

# Venture Capital Exits and Investments: The influences of market timing, and media attention

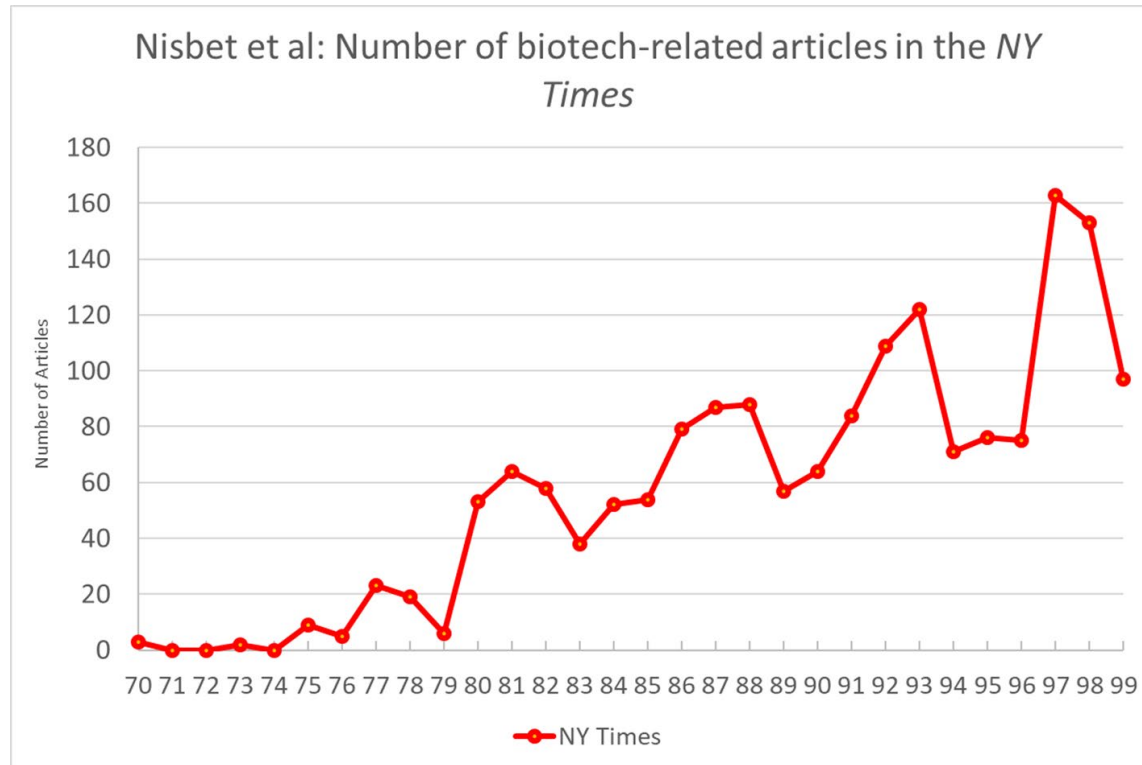
Peter Chung, University of California Riverside

Yun Liu, Keck Graduate Institute

Richard Smith, University of California Riverside

# Where we started

- Our initial motivation: Sector-specific VC and PE investing and media attention are episodic.



- Our conjecture: When a sector gets media attention, resources will flow into it.
- Our questions:
  - Does increased attention lead to more investments (funding rounds, etc.)?
  - Does attention drive over-optimism in IPO exits?

# Where we are now.

Do VC firms add value through exit and investment timing?

- Can VCs time IPOs to precede market declines (“market timing”)?
  - Maybe – in the biotech sector.
- Does media attention also influence VC exit timing?
  - No for IPO. Maybe for M&A.
- Do market conditions influence the focus of new VC investments?
  - Yes. When market returns are low (high), VCs focus on earlier (later) stages.

# Why focus on biotech?

- Long development cycle requiring several funding rounds
- VC interest in biotech is episodic
- Evidence of market timing in this sector is mixed
- Several decades of VC investment in biotech
- Media attention to biotech has long been studied

# IPO Timing Literature

# SEC Shines Spotlight on Market Timing

- In 1963, the SEC called attention to the “troublesome and sometimes dangerous phenomenon of ‘hot’ issues.”
  - Focusing on IPOs during the 1961 “hot IPO market”, the SEC found that as of September 30, 1962, 77.2% were trading below offer price.
  - Ascribed the negative returns to over-optimism and speculation.
- 1972 SEC hearing on hot issue markets.
- Academic research has followed.

# Two Approaches to Studying Market Timing

- Event-time models: Treat each IPO as independent
  - Test for abnormal market-adjusted returns.
- Calendar-time models: Treat IPOs as interdependent
  - Test whether periods of high activity predict negative abnormal returns or market returns.

# Firm-specific IPO Market Timing

- Event-time models: IPOs follow market run-ups and precede declining adjusted returns or operating performance.
  - Ritter (*JF* 1991), Keloharju (*JFE* 1993), Mikkelson and Shah (WP 1994), Pagano, Fabio, and Zingales (*JF* 1998), Arosio, Paeleari, and Guidici (WP 2001)
- Calendar-time models: No actual market timing – pseudo market timing.
  - Schultz (*JF* 2003), Gompers and Lerner (*JF* 2003)
- The calendar-time evidence is disputed:
  - Ang, Gu, and Hochberg (*JFQA* 2007) find underperformance in post 1970 data too large to be explained by pseudo market timing.



# Aggregate IPO Market Timing (Our Focus)

- Negative expected market returns after IPOs
  - Baker and Wurgler (*JF* 2003) especially around Great Depression.
- Baker and Wurgler evidence is disputed.
  - Butler, Grullon, and Weston (*JF* 2005) ascribe to look-back and small-sample biases.
- Baker and Wurgler push back.
  - Baker, Taliaferro, and Wurgler (*JF* 2006) market timing evidence still present after bias controls.

# Venture-backed Firms and Market Timing

- Lerner (*JFE* 1994) choice between IPO and private financing of VC-backed biotech firms. 1978-1992.
  - Evidence of aggregate market timing:
    - 1) Firms go public after market run-ups and before market declines.
    - 2) Experienced VCs are more proficient at timing.
  - Argues: biotech sector is particularly well-suited to testing market timing.
- Brav and Gompers (*JF* 1997) on firm-specific market timing
  - Evidence of firm-specific market timing:
    - 1) Long-run returns after IPOs are lower than benchmark.
    - 2) After IPOs, VC-backed firms outperform non-VC-backed.
    - 3) Over-optimism is concentrated among small and risky issuers.
  - Market adjusted post-IPO returns are similar for VC-backed and non-VC-backed IPO firms and similar to matched non-IPO public firms.

# Venture-backed Firms and Market Timing

- Ball, Chiu, and Smith (*RFS* 2011) study exit choices between IPO and M&A using a calendar-time approach. 1978-2009.
  - VC-backed firms favor IPO after run-ups.
  - No evidence of successful market timing combining all sectors.
  - Sector-level:
    - 1) For all eight sectors, firms favor IPO after run-ups.
    - 2) After IPOs, biotech sector returns are significantly negative or near zero.
    - 3) However, for the period after that covered by Lerner post-exit returns are positive.
    - 4) The Lerner sample period may be aberrational.
  - Except for biotech, the evidence does not support market timing.
  - For biotech, the evidence depends on the period of study.

# Attention Literature

# Attention: Communications Literature

- Media attention to biotech has been studied since the early 1980s.
  - Goodell (*Columbia Journalism Review* 1980), Altimore (*Science, Technology, & Human Values* 1982), Pfund and Hofstadter (*Journal of Communication* 1981), Gaskell, Durant, Bauer, and Allum (*Science* 1999), Nisbet and Lewenstein (*Science Communication* 2002)
- None examines the effects of attention on investment or exit choices.
  - E.g. Nisbet and Lewenstein conduct a content analysis of biotech coverage in the *New York Times* and *Newsweek* as opinion-shaping but with no focus on the impact. Rather, the focus is on how biotech events affect media coverage.

# Attention: Are investors influenced by attention?

- Rajan and Servaes (*JF* 1997). Analyst coverage and performance of IPOs
  - Analyst optimism is negatively related to post IPO adjusted returns.
  - Results suggest that investors optimism is influenced by analyst coverage.
- Tetlock (*JF* 2007). *WSJ* “abreast of the market”
  - Media pessimism induces temporary pressure on market prices.
  - Price impact is large and slow to reverse for small stocks (SMB).

# Attention: Effects of attention are transitory

- Bhattacharya, Galpin, Ray, and Yu (*JFQA* 2009) examine media coverage during the dot-com bubble.
  - Positive coverage is positively related to same-day abnormal returns.
  - The direction of causality is not clear.
- Que and Zhang (*JCF* 2021) study how investor attention to industry affects valuations of private VC-backed firms.
  - Increased attention leads to higher valuations in private rounds.
  - But, higher attention-related valuations are reversed in later rounds.

# Investment Timing Literature



# Investment Timing and Focus

- Gompers, Kovner, Lerner, and Scharfstein (*JFE* 2008). VC investment cycles: The impact of public markets
  - VCs increase investments when public market signals become favorable.
- Kaplan and Schoar (*JF* 2005). Private equity performance: Returns, persistence, and capital flows
  - Capital raised is positively related to market return in the prior year.
- Nanda, Samila, and Sorenson (*JFE* 2020). The persistent effect of initial success: Evidence from VC
  - Initial success stems from fortuitous (lucky) selection of sector, location, stage and not from ability to spot sector, location, stage with high potential.

# Data and Empirical Analysis

# Data

- Pitchbook VC quarterly numbers of investments and exits 1980-2020
  - All investments
  - Biotech investments
- Quarterly market returns
  - NASDAQ from 1980-Q1
  - A Biotech Index from 1994-Q1
- Nexis Uni data on numbers of *NYT* and *WSJ* articles
  - All articles
  - All Biotech\* articles (headline and lead paragraph)
  - All negative *NYT* articles on Biotech (per Nexis Uni) (not-reported)

# Models

- Dependent:
  - Number (or Percent) of Event-type (IPO, M&A. Series A) in quarter.
- Independent:
  - Leads and Lags of quarterly returns
  - Leads of number of articles in quarter
  - Linear and non-linear controls for growth trends
- Timing of influence is uncertain – Wald tests
- OLS and Newey-West results are similar

# Descriptive Data over Time (quarterly averages)

		1980-89	1990-99	2000-09	2010-20
<b>Panel A</b>	<b>VC Harvesting</b>				
	All IPOs	26.83	104.53	94.75	92.45
	All M&As	24.95	113.13	915.18	1950.45
	All IPOs/IPOs+M&As	0.62	0.53	0.10	0.05
	Biotech IPO	0.95	4.00	5.18	10.95
	Biotech M&A	0.25	1.73	14.63	31.02
	Biotech IPO/Biotech IPOs + M&As	0.84	0.70	0.26	0.25
<b>Panel B</b>	<b>VC Investment Series</b>				
	Biotech Series A	0.03	1.58	15.53	47.30
	Biotech All Series	0.05	4.80	36.43	92.91
	Biotech Series A/Biotech All Series	0.50	0.37	0.42	0.51
<b>Panel C</b>	<b>Quarterly Market Returns</b>				
	Nasdaq	2.81%	6.47%	-0.81%	4.39%
	Biotech Index		8.40%	0.25%	4.57%
<b>Panel D</b>	<b>Media Attention</b>				
	NYT Biotech Articles	16.15	25.35	26.35	13.61
	WSJ Biotech Articles	3.425	7.275	9.4	10.5

# Numbers of IPOs

# Media Attention – A first look

Biotech IPOs on WSJ Attention				Biotech IPOs on NYT Attention			
		N Obs	164			N Obs	160
		R <sup>2</sup>	0.5377			R <sup>2</sup>	0.545
IPO Number	Coef.	t	P>t	IPO Number	Coef.	t	P>t
biowsj	0.1253	1.660	<b>0.099</b>	newbionyt	0.0688	1.650	0.102
biowsj+1	0.0250	0.280	0.783	newbionyt+1	0.0272	0.490	0.623
biowsj+2	0.0046	0.050	0.958	newbionyt+2	0.0408	0.800	0.423
biowsj+3	-0.1240	-1.200	0.232	newbionyt+3	-0.0144	-0.290	0.775
biowsj+4	-0.0510	-0.630	0.528	newbionyt+4	-0.0139	-0.290	0.776
Controls	Yes			Controls	Yes		
Wald Tests		Sum	p-value	Wald Tests		Sum	p-value
biowsj + biowsj+1		0.1503	0.127	bionyt + bionyt+1		0.0960	<b>0.068</b>
biowsj+1 + biowsj+2		0.0296	0.727	bionyt+1 + bionyt+2		0.0680	0.194
biowsj +biowsj+1 + biowsj+2		0.1549	<b>0.070</b>	bionyt +bionyt+1 + bionyt+2		0.1368	<b>0.024</b>
biowsj+1 + biowsj+2 + biowsj+3		-0.0944	0.403	bionyt+1 + bionyt+2 + bionyt+3		0.0536	0.486
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4		-0.1454	0.149	bionyt+1 + bionyt+2 + bionyt+3 + bionyt+4		0.0397	0.484
biowsj+2 + biowsj+3		-0.1194	0.260	bionyt+2 + bionyt+3		0.0263	0.656
biowsj+2 + biowsj+3 + biowsj+4		-0.1704	<b>0.074</b>	bionyt+2 + bionyt+3 + bionyt+4		0.0125	0.826

# Media Attention – A First Look

## Biotech IPOs on WSJ Attention

N Obs 164  
R<sup>2</sup> 0.5377

### IPO Number

biowsj  
biowsj+1  
biowsj+2  
biowsj+3  
biowsj+4  
Controls

Coef. t P>t

## Biotech IPOs on NYT Attention

N Obs 160  
R<sup>2</sup> 0.545

### IPO Number

Coef. t P>t  
0.0688 1.650 0.102  
0.0272 0.490 0.623  
0.0408 0.800 0.423  
-0.0144 -0.290 0.775  
-0.0139 -0.290 0.776  
Yes

Positive association between media attention and IPO activity, without controlling for market returns

### Wald Tests

Sum p-value

biowsj + biowsj+1 0.1503 0.127  
biowsj+1 + biowsj+2 0.0296 0.727  
biowsj +biowsj+1 + biowsj+2 0.1549 **0.070**  
biowsj+1 + biowsj+2 + biowsj+3 -0.0944 0.403  
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4 -0.1454 0.149  
biowsj+2 + biowsj+3 -0.1194 0.260  
biowsj+2 + biowsj+3 + biowsj+4 -0.1704 **0.074**

### Wald Tests

Sum p-value

bionyt + bionyt+1 0.0960 **0.068**  
bionyt+1 + bionyt+2 0.0680 0.194  
bionyt +bionyt+1 + bionyt+2 0.1368 **0.024**  
bionyt+1 + bionyt+2 + bionyt+3 0.0536 0.486  
bionyt+1 + bionyt+2 + bionyt+3 + bionyt+4 0.0397 0.484  
bionyt+2 + bionyt+3 0.0263 0.656  
bionyt+2 + bionyt+3 + bionyt+4 0.0125 0.826



# Can VCs Time the Market with IPOs? All VC-backed

## All IPOs on NASDAQ Index Returns

		N Obs	164
		R <sup>2</sup>	0.3761
IPO Number	Coef.	t-stat	P>t
nasd-2	-45.1524	-1.340	0.182
nasd-1	-10.0681	-0.370	0.709
nasdaq	10.4350	0.380	0.706
nasd+1	120.8241	2.990	<b>0.003</b>
nasd+2	94.9148	3.210	<b>0.002</b>
Controls	Yes		

Wald Tests	Sum	p-value
nasd + nasd-2 + nasd-1	-44.7856	0.357
nasd-1 + nasd-2	-55.2205	0.174
nasdaq + nasd+1	215.7389	<b>0.009</b>
nasd+ nasd+1 + nasd+2	226.1738	<b>0.000</b>
nasd+1 + nasd+2	215.7389	<b>0.000</b>

## All IPOs on Biotech Index Returns

		N Obs	108
		R <sup>2</sup>	0.2960
IPO Number	Coef.	t-stat	P>t
bioret-2	-1.8919	-0.0800	0.939
bioretl-1	6.6176	0.3400	0.734
bioret	15.9884	0.5500	0.586
bioret+1	120.6248	2.8900	<b>0.005</b>
bioret+2	96.7591	3.7700	<b>0.000</b>
Controls	Yes		

Wald Tests	Sum	p-value
bioret + bioret-1 + bioret-2	20.7141	0.629
bioret-1 + bioret-2	4.7257	0.886
bioret + bioret+1	217.3839	<b>0.006</b>
bioret + bioret+1 + bioret+2	233.3723	<b>0.000</b>
bioret+1 + bioret+2	217.3839	<b>0.000</b>

# Can VCs Time the Market with IPOs? All VC-backed

## All IPOs on NASDAQ Index Returns

		N Obs	164
		R^2	0.3761
IPO Number	Coef.	t-stat	P>t
nasd-2	-45.1524	-1.340	0.182
nasd-1	-10.0681	-0.370	0.709
nasdaq	10.4250		
nasd+1			
nasd+2			
Controls	Yes		

## All IPOs on Biotech Index Returns

		N Obs	108
		R^2	0.2960
IPO Number	Coef.	t-stat	P>t
bioret-2	-1.8919	-0.0800	0.939
bioretl-1	6.6176	0.3400	0.734
	15.9884	0.5500	0.586
	120.6248	2.8900	<b>0.005</b>
	96.7591	3.7700	<b>0.000</b>
Controls	Yes		

IPO activity is higher after market run-ups

### Wald Tests

	Sum	p-value
nasd + nasd-2 + nasd-1	-44.7856	0.357
nasd-1 + nasd-2	-55.2205	0.174
nasdaq + nasd+1	215.7389	<b>0.009</b>
nasd+ nasd+1 + nasd+2	226.1738	<b>0.000</b>
nasd+1 + nasd+2	215.7389	<b>0.000</b>

### Wald Tests

	Sum	p-value
bioret + bioret-1 + bioret-2	20.7141	0.629
bioret-1 + bioret-2	4.7257	0.886
bioret + bioret+1	217.3839	<b>0.006</b>
bioret + bioret+1 + bioret+2	233.3723	<b>0.000</b>
bioret+1 + bioret+2	217.3839	<b>0.000</b>

# Can VCs Time the Market with IPOs? All VC-backed

## All IPOs on NASDAQ Index Returns

N Obs 164  
R^2 0.3761

IPO Number	Coef.	t-stat	P>t
nasd-2	-45.1524	-1.340	0.182
nasd-1	-1.1111	-0.020	0.984
nasdaq	1.1111	0.020	0.984
nasd+1	120.6248	2.8900	0.005
nasd+2	96.7591	3.7700	0.000
Controls			

## All IPOs on Biotech Index Returns

N Obs 108  
R^2 0.2960

IPO Number	Coef.	t-stat	P>t
bioret-2	-1.8919	-0.0800	0.939
bioret-1	6.6176	0.3400	0.734
bioret	15.9884	0.5500	0.586
bioret+1	120.6248	2.8900	0.005
bioret+2	96.7591	3.7700	0.000
Yes			

No significant evidence of ability to time IPOs before market declines

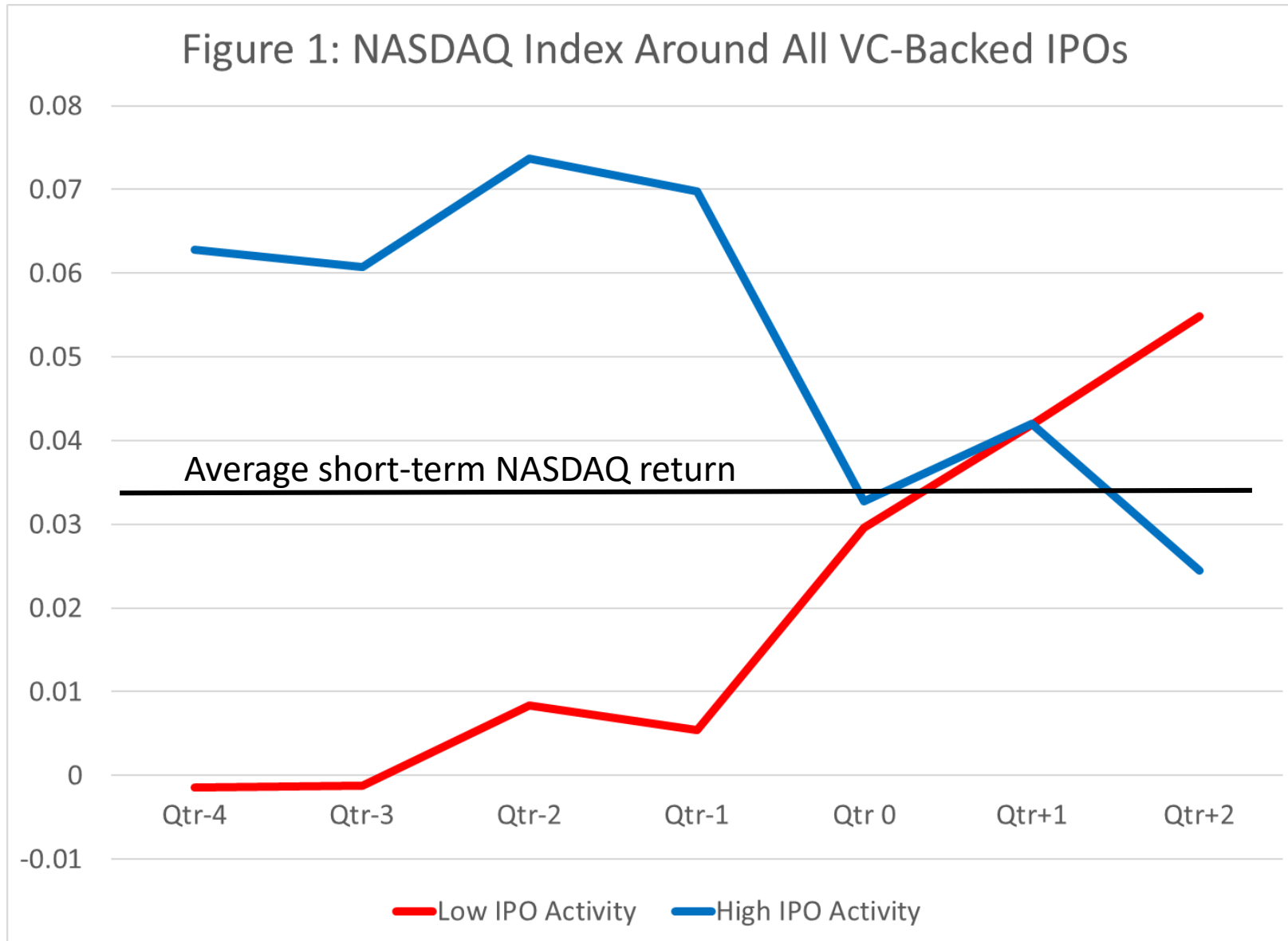
### Wald Tests

	Sum	p-value
nasd + nasd-2 + nasd-1	-44.7856	0.357
nasd-1 + nasd-2	-55.2205	0.174
nasdaq + nasd+1	215.7389	0.009
nasd+ nasd+1 + nasd+2	226.1738	0.000
nasd+1 + nasd+2	215.7389	0.000

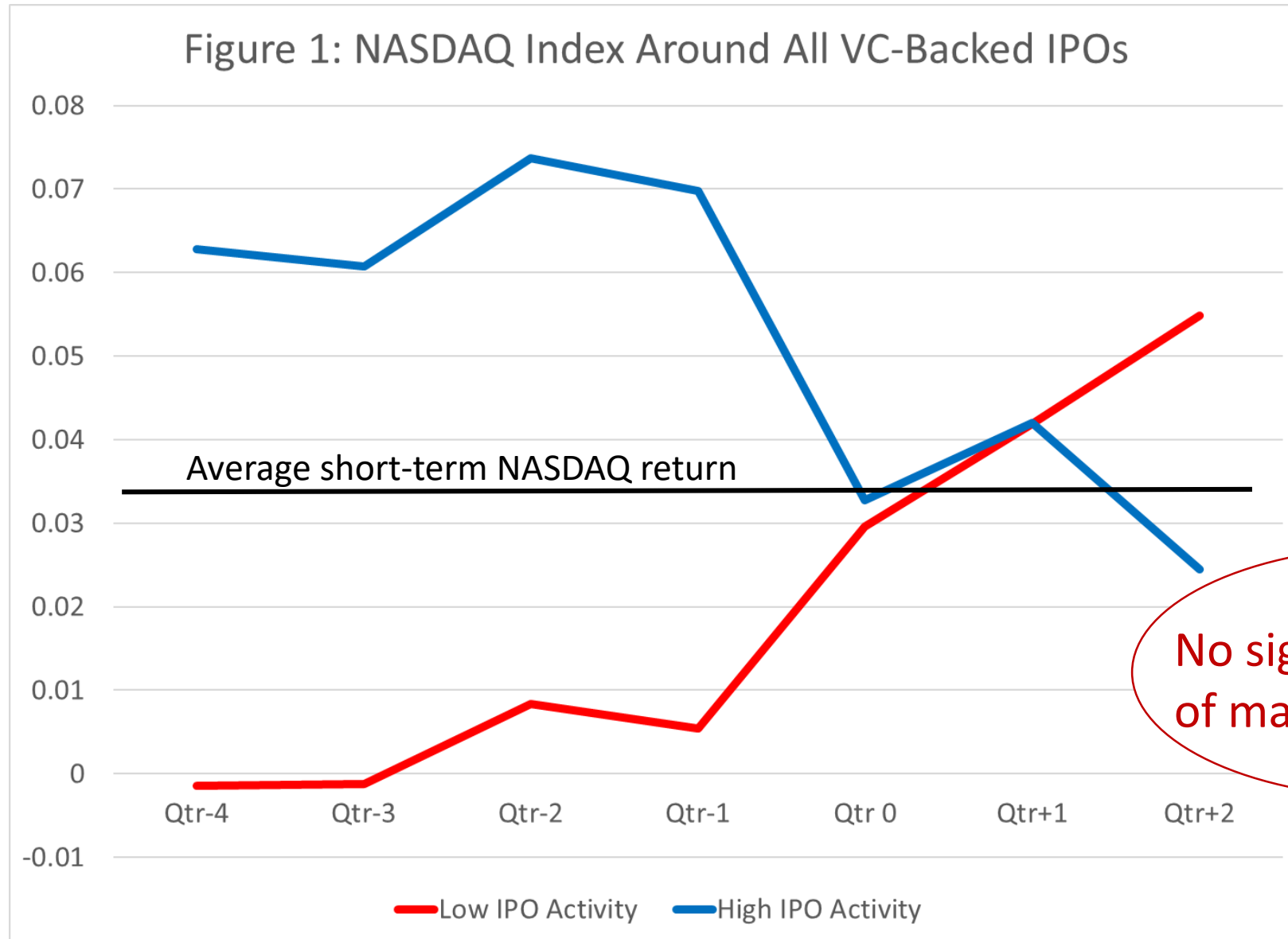
### Wald Tests

	Sum	p-value
bioret + bioret-1 + bioret-2	20.7141	0.629
bioret-1 + bioret-2	4.7257	0.886
bioret + bioret+1	217.3839	0.006
bioret + bioret+1 + bioret+2	233.3723	0.000
bioret+1 + bioret+2	217.3839	0.000

# Quarterly Returns Around All VC-backed IPOs



# Quarterly Returns Around All VC-backed IPOs



No significant evidence of market timing

# Can VCs Time the Market with Biotech IPOs?

## Biotech IPOs on NASDAQ

		N Obs	162
		R <sup>2</sup>	0.5593
IPO Number	Coef.	t	P>t
Nasd-2	-3.7314	-1.660	<b>0.098</b>
Nasd-1	-5.1976	-1.940	<b>0.054</b>
nasdaq	-2.5168	-1.000	0.319
Nasd+1	6.4660	3.020	<b>0.003</b>
Nasdl+2	4.8675	1.990	<b>0.048</b>
Controls	Yes		
Wald Tests		Sum	p-value
nasd + nasd-2 + nasd-1		-11.4458	<b>0.011</b>
Nasd-1 + nasd-2		-8.9289	<b>0.018</b>
nasdaq + nasd+1		3.9492	0.140
nasd+ nasd+1 + nasd+2		8.8167	<b>0.022</b>
Nasd+1 + nasd+2		11.3335	<b>0.000</b>

## BioIndex Biotech IPOs

		N Obs	106
		R <sup>2</sup>	0.5225
IPO Number	Coef.	t	P>t
Bioret-2	-2.5369	-1.060	0.294
Bioret-1	-6.5861	-3.010	<b>0.003</b>
bioret	-3.6447	-1.190	0.237
Bioret+1	6.9717	2.860	<b>0.005</b>
Bioret+2	8.4697	3.440	<b>0.001</b>
Controls	Yes		
Wald Tests		Sum	p-value
bioret + bioret-1 + biuret-2		-9.1229	<b>0.001</b>
Bioret-1 + bioret-2		-2.5369	<b>0.014</b>
bioret + biuret+1		-10.2307	0.417
bioret + bioret+1 + biuret+2		-3.2590	<b>0.002</b>
Bioret+1 + bioret+2		3.3271	<b>0.000</b>

# Can VCs Time the Market with Biotech IPOs?

## Biotech IPOs on NASDAQ

N Obs 162  
R<sup>2</sup> 0.5593

IPO Number	Coef.	t	P>t
Nasd-2	-3.7314	-1.660	<b>0.098</b>
Nasd-1	-5.1976	-1.940	<b>0.054</b>
nasdaq			
Nasd+1			
Nasdl+2			
Controls	Yes		

Wald Tests	Sum	p-value
nasd + nasd-2 + nasd-1	-11.4458	<b>0.011</b>
Nasd-1 + nasd-2	-8.9289	<b>0.018</b>
nasdaq + nasd+1	3.9492	0.140
nasd+ nasd+1 + nasd+2	8.8167	<b>0.022</b>
Nasd+1 + nasd+2	11.3335	<b>0.000</b>

## BioIndex Biotech IPOs

N Obs 106  
R<sup>2</sup> 0.5225

IPO Number	Coef.	t	P>t
Bioret-2	-2.5369	-1.060	0.294
Bioret-1	-6.5861	-3.010	<b>0.003</b>
	-3.6447	-1.190	0.237
	6.9717	2.860	<b>0.005</b>
	8.4697	3.440	<b>0.001</b>
Controls	Yes		

Wald Tests	Sum	p-value
bioret + bioret-1 + biuret-2	-9.1229	<b>0.001</b>
Bioret-1 + bioret-2	-2.5369	<b>0.014</b>
bioret + biuret+1	-10.2307	0.417
bioret + bioret+1 + biuret+2	-3.2590	<b>0.002</b>
Bioret+1 + bioret+2	3.3271	<b>0.000</b>

Biotech IPO activity is higher after market run-ups

# Can VCs Time the Market with Biotech IPOs?

## Biotech IPOs on NASDAQ

N Obs 162  
R<sup>2</sup> 0.5593

IPO Number	Coef.	t	P>t
Nasd-2	-3.7314	-1.660	<b>0.098</b>
Nasd-1	-5.1976	-1.940	<b>0.054</b>
nasdaq			
Nasd+1			
Nasdl+2			
Controls			

## BioIndex Biotech IPOs

N Obs 106  
R<sup>2</sup> 0.5225

IPO Number	Coef.	t	P>t
Bioret-2	-2.5369	-1.060	0.294
Bioret-1	-6.5861	-3.010	<b>0.003</b>
	-3.6447	-1.190	0.237
	6.9717	2.860	<b>0.005</b>
	8.4697	3.440	<b>0.001</b>
Yes			

Biotech IPO activity precedes market declines.  
Is it market timing?

### Wald Tests

Sum p-value

nasd + nasd-2 + nasd-1	-11.4458	<b>0.011</b>
Nasd-1 + nasd-2	-8.9289	<b>0.018</b>
nasdaq + nasd+1	3.9492	0.140
nasd+ nasd+1 + nasd+2	8.8167	<b>0.022</b>
Nasd+1 + nasd+2	11.3335	<b>0.000</b>

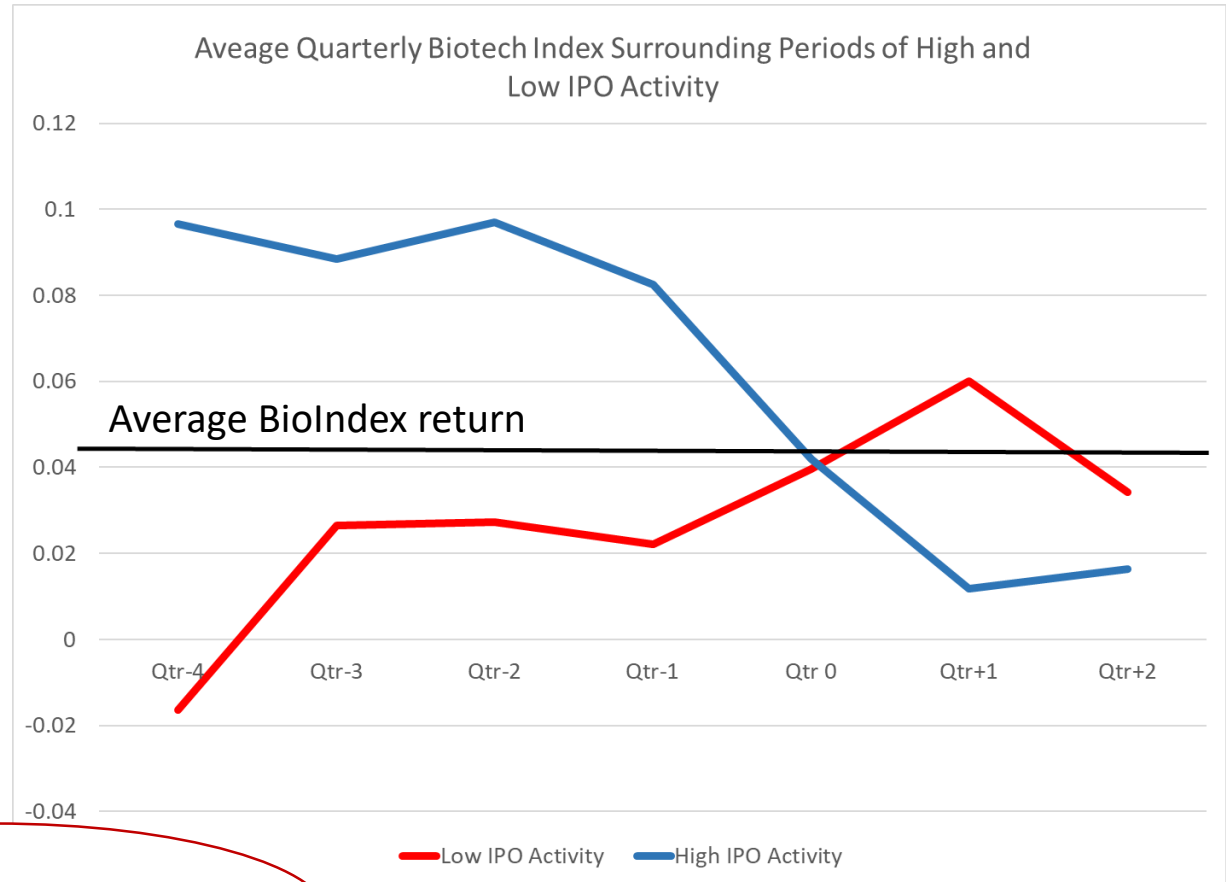
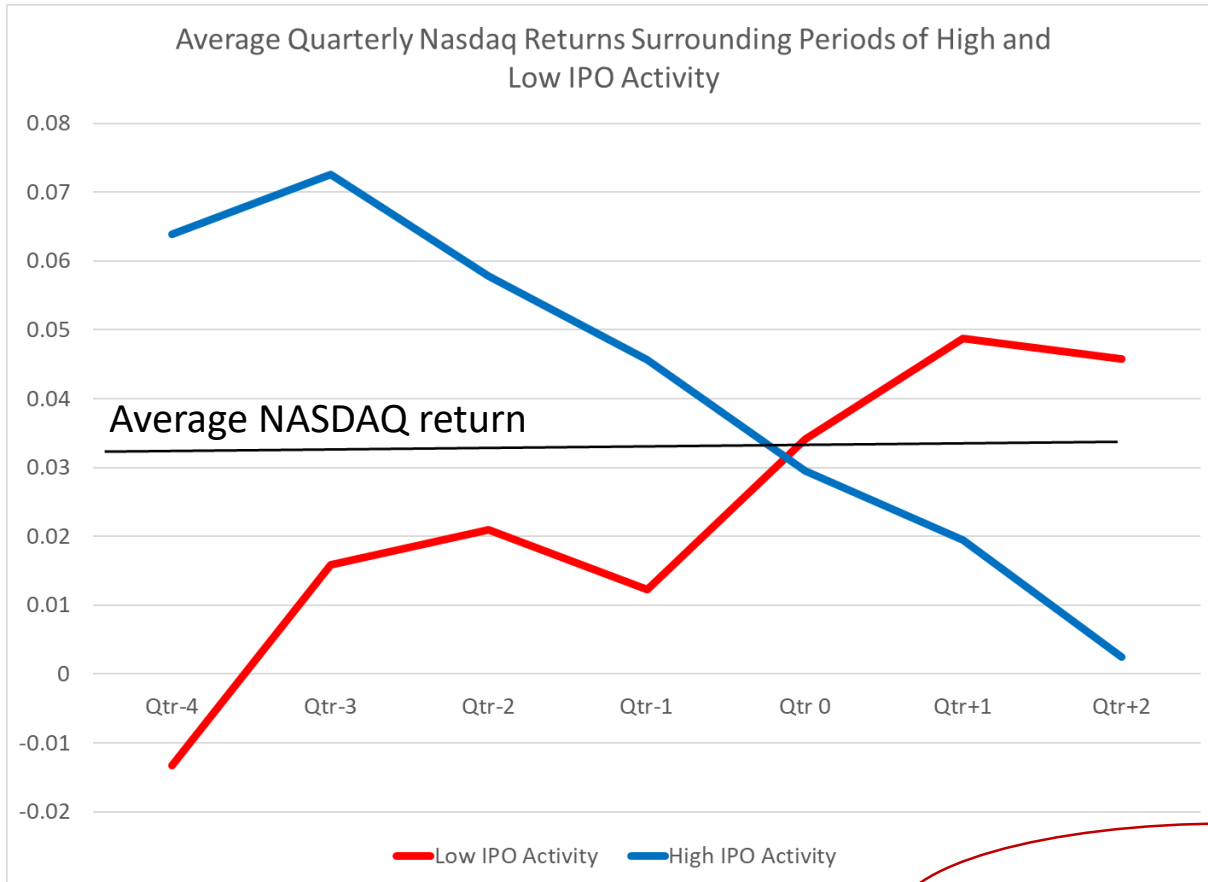
### Wald Tests

Sum p-value

bioret + bioret-1 + biuret-2	-9.1229	<b>0.001</b>
Bioret-1 + bioret-2	-2.5369	<b>0.014</b>
bioret + biuret+1	-10.2307	0.417
bioret + bioret+1 + biuret+2	-3.2590	<b>0.002</b>
Bioret+1 + bioret+2	3.3271	<b>0.000</b>

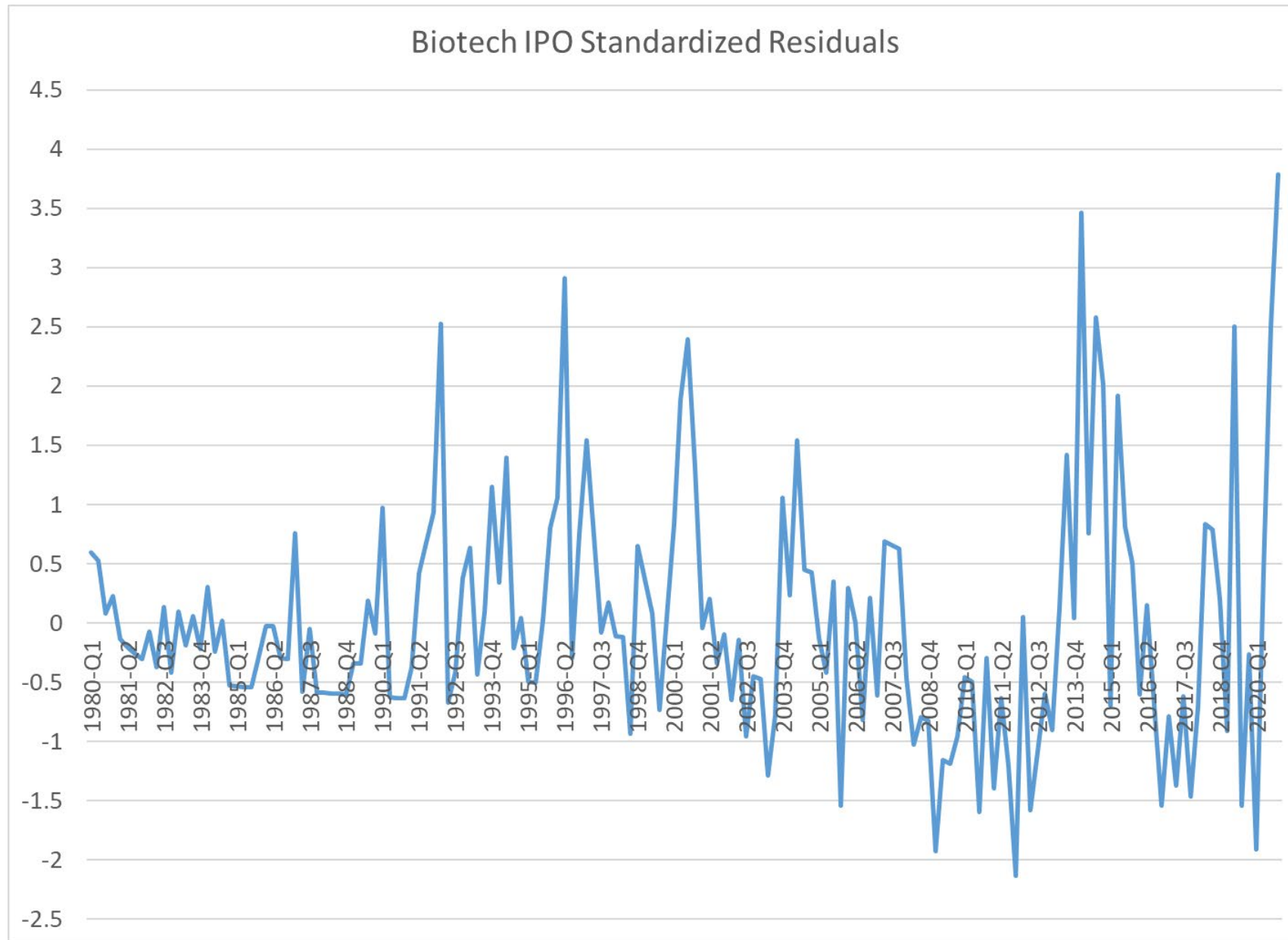


# Quarterly Returns Around Biotech IPOs



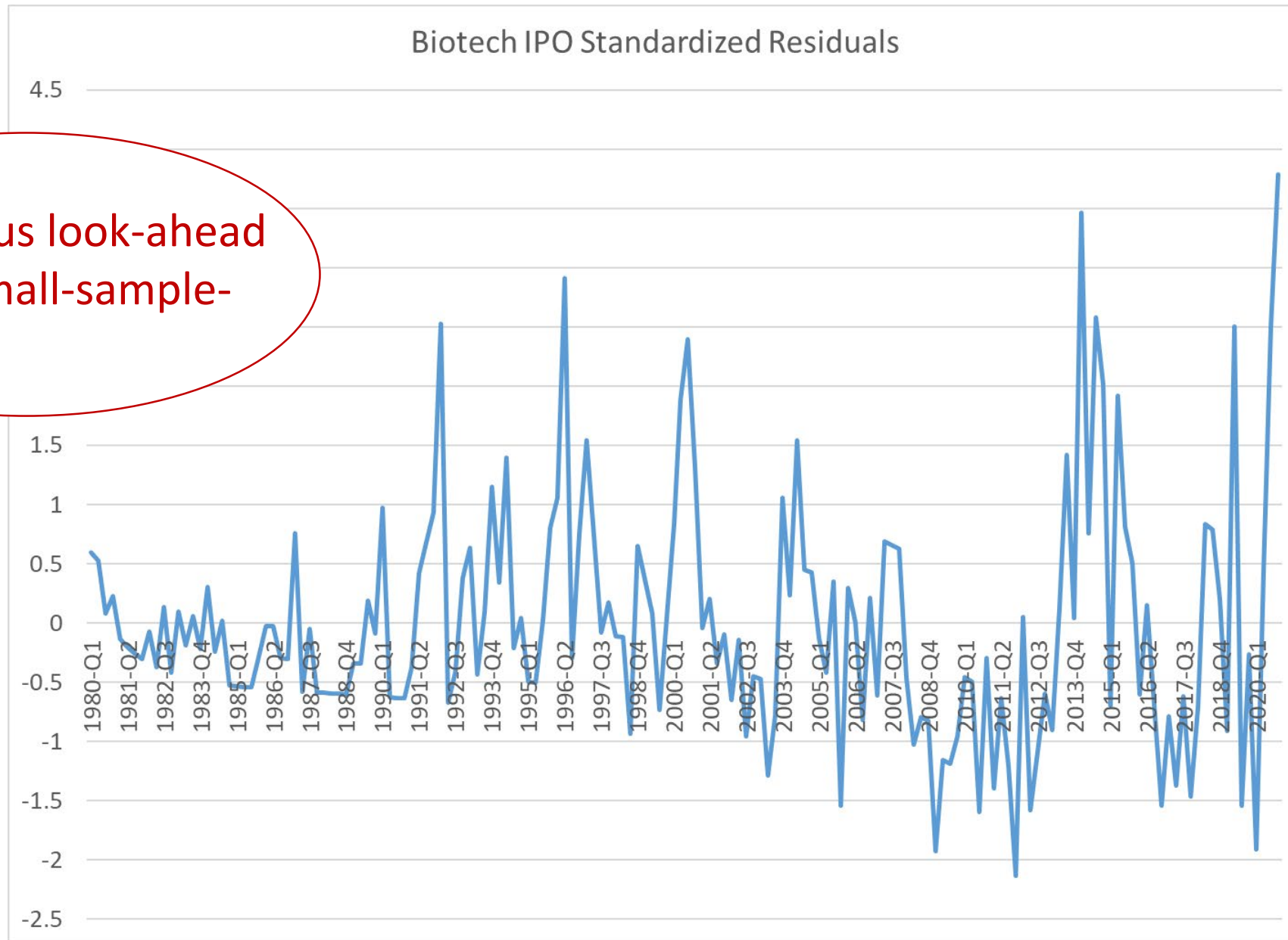
Effective market timing

# Trend-adjusted Residuals of Number of Biotech IPOs



# Trend-adjusted Residuals of Number of Biotech IPOs

No obvious look-ahead bias or small-sample-problem



# Does WSJ Media Attention Also Matter for IPOs?

Biotech IPOs on NASDAQ Index Returns

Biotech IPOs on Biotech Index Returns

							N Obs	106
							R^2	0.5608
IPO Number							t	P>t
nasd-2							1.500	0.138
nasd-1							<b>-3.270</b>	<b>0.002</b>
nasdaq							-4.5807	-1.390
nasd+1	6.7212	2.790	<b>0.000</b>	bioret+1	6.3404	<b>2.600</b>	<b>0.011</b>	
nasd+2	4.5201	1.860	<b>0.064</b>	bioret+2	8.0899	<b>3.090</b>	<b>0.003</b>	
biowsj	0.0930	1.250	0.214	biowsj	0.0861	1.010	0.317	
biowsj+1	0.0157	0.170	0.865	biowsj+1	-0.0038	-0.030	0.973	
biowsj+2	0.0415	0.440	0.661	biowsj+2	0.0140	0.140	0.892	
biowsj+3	-0.1237	-1.220	0.224	biowsj+3	-0.1860	-1.560	0.122	
biowsj+4	-0.0720	-0.890	0.375	biowsj+4	-0.1256	-1.390	0.169	
Controls	Yes			Controls	Yes			
<b>Wald Tests</b>	<b>Sum</b>	<b>p-value</b>		<b>Wald Tests</b>	<b>Sum</b>	<b>p-value</b>		
nasd + nasd-2 + nasd-1	-11.4723	<b>0.016</b>		bioret + bioret-1 + bioret-2	-15.4508	<b>0.000</b>		
nasd-1 + nasd-2	-8.8029	<b>0.025</b>		bioret-1 + bioret-2	-10.8701	<b>0.003</b>		
nasd+ nasd+1 + nasd+2	8.5719	<b>0.030</b>		bioret + bioretlag1 + bioretlag2	9.8496	<b>0.011</b>		
nasd+1 + nasd+2	11.2413	<b>0.000</b>		bioret+1 + bioret+2	14.4303	<b>0.000</b>		
biowsj + biowsj+1	0.1087	0.283		biowsj + biowsj+1	0.0823	0.431		
biowsj+1 + biowsj+2	0.0571	0.524		biowsj+1 + biowsj+2	0.0103	0.915		
biowsj + biowsj+1 + biowsj+2	0.1502	<b>0.072</b>		biowsj + biowsj+1 + biowsj+2	0.0963	0.301		
biowsj+1 + biowsj+2 + biowsj+3	-0.0665	0.557		biowsj+1 + biowsj+2 + biowsj+3	-0.1758	0.242		
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	-0.1385	0.172		biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	-0.3013	<b>0.021</b>		
biowsj+2 + biowsj+3	-0.0822	0.466		biowsj+2 + biowsj+3	-0.1720	0.211		
biowsj+2 + biowsj+3 + biowsj+4	-0.1542	0.101		biowsj+2 + biowsj+3 + biowsj+4	-0.2975	<b>0.011</b>		

No clear relation between media attention and IPO activity after controlling for market returns.

# Summary: Number of IPOs

- Biotech IPO activity increases after market run-ups.
  - 1 SD higher 3-qtr return > 2.04 more IPOs (BioIndex).
- High Biotech IPO activity predicts low market returns.
  - After high IPO activity, market returns are positive but significantly low.
    - Around 1% per quarter over 2 quarters v. 3.2% average over all quarters (Nasdaq)
- Attention
  - No clear results (WSJ).
  - Similar results with BioIndex and NASDAQ
- Similar results for IPO percentage of IPO + M&A (not shown).

Number of M&As

# Can VCs Time the Market with M&As?

Biotech M&As on NASDAQ Index Returns

	N Obs	162	
	R^2	0.9412	
M&A Number	Coef.	t	P>t
nasd-2	-6.4038	-2.700	<b>0.008</b>
nasd-1	-0.9070	-0.400	0.687
nasdaq	-4.0075	-1.910	<b>0.058</b>
nasd+1	0.8362	0.370	0.713
nasd+2	-4.0907	-1.700	<b>0.091</b>
biowsj	0.1229	1.340	0.183
biowsj+1	0.0866	0.840	0.403
biowsj+2	0.1031	0.850	0.399
biowsj+3	0.0005	0.000	0.996
biowsj+4	0.0570	0.640	0.521
Controls	Yes		

Wald Tests	Sum	p-value
nasd + nasd-2 + nasd-1	-11.3183	<b>0.001</b>
nasd-1 + nasd-2	-7.3108	<b>0.013</b>
nasdaq + nasd+1	-3.1713	0.254
nasd+ nasd+1 + nasd+2	-7.2620	<b>0.025</b>
nasd+1 + nasd+2	-3.2545	0.301
biowsj + biowsj+1	0.2094	<b>0.041</b>
biowsj+1 + biowsj+2	0.1896	<b>0.091</b>
biowsj +biowsj+1 + biowsj+2	0.3125	<b>0.005</b>
biowsj+1 + biowsj+2 + biowsj+3	0.1901	<b>0.078</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.2472	<b>0.036</b>
biowsj+2 + biowsj+3	0.1036	0.333
biowsj+2 + biowsj+3 + biowsj+4	0.1606	0.197

Biotech M&As on Biotech Index Returns

	N Obs	106	
	R^2	0.9115	
M&A Number	Coef.	t	P>t
bioret-2	-4.4382	-1.620	0.109
bioretl-1	-0.9532	-0.340	0.737
bioret	-1.0597	-0.460	0.648
bioret+1	-2.1979	-0.820	0.417
bioret+2	-0.6031	-0.220	0.824
biowsj	0.1691	1.500	0.138
biowsj+1	0.1498	1.150	0.253
biowsj+2	0.1400	0.990	0.326
biowsj+3	0.0545	0.450	0.656
biowsj+4	0.0461	0.420	0.673
Controls	Yes		

Wald Tests	Sum	p-value
bioret + bioret-1 + bioret-2	-6.4512	0.165
bioret-1 + bioret-2	-5.3914	0.184
bioret + bioretlag1	-3.2576	0.382
bioret + bioretlag1 + bioretlag2	-3.8606	0.370
bioret+1 + bioret+2	-2.8009	0.443
biowsj + biowsj+1	0.3189	<b>0.015</b>
biowsj+1 + biowsj+2	0.2898	<b>0.039</b>
biowsj +biowsj+1 + biowsj+2	0.4588	<b>0.002</b>
biowsj+1 + biowsj+2 + biowsj+3	0.3443	<b>0.023</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.3903	<b>0.022</b>
biowsj+2 + biowsj+3	0.1945	0.114
biowsj+2 + biowsj+3 + biowsj+4	0.2405	0.125

# Can VCs Time the Market with M&As?

Biotech M&As on NASDAQ Index Returns

N Obs 162  
R^2 0.9412

M&A Number	Coef.	t	P>t
nasd-2	-6.4038	-2.700	<b>0.008</b>
nasd-1	-0.9070	-0.400	0.687
nasdaq	-4.0075	-1.910	<b>0.058</b>
nasd+1	0.8362	0.370	0.713
nasd+2	-4.0907	1.700	<b>0.091</b>
biowsj			
biowsj+1			
biowsj+2			
biowsj+3			
biowsj+4			
Controls			

Biotech M&As on Biotech Index Returns

N Obs 106  
R^2 0.9115

M&A Number	Coef.	t	P>t
bioret-2	-4.4382	-1.620	0.109
bioretl-1	-0.9532	-0.340	0.737
bioret	-1.0597	-0.460	0.648
bioret+1	-2.1979	-0.820	0.417
bioret+2	-0.6031	-0.220	0.824
	0.1691	1.500	0.138
	0.1498	1.150	0.253
	0.1400	0.990	0.326
	0.0545	0.450	0.656
	0.0461	0.420	0.673
Yes			

VC-based biotech firms substitute away from M&As to IPOs after market run-ups

Wald Tests

	Sum	p-value
nasd + nasd-2 + nasd-1	-11.3183	<b>0.001</b>
nasd-1 + nasd-2	-7.3108	<b>0.013</b>
nasdaq + nasd+1	-3.1713	0.254
nasd+ nasd+1 + nasd+2	-7.2620	<b>0.025</b>
nasd+1 + nasd+2	-3.2545	0.301
biowsj + biowsj+1	0.2094	<b>0.041</b>
biowsj+1 + biowsj+2	0.1896	<b>0.091</b>
biowsj +biowsj+1 + biowsj+2	0.3125	<b>0.005</b>
biowsj+1 + biowsj+2 + biowsj+3	0.1901	<b>0.078</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.2472	<b>0.036</b>
biowsj+2 + biowsj+3	0.1036	0.333
biowsj+2 + biowsj+3 + biowsj+4	0.1606	0.197

Wald Tests

	Sum	p-value
bioret + bioret-1 + bioret-2	-6.4512	0.165
bioret-1 + bioret-2	-5.3914	0.184
bioret + bioretlag1	-3.2576	0.382
bioret + bioretlag1 + bioretlag2	-3.8606	0.370
bioret+1 + bioret+2	-2.8009	0.443
biowsj + biowsj+1	0.3189	<b>0.015</b>
biowsj+1 + biowsj+2	0.2898	<b>0.039</b>
biowsj +biowsj+1 + biowsj+2	0.4588	<b>0.002</b>
biowsj+1 + biowsj+2 + biowsj+3	0.3443	<b>0.023</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.3903	<b>0.022</b>
biowsj+2 + biowsj+3	0.1945	0.114
biowsj+2 + biowsj+3 + biowsj+4	0.2405	0.125



# Can VCs Time the Market with M&As?

Biotech M&As on NASDAQ Index Returns

	N Obs	162	
	R <sup>2</sup>	0.9412	
M&A Number	Coef.	t	P>t
nasd-2	-6.4038	-2.700	<b>0.008</b>
nasd-1	-0.9070	-0.400	0.687
nasdaq	-4.0075	-1.910	<b>0.058</b>
nasd+1	0.8362	0.370	0.713
nasd+2			
biowsj			
biowsj+1			
biowsj+2			
biowsj+3			
biowsj+4			
Controls	Yes		

Biotech M&As on Biotech Index Returns

	N Obs	106	
	R <sup>2</sup>	0.9115	
M&A Number	Coef.	t	P>t
bioret-2	-4.4382	-1.620	0.109
bioretl-1	-0.9532	-0.340	0.737
bioret	-1.0597	-0.460	0.648
bioret+1	-2.1979	-0.820	0.417
	-0.6031	-0.220	0.824
	0.1691	1.500	0.138
	0.1498	1.150	0.253
	0.1400	0.990	0.326
	0.0545	0.450	0.656
	0.0461	0.420	0.673
Controls	Yes		

Market timing using NASDAQ.  
Can acquirers time the market?

Wald Tests

	Sum	p-value
nasd + nasd-2 + nasd-1	-11.3183	<b>0.001</b>
nasd-1 + nasd-2	-7.3108	<b>0.013</b>
nasdaq + nasd+1	-3.1713	0.254
nasd+ nasd+1 + nasd+2	-7.2620	<b>0.025</b>
nasd+1 + nasd+2	-3.2545	0.301
biowsj + biowsj+1	0.2094	<b>0.041</b>
biowsj+1 + biowsj+2	0.1896	<b>0.091</b>
biowsj +biowsj+1 + biowsj+2	0.3125	<b>0.005</b>
biowsj+1 + biowsj+2 + biowsj+3	0.1901	<b>0.078</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.2472	<b>0.036</b>
biowsj+2 + biowsj+3	0.1036	0.333
biowsj+2 + biowsj+3 + biowsj+4	0.1606	0.197

Wald Tests

	Sum	p-value
bioret + bioret-1 + bioret-2	-6.4512	0.165
bioret-1 + bioret-2	-5.3914	0.184
bioret + bioretlag1	-3.2576	0.382
bioret + bioretlag1 + bioretlag2	-3.8606	0.370
bioret+1 + bioret+2	-2.8009	0.443
biowsj + biowsj+1	0.3189	<b>0.015</b>
biowsj+1 + biowsj+2	0.2898	<b>0.039</b>
biowsj +biowsj+1 + biowsj+2	0.4588	<b>0.002</b>
biowsj+1 + biowsj+2 + biowsj+3	0.3443	<b>0.023</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.3903	<b>0.022</b>
biowsj+2 + biowsj+3	0.1945	0.114
biowsj+2 + biowsj+3 + biowsj+4	0.2405	0.125

# Does WSJ Media Attention Also Matter for M&As?

Biotech M&As on NASDAQ Index Returns

	N Obs	162	
	R^2	0.9412	
M&A Number	Coef.	t	P>t
nasd-2	-6.4038	-2.700	<b>0.008</b>
nasd-1	-0.9070	-0.400	0.687
nasdaq	-4.0075	-1.910	<b>0.058</b>
nasd+1	0.8362	0.370	0.713
nasd+2	-4.0907	-1.700	<b>0.091</b>
biowsj	0.1229	1.340	0.183
biowsj+1	0.0866	0.840	0.403
biowsj+2	0.1031	0.850	0.399
biowsj+3	0.0005	0.000	0.996
biowsj+4	0.0570		
Controls	Yes		

Biotech M&As on Biotech Index Returns

	N Obs	106	
	R^2	0.9115	
M&A Number	Coef.	t	P>t
bioret-2	-4.4382	-1.620	0.109
bioretl-1	-0.9532	-0.340	0.737
bioret	-1.0597	-0.460	0.648
bioret+1	-2.1979	-0.820	0.417
bioret+2	-0.6031	-0.220	0.824
biowsj	0.1691	1.500	0.138
biowsj+1	0.1498	1.150	0.253
biowsj+2	0.1400	0.990	0.326
biowsi+3	0.0545	0.450	0.656
	0.0461	0.420	0.673
Controls	Yes		

Positive association between media attention and M&A activity

**Wald Tests**

nasd + nasd-2 + nasd-1		
nasd-1 + nasd-2		
nasdaq + nasd+1		
nasd+ nasd+1 + nasd+2	-7.2620	<b>0.025</b>
nasd+1 + nasd+2	-3.2545	0.301

	Sum	p-value
bioret + bioretlag1 + bioretlag2	-6.4512	0.165
bioret+1 + bioret+2	-5.3914	0.184
	-3.2576	0.382
	-3.8606	0.370
	-2.8009	0.443

biowsj + biowsj+1	0.2094	<b>0.041</b>	biowsj + biowsj+1	0.3189	<b>0.015</b>
biowsj+1 + biowsj+2	0.1896	<b>0.091</b>	biowsj+1 + biowsj+2	0.2898	<b>0.039</b>
biowsj +biowsj+1 + biowsj+2	0.3125	<b>0.005</b>	biowsj +biowsj+1 + biowsj+2	0.4588	<b>0.002</b>
biowsj+1 + biowsj+2 + biowsj+3	0.1901	<b>0.078</b>	biowsj+1 + biowsj+2 + biowsj+3	0.3443	<b>0.023</b>
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.2472	<b>0.036</b>	biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.3903	<b>0.022</b>
biowsj+2 + biowsj+3	0.1036	0.333	biowsj+2 + biowsj+3	0.1945	0.114
biowsj+2 + biowsj+3 + biowsj+4	0.1606	0.197	biowsj+2 + biowsj+3 + biowsj+4	0.2405	0.125

# Summary: Number of M&As

- Market timing: Supported for M&A using NASDAQ.
  - Is this because acquirers anticipate market declines?
- Attention: Positive effect of WSJ attention in quarters before M&As.
  - Possible lack of causality

# Investment Timing and Focus

# Investment Timing: Series A v. All Series

Series A Percentage on NASDAQ Index Returns				Series A Percentage on Biotech Index Returns			
	N Obs	119		N Obs	106		
	R <sup>2</sup>	0.2803		R <sup>2</sup>	0.5468		
Series A Percent	Coef.	t	P>t	Series A Percent	Coef.	t	P>t
nasd-2	-0.12591	-0.890	0.378	bioret-2	-0.0662	-0.940	0.350
nasd-1	0.062758	0.470	0.639	bioretl-1	-0.1251	-1.700	<b>0.092</b>
nasdaq	-0.0468	-0.290	0.769	bioret	-0.2058	-3.190	<b>0.002</b>
nasd+1	-0.28183	-1.610	0.110	bioret+1	-0.1397	-2.070	<b>0.042</b>
nasd+2	-0.038	-0.210	0.836	bioret+2	-0.1121	-1.770	<b>0.081</b>
biowsj	-0.00531	<b>-1.550</b>	<b>0.125</b>	biowsj	-0.0002	-0.130	0.896
biowsj+1	-0.00171	-0.540	0.588	biowsj+1	-0.0027	-1.420	0.158
biowsj+2	-0.00223	<b>-0.590</b>	<b>0.553</b>	biowsj+2	0.0017	0.750	0.455
biowsj+3	0.006421	1.970	0.052	biowsj+3	-0.0003	-0.160	0.872
biowsj+4	0.002219	<b>0.730</b>	<b>0.466</b>	biowsj+4	0.0006	0.270	0.788
Controls	Yes			Controls	Yes		
Wald Tests	Sum	p-value		Wald Tests	Sum	p-value	
nasd + nasd-2 + nasd-1	-0.1100	0.656		bioret + bioret-1 + bioret-2	-0.3970	<b>0.001</b>	
nasd-1 + nasd-2	-0.0632	0.742		bioret-1 + bioret-2	-0.1912	<b>0.067</b>	
nasdaq + nasd+1	-0.3286	<b>0.094</b>		bioret + bioretlag1	-0.3454	<b>0.001</b>	
nasd+ nasd+1 + nasd+2	-0.3666	0.150		bioret + bioretlag1 + bioretlag2	-0.4576	<b>0.000</b>	
nasd+1 + nasd+2	-0.3198	0.222		bioret+1 + bioret+2	-0.2518	<b>0.010</b>	
biowsj + biowsj+1	-0.0070	<b>0.071</b>		biowsj + biowsj+1	-0.0030	0.212	
biowsj+1 + biowsj+2	-0.0039	0.297		biowsj+1 + biowsj+2	-0.0010	0.671	
biowsj +biowsj+1 + biowsj+2	-0.0092	<b>0.097</b>		biowsj +biowsj+1 + biowsj+2	-0.0012	0.673	
biowsj+1 + biowsj+2 + biowsj+3	0.0025	0.592		biowsj+1 + biowsj+2 + biowsj+3	-0.0013	0.615	
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.0047	0.247		biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	-0.0007	0.794	
biowsj+2 + biowsj+3	0.0042	0.292		biowsj+2 + biowsj+3	0.0014	0.561	
biowsj+2 + biowsj+3 + biowsj+4	0.0064	0.150		biowsj+2 + biowsj+3 + biowsj+4	0.0020	0.491	

# Investment Timing: Series A v. All Series

Series A Percentage on NASDAQ Index Returns

	N Obs	119	
	R^2	0.2803	
Series A Percent	Coef.	t	P>t
nasd-2	-0.12591	-0.890	0.378
nasd-1	0.062758	0.470	0.639
nasdaq	-0.0468	-0.290	0.769
nasd+1	-0.28183	-1.610	0.110
nasd+2	-0.038	-0.210	0.836
biowsj	-0.00531	<b>-1.550</b>	<b>0.125</b>
biowsj+1	-0.00171	-0.540	0.588
biowsj+2	-0.00223	<b>-0.590</b>	<b>0.553</b>
biowsj+3	0.006421	1.970	0.052
biowsj+4	0.002219	<b>0.730</b>	<b>0.466</b>
Controls	Yes		

Wald Tests	Sum	p-value
nasd + nasd-2 + nasd-1	-0.1100	0.656
nasd-1 + nasd-2	-0.0632	0.742
nasdaq + nasd+1	-0.3286	<b>0.094</b>
nasd+ nasd+1 + nasd+2	-0.3666	0.150
nasd+1 + nasd+2	-0.3198	0.222
biowsj + biowsj+1	-0.0070	<b>0.071</b>
biowsj+1 + biowsj+2	-0.0039	0.297
biowsj +biowsj+1 + biowsj+2	-0.0092	<b>0.097</b>
biowsj+1 + biowsj+2 + biowsj+3	0.0025	0.592
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.0047	0.247
biowsj+2 + biowsj+3	0.0042	0.292
biowsj+2 + biowsj+3 + biowsj+4	0.0064	0.150

Series A Percentage on Biotech Index Returns

	N Obs	106	
	R^2	0.5468	
Series A Percent	Coef.	t	P>t
bioret-2	-0.0662	-0.940	0.350
bioretl-1	-0.1251	-1.700	<b>0.092</b>
bioret	-0.2058	-3.190	<b>0.002</b>
bioret+1	-0.1397	-2.070	<b>0.042</b>
bioret+2	-0.1397	-2.070	<b>0.081</b>
Controls	Yes		

Wald Tests	Sum	p-value
bioret + bioret-1 + bioret-2	-0.3970	<b>0.001</b>
bioret-1 + bioret-2	-0.1912	<b>0.067</b>
bioret + bioretlag1	-0.3454	<b>0.001</b>
bioret + bioretlag1 + bioretlag2	-0.4576	<b>0.000</b>
bioret+1 + bioret+2	-0.2518	<b>0.010</b>
biowsj + biowsj+1	-0.0030	0.212
biowsj+1 + biowsj+2	-0.0010	0.671
biowsj +biowsj+1 + biowsj+2	-0.0012	0.673
biowsj+1 + biowsj+2 + biowsj+3	-0.0013	0.615
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	-0.0007	0.794
biowsj+2 + biowsj+3	0.0014	0.561
biowsj+2 + biowsj+3 + biowsj+4	0.0020	0.491

Lead biotech index returns are negatively related to Series A percent

# Investment Timing: Series A v. All Series

Series A Percentage on NASDAQ Index Returns

	N Obs	119	
	R^2	0.2803	
Series A Percent	Coef.	t	P>t
nasd-2	-0.12591	-0.890	0.378
nasd-1	0.062758	0.470	0.639
nasdaq	-0.0468	-0.290	0.769
nasd+1	-0.28183	-1.610	0.110
nasd+2	-0.038	-0.210	0.836
biowsj	-0.00531	<b>-1.550</b>	<b>0.125</b>
biowsj+1	-0.00171	-0.540	0.588
biowsj+2	-0.00223	<b>-0.590</b>	<b>0.553</b>
biowsj+3	0.006421	1.970	0.052
biowsj+4	0.002219	<b>0.730</b>	<b>0.466</b>
Controls	Yes		

Series A Percentage on Biotech Index Returns

	N Obs	106	
	R^2	0.5468	
Series A Percent	Coef.	t	P>t
bioret-2	-0.0662	-0.940	0.350
bioretl-1	-0.1251	-1.700	<b>0.092</b>
bioret	-0.2058	-3.190	<b>0.002</b>
bioret+1	-0.1397	-2.070	<b>0.042</b>
bioret+2			<b>0.081</b>
Controls			

Lag biotech index returns are negatively related to Series A percent

Wald Tests

	Sum	p-value
nasd + nasd-2 + nasd-1	-0.1100	0.656
nasd-1 + nasd-2	-0.0632	0.742
nasdaq + nasd+1	-0.3286	<b>0.094</b>
nasd+ nasd+1 + nasd+2	-0.3666	0.150
nasd+1 + nasd+2	-0.3198	0.222
biowsj + biowsj+1	-0.0070	<b>0.071</b>
biowsj+1 + biowsj+2	-0.0039	0.297
biowsj + biowsj+1 + biowsj+2	-0.0092	<b>0.097</b>
biowsj+1 + biowsj+2 + biowsj+3	0.0025	0.592
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	0.0047	0.247
biowsj+2 + biowsj+3	0.0042	0.292
biowsj+2 + biowsj+3 + biowsj+4	0.0064	0.150

Wald Tests

	Sum	p-value
bioret + bioret-1 + bioret-2	-0.3970	<b>0.001</b>
bioret-1 + bioret-2	-0.1912	<b>0.067</b>
bioret + bioretlag1	-0.3454	<b>0.001</b>
bioret + bioretlag1 + bioretlag2	-0.4576	<b>0.000</b>
bioret+1 + bioret+2	-0.2518	<b>0.010</b>
biowsj + biowsj+1	-0.0030	0.212
biowsj+1 + biowsj+2	-0.0010	0.671
biowsj + biowsj+1 + biowsj+2	-0.0012	0.673
biowsj+1 + biowsj+2 + biowsj+3	-0.0013	0.615
biowsj+1 + biowsj+2 + biowsj+3 + biowsj+4	-0.0007	0.794
biowsj+2 + biowsj+3	0.0014	0.561
biowsj+2 + biowsj+3 + biowsj+4	0.0020	0.491

# Summary: VC Investment Focus and Timing

- VCs focus on earlier stages when market returns are low.
- Media attention has no material effect.



Conclusion

# Recap for the Biotech Sector

- IPOs
  - High IPO activity precedes quarters with low market returns.
  - Little evidence that IPO activity is related to media attention.
- M&A exits
  - When market returns are low, VC-backed biotechs substitute into M&As.
  - High M&A exits are preceded by high levels of media attention to biotech.
- Investment timing and focus
  - When biotech returns have been low (high), VCs focus on early investment stages (later stages) with long (shorter) expected holding periods