/EBITDA	Public Match D/EV	Public Match Log D/EBITDA	LBO D/EV	LBO Log D/EBITDA
Public Co. Debt/EV	0.19 [0.13]					
Public Co. Ln Debt/EBITDA		0.01 [0.07]				
Industry-Continent-Year matched median ROIC			-0.39*** [0.13]	-8.02*** [1.02]	-0.56 [0.40]	-1.9 [1.41]
ICY EV/BV			-0.05*** [0.01]	-0.36*** [0.12]	-0.01 [0.04]	0.18* [0.10]
Industry stdev ROIC			-0.46*** [0.09]	-3.34*** [0.74]	-0.05 [0.24]	-0.16 [0.58]
ICY R&D/Sales			-1.05*** [0.32]	-24.89*** [4.29]	-0.5 [0.84]	-0.05 [1.76]
Corp. tax rate			0.002 [0.001]	0.02*** [0.01]	0.00 [0.01]	-0.02* [0.01]
Local stock market TTM return			0.019 [0.036]	0.12 [0.16]	-0.03 [0.09]	0.17 [0.20]
Libor + Lev. Loan spread			0.00 [0.00]	0.02 [0.02]	-0.007 [0.013]	-0.07*** [0.03]
Inflation rate			0.01 [0.01]	0.00 [0.05]	0.04 [0.03]	0.03 [0.06]
Constant	0.63*** [0.03]	1.56*** [0.06]	0.38*** [0.06]	2.48*** [0.37]	0.70** [0.28]	2.66*** [0.51]
Observations	139	92	133	116	122	93
R-squared	0.01	0	0.61	0.65	0.08	0.2

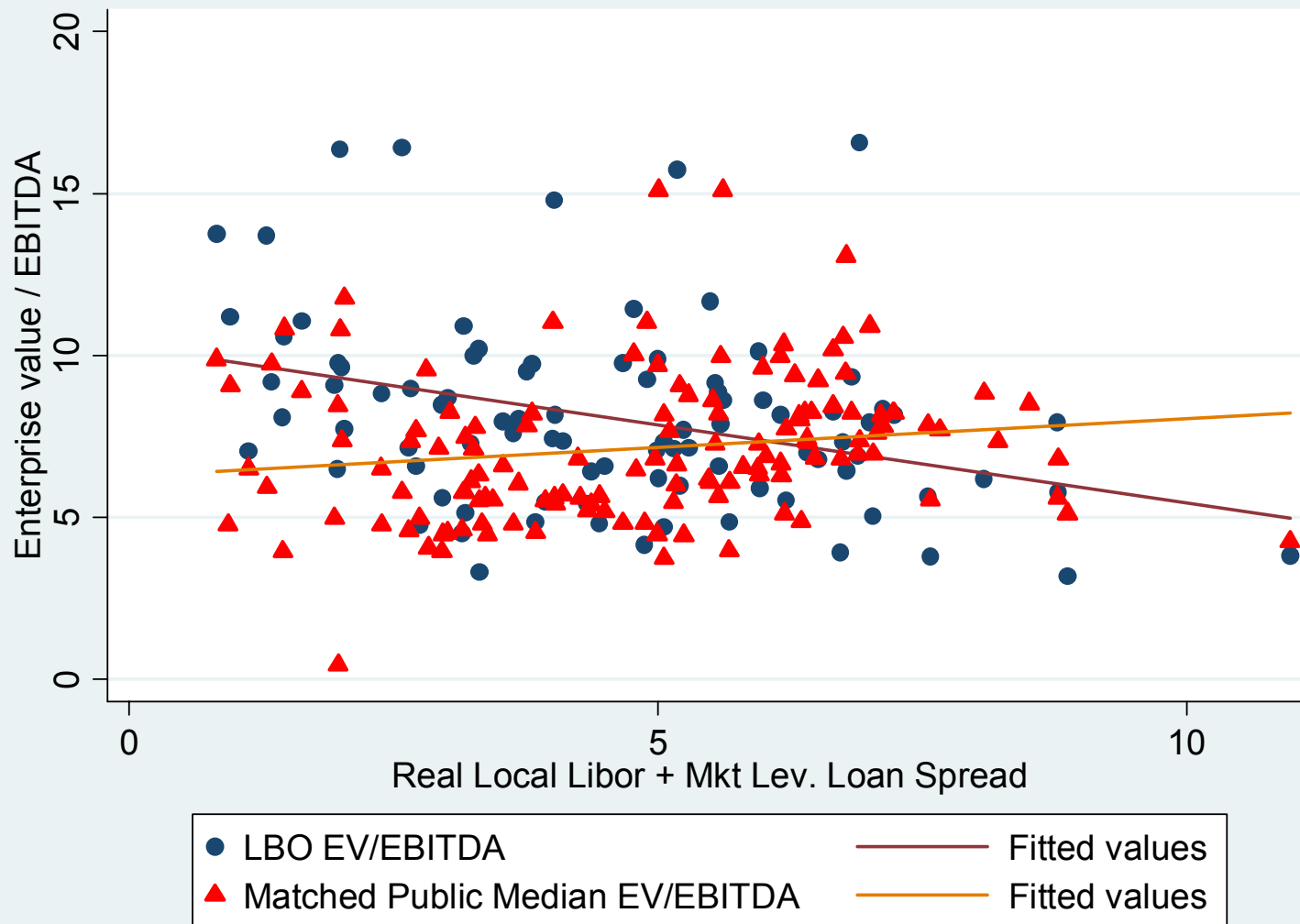
LBO leverage: fund and target controls

	LBO Log		LBO Log	
	LBO D/EV	D/EBITDA	LBO D/EV	D/EBITDA
ICY matched median ROIC	-0.52			
	[0.34]			
ICY EV/BV		0.09	-0.01	0.1
		[0.06]	[0.03]	[0.07]
Libor + Lev. Loan spread	-0.007	-0.07***	-0.01	-0.08**
	[0.010]	[0.02]	[0.01]	[0.03]
Inflation rate	0.03	0.06	0.02	0.07
	[0.02]	[0.05]	[0.03]	[0.06]
Public to Private	0.12*	0.12		
	[0.06]	[0.14]		
Divisional	0.10*	-0.06		
	[0.06]	[0.11]		
Secondary	0.09	-0.04		
	[0.06]	[0.13]		
Club deal	-0.01	0.03		
	[0.04]	[0.10]		
Aggregate LBO fund overhang			-0.33*	-0.06
			[0.19]	[0.51]
Number of prev. funds			0.01	0.04*
			[0.01]	[0.02]
Years since last fund			0.02	0
			[0.02]	[0.05]
Constant	0.65***	1.61***	0.61***	1.32***
	[0.11]	[0.18]	[0.15]	[0.34]
Observations	124	94	114	86
R-squared	0.1	0.17	0.07	0.17

leverage and valuation

- do credit conditions also affect the price paid in the deal?
- we control for public company valuation multiples, and fund specific variables (such as club deal, extent of overhang of committed capital, when transaction occurred in fund lifecycle etc.)

valuations and market interest rates



valuations: initial regressions

	LBO Log EV/EBITDA	LBO Log EV/EBITDA	LBO Log EV/EBITDA	LBO Log EV/EBITDA	Public Log EV/EBITDA
Public Co. Ln EV/EBITDA	0.35*** [0.10]	0.36*** [0.09]	0.33*** [0.10]	0.31** [0.14]	
Local stock market TTM return		0,09 [0.14]	0,01 [0.15]	0,06 [0.16]	0.20* [0.11]
Libor + Lev. Loan spread		-0.07*** [0.02]	-0.06*** [0.01]	-0.06** [0.02]	0.03* [0.02]
Inflation rate		0,01 [0.04]	0 [0.04]	0,03 [0.05]	0,05 [0.04]
Public to Private			0,04 [0.11]		
Aggregate LBO fund overhang				0,07 [0.46]	
Number of prev. funds				0,02 [0.02]	
Years since last fund				-0,005 [0.038]	
Divisional			-0,14 [0.09]		
Secondary			-0,037 [0.113]		
Club deal			0,00 [0.08]		
Constant	1.36*** [0.21]	1.60*** [0.21]	1.74*** [0.24]	1.512*** [0.312]	1.66*** [0.14]
Observations	97	90	90	81	134
R-squared	0,1	0,25	0,3	0,23	0,06

conclusion? (at least) 3 possible stories

1. APV story:

- lower interest rates affect cost of debt and equity similarly
- EV/EBITDA goes up because discount rate goes down.
- D/EBITDA goes up because more debt is needed to hit target interest coverage.

Problems for the APV story:

- EV/EBITDA of public firms should also go up.
- interest effect on EV/EBITDA on LBOs persists after controlling for public valuations

2. mis-priced debt, or market-timing, story

- if there are limits to arbitrage between debt and equity market, debt can become “too cheap”
- then, value only impacted to the extent the firm takes new debt (LBO)

➔ this should help LPs

➔ but why do public firms not react and add leverage?

3. agency story

- when interest rates go down, GP can lever up more without going bust

➔ increases value of carry

➔ increases amount that GP is willing to pay for target companies

➔ this should hurt LPs

can we separate the stories?

- both the market timing and agency stories work purely through leverage – interest rate does not necessarily have direct impact on valuation
- look only at impact of interest rates on valuation that goes through leverage

valuation: initial IV estimates

	IV	First Stage
	LBO Log EV/EBITDA	LBO Log D/EBITDA
LBO Ln Debt/EBITDA	0.89***	
	[0.16]	
Public Co. Ln EV/EBITDA	0,03	
	[0.11]	
Libor + Lev. Loan spread		-0.06***
		[0.02]
Inflation rate		0.0838*
		[0.0428]
Constant	0.54***	1.68***
	[0.20]	[0.15]
Observations	89	93
R-squared	0,56	0,11
Robust standard errors in brackets		
*** p<0.01, ** p<0.05, * p<0.1		

conclusions

- LBO firms use complex financial structures
- the determinants of leverage appear very different between public firms and LBOs:
 - unlike public firms, LBO leverage seems primarily driven by debt market conditions
- debt markets also appear to drive transaction pricing
- but much still to be done:
 - extend sample across time, funds, countries
 - look at dynamics – leverage over time
 - understand GP-LP agency issues
 - more focus on fund variables (age, size, uninvested capital) – currently they appear to have little influence
 - more cross-sectional variation with more funds in sample
 - more work on instrumenting leverage in valuation regressions