NUMBERS AND NARRATIVE: VALUE AND PRICE IN THE DRUG BUSINESS

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Bridging the Gap

Favored Tools
- Accounting statements
- Excel spreadsheets
- Statistical Measures
- Pricing Data

A Good Valuation

Favored Tools
- Anecdotes
- Experience (own or others)
- Behavioral evidence

The Numbers People ⟷ The Narrative People

Illusions/Delusions
1. Precision: Data is precise
2. Objectivity: Data has no bias
3. Control: Data can control reality

Illusions/Delusions
1. Creativity cannot be quantified
2. If the story is good, the investment will be.
3. Experience is the best teacher

From Story to Numbers: The Steps

Step 1: Develop a narrative for the business that you are valuing
In the narrative, you tell your story about how you see the business evolving over time.

Step 2: Test the narrative to see if it is possible, plausible and probable
There are lots of possible narratives, not all of them are plausible and only a few of them are probable.

Step 3: Convert the narrative into drivers of value
Take the narrative apart and look at how you will bring it into valuaton inputs starting with potential market size down to cash flows and risk. By the time you are done, each part of the narrative should have a place in your numbers and each number should be backed up a portion of your story.

Step 4: Connect the drivers of value to a valuation
Create an intrinsic valuation model that connects the inputs to an end-value the business.

Step 5: Keep the feedback loop open
Listen to people who know the business better than you do and use their suggestions to fine tune your narrative and perhaps even alter it. Work out the effects on value of alternative narratives for the company.

The Drug Business: Then and Now!

The Drug Business in 1991

- Spend on R&D first
- Mostly domestic
- Almost complete pricing power
- Use Blockbuster drugs to generate super profits.
- Use legal strategies to extend patent protection.

The Drug Business today

- Spend on R&D and acquisitions
- Increasingly international
- Limited pricing powr
- Use marketing strategies to work on “brand name” life extensions.

The Underlying Big Story: A Decline in Pricing Power

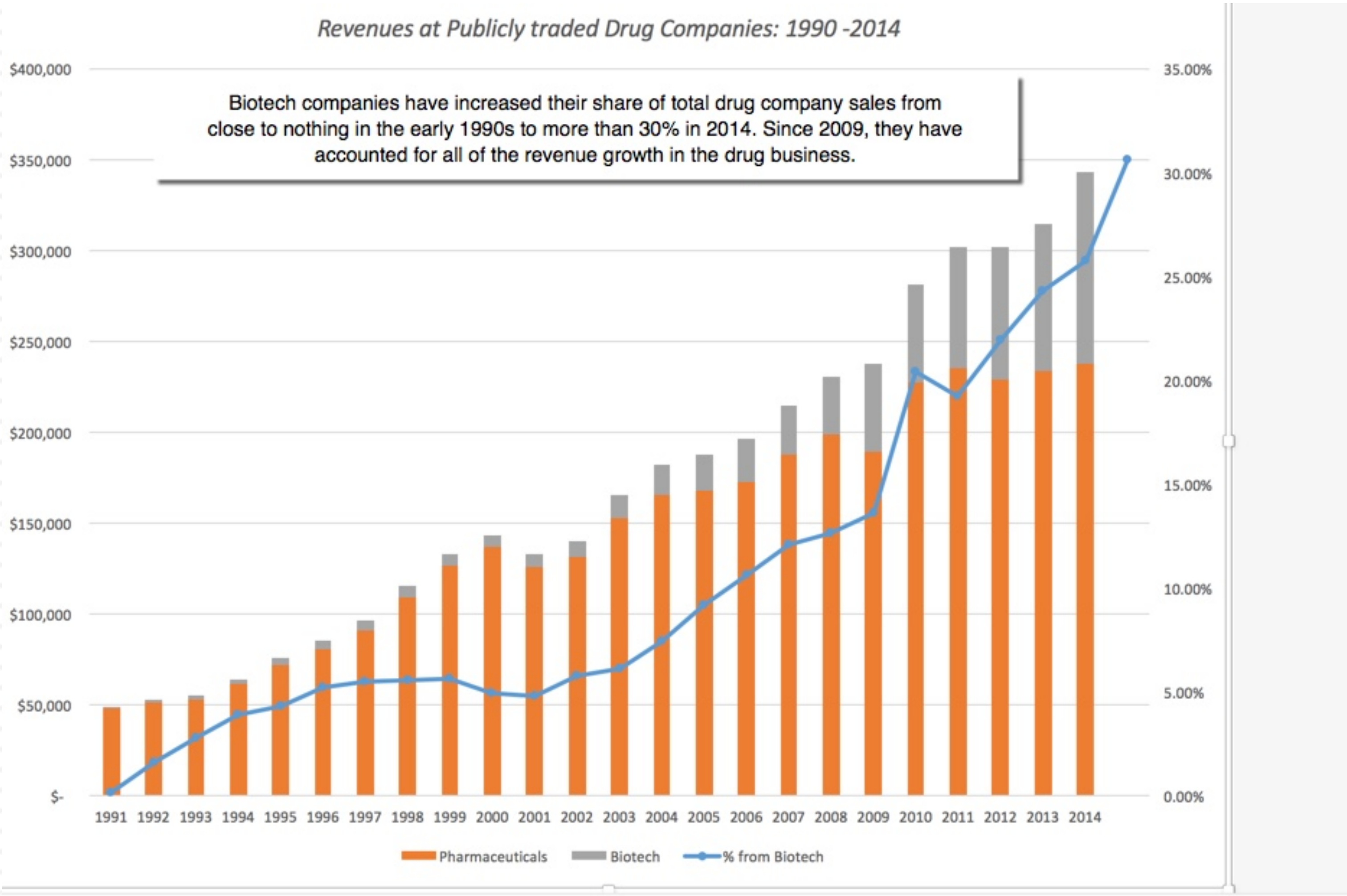
1. Consolidation within the health insurance business, potentially increasing their bargaining power with the pharmaceutical companies on drug prices.
2. The government has used the buying clout of Medicaid to bargain for better prices on drugs, and while Medicare still works through insurance companies, it can put pressure on them to negotiate for lower costs.
3. Pharmacies that represent the distribution networks for many drugs have also been corporatized and consolidated, and are gaining a voice in the pricing process.

The net effect of all of these changes is that R&D has much more uncertain payoffs and has to evaluated like any other large capital investment : that it is good only when it creates value for a business.

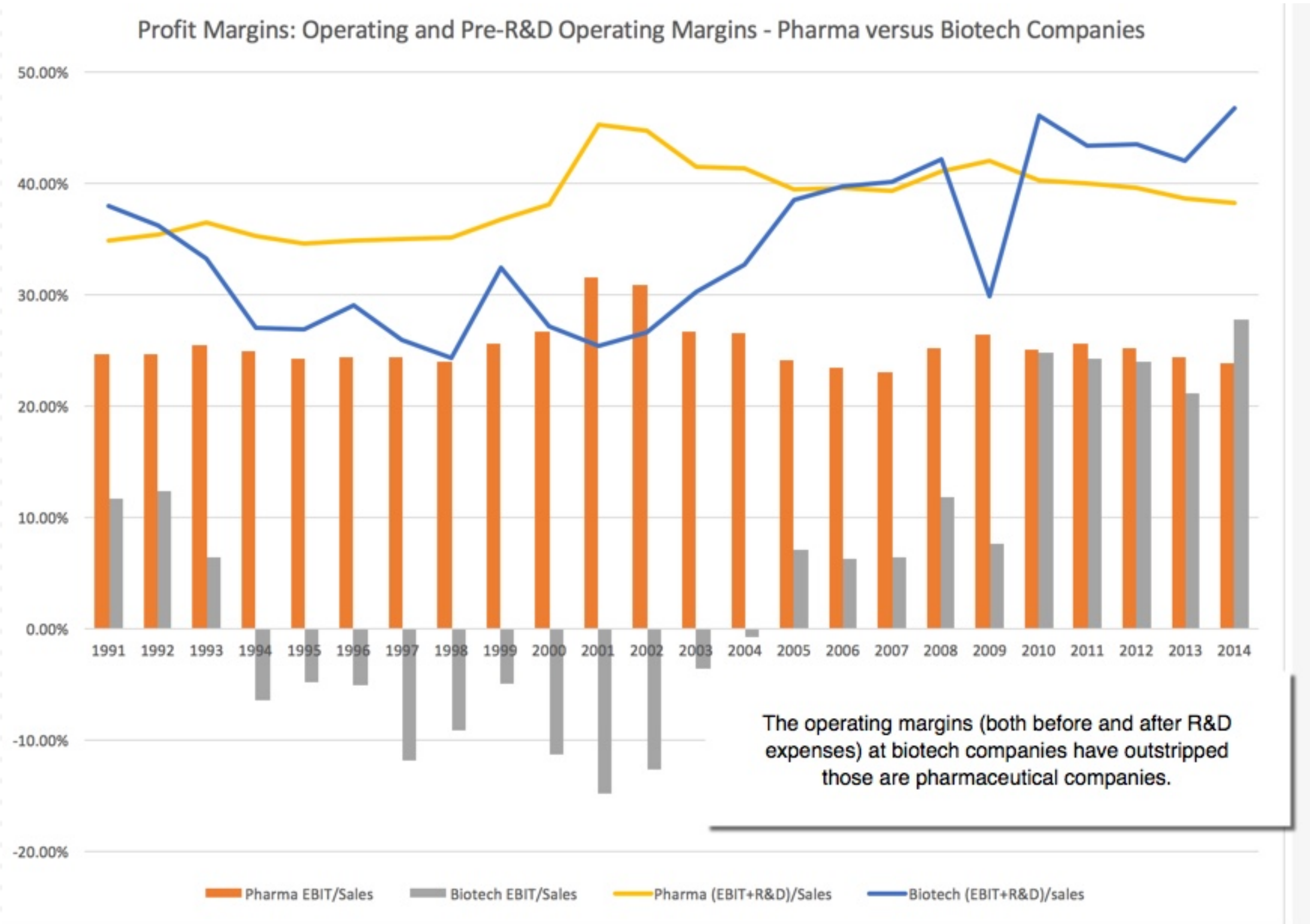
Pharma versus Biotech

- Research basis: The is the method by which they produce drugs, with pharmaceutical firms working with chemicals and biotechnology companies using live organisms (bacteria, cells or yeast) to generate their drugs.
- Other differences: The rest of the differences that people point to between the two, i.e, that biotech companies spend more time on research, tend to lose money and are riskier have less to do with business differences than life cycle differences.

The Growth of Biotech



The Money Machine is slowing…



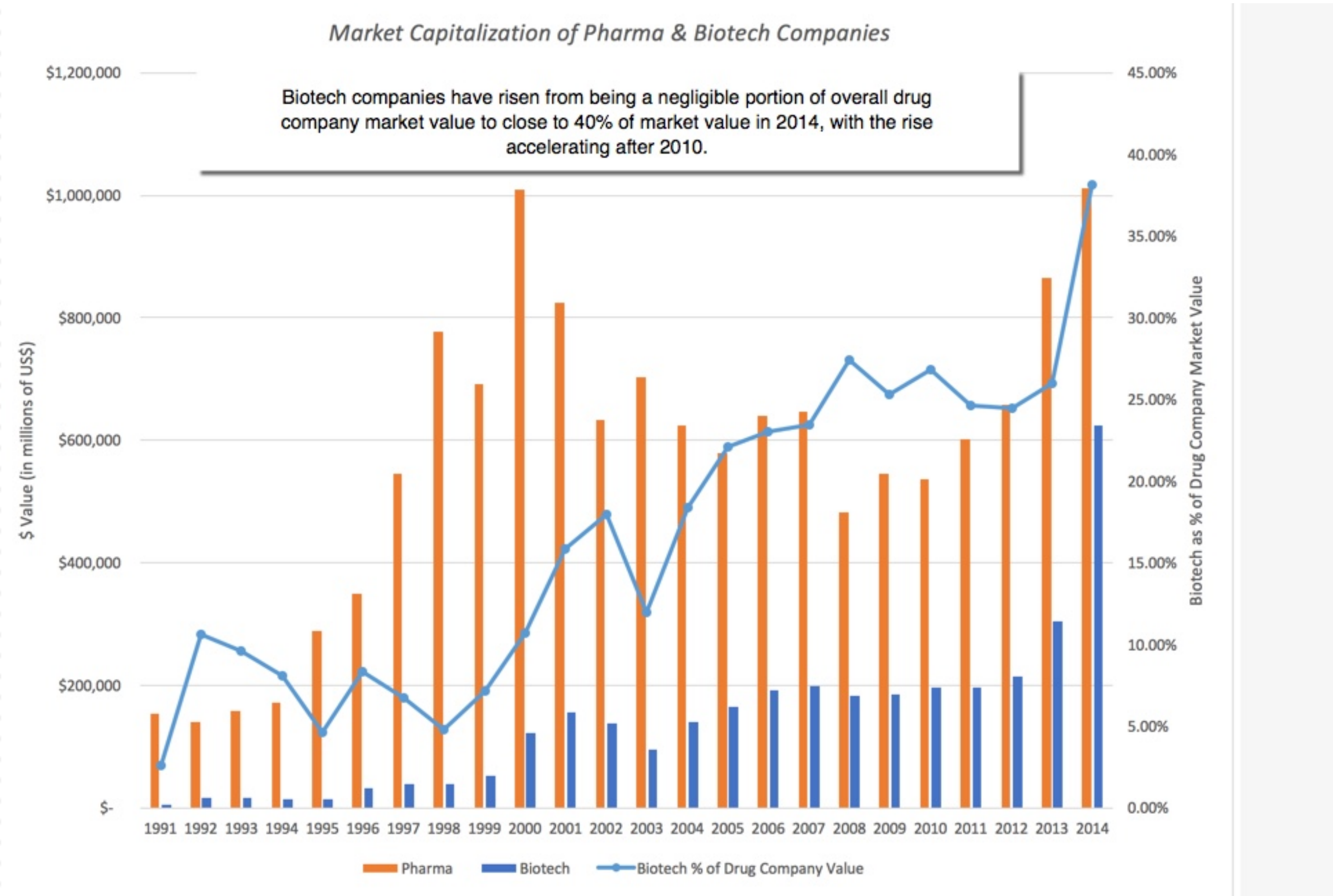
The Payoff to R&D is dropping

	Pharmaceutical Firms			Biotech Firms		
Year	R&D/Sales	Revenue Growth Rate	Growth to R&D Ratio	R&D/Sales	Revenue Growth Rate	Growth to R&D Ratio
1991	10.17%	49.30%	4.85	26.22%	1444.23%	55.08
1992	10.64%	6.40%	0.60	23.80%	82.91%	3.48
1993	10.97%	3.58%	0.33	26.87%	48.36%	1.80
1994	10.30%	15.85%	1.54	33.50%	27.66%	0.83
1995	10.37%	17.32%	1.67	31.72%	42.99%	1.36
1996	10.44%	11.38%	1.09	34.18%	18.61%	0.54
1997	10.61%	13.20%	1.24	37.80%	14.23%	0.38
1998	11.15%	19.92%	1.79	33.44%	21.49%	0.64
1999	11.08%	15.66%	1.41	37.39%	0.32%	0.01
2000	11.41%	8.15%	0.71	38.46%	4.79%	0.12
2001	13.74%	-8.17%	-0.59	40.23%	11.96%	0.30
2002	13.95%	4.80%	0.34	39.19%	11.34%	0.29
2003	14.72%	16.26%	1.10	33.86%	44.21%	1.31
2004	14.79%	8.17%	0.55	33.43%	35.49%	1.06
2005	15.40%	1.49%	0.10	31.43%	19.26%	0.61
2006	16.08%	2.86%	0.18	33.49%	19.43%	0.58
2007	16.21%	8.57%	0.53	33.76%	14.29%	0.42
2008	15.94%	6.21%	0.39	30.35%	15.20%	0.50
2009	15.58%	-4.87%	-0.31	22.18%	54.79%	2.47
2010	15.17%	19.82%	1.31	21.25%	11.42%	0.54
2011	14.30%	3.77%	0.26	19.19%	22.76%	1.19
2012	14.48%	-2.99%	-0.21	19.53%	10.52%	0.54
2013	14.28%	2.34%	0.16	20.80%	10.50%	0.51
2014	14.36%	1.67%	0.12	19.04%	29.59%	1.55
1991-1995	**10.49%**	**18.49%**	**1.80**	**28.42%**	**329.23%**	**12.51**
1996-2000	**10.94%**	**13.66%**	**1.25**	**36.26%**	**11.89%**	**0.34**
2001-2005	**14.52%**	**4.51%**	**0.30**	**35.63%**	**24.45%**	**0.71**
2006-2010	**15.80%**	**6.52%**	**0.42**	**28.21%**	**23.02%**	**0.90**
2011-2014	**14.36%**	**1.20%**	**0.08**	**19.64%**	**18.34%**	**0.95**

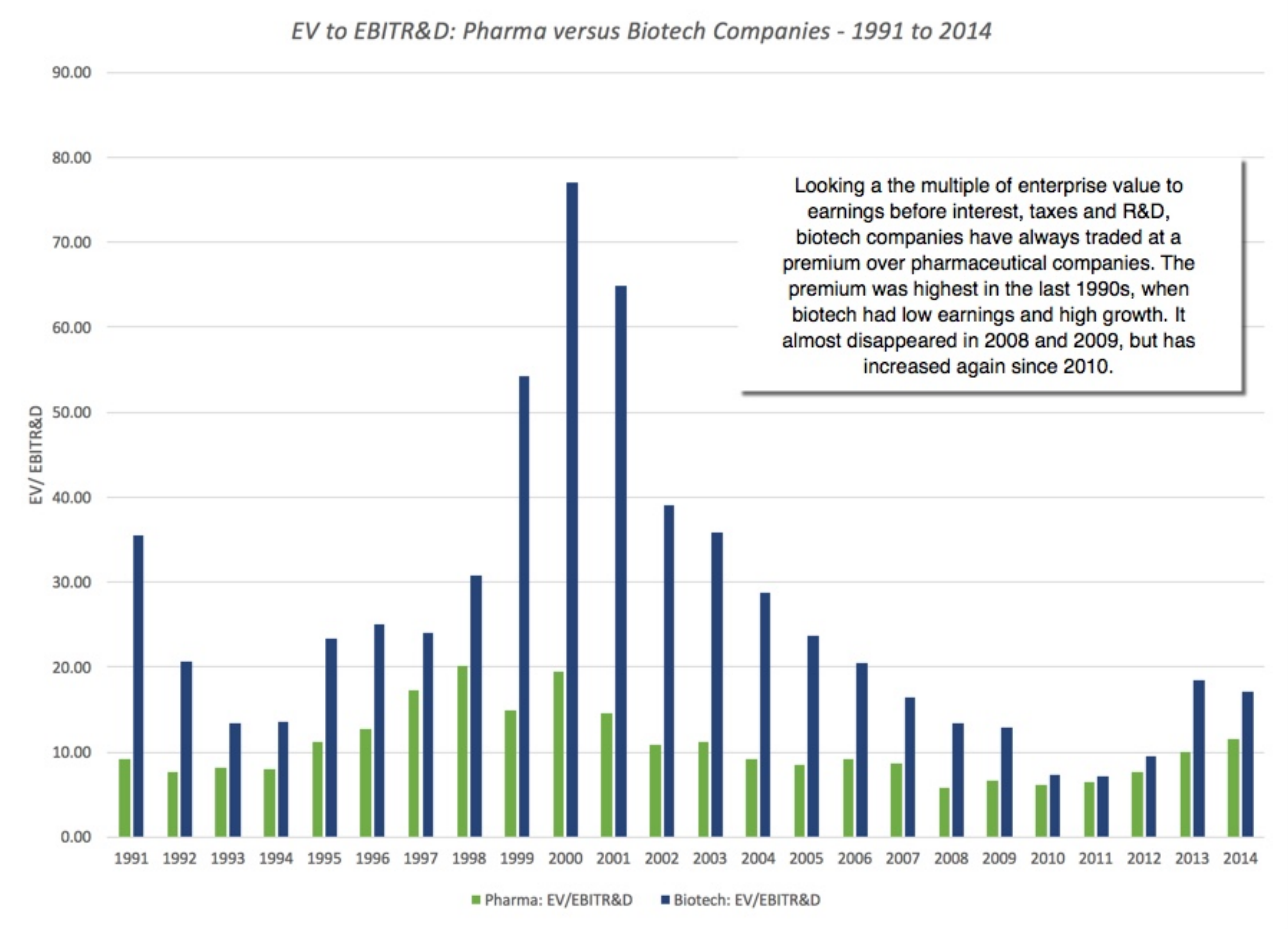
The biggest drug companies

Company Name	Industry Classifications	Revenues in 2014
Johnson & Johnson (NYSE:JNJ)	Pharmaceuticals (Primary)	$74,331.00
Pfizer Inc. (NYSE:PFE)	Pharmaceuticals (Primary)	$49,605.00
Merck & Co. Inc. (NYSE:MRK)	Pharmaceuticals (Primary)	$42,237.00
Gilead Sciences Inc. (NasdaqGS:GILD)	Biotechnology (Primary)	$24,890.00
Amgen Inc. (NasdaqGS:AMGN)	Biotechnology (Primary)	$20,063.00
AbbVie Inc. (NYSE:ABBV)	Biotechnology (Primary)	$19,960.00
Eli Lilly and Company (NYSE:LLY)	Pharmaceuticals (Primary)	$19,615.60
Bristol-Myers Squibb Company (NYSE:BMY)	Pharmaceuticals (Primary)	$15,879.00
Allergan plc (NYSE:AGN)	Pharmaceuticals (Primary)	$13,062.30
Biogen Inc. (NasdaqGS:BIIB)	Biotechnology (Primary)	$9,700.30

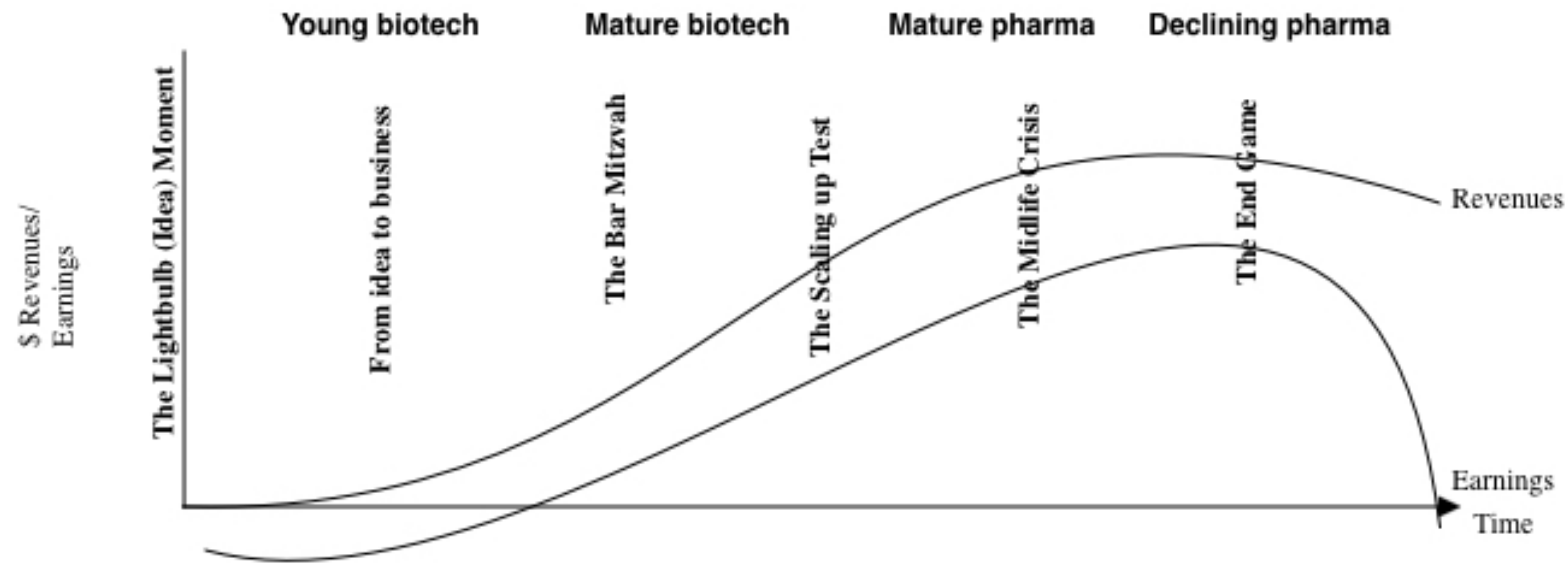
The Market Cap is shifting



And the pricing is adjusting



It’s in the life cycle



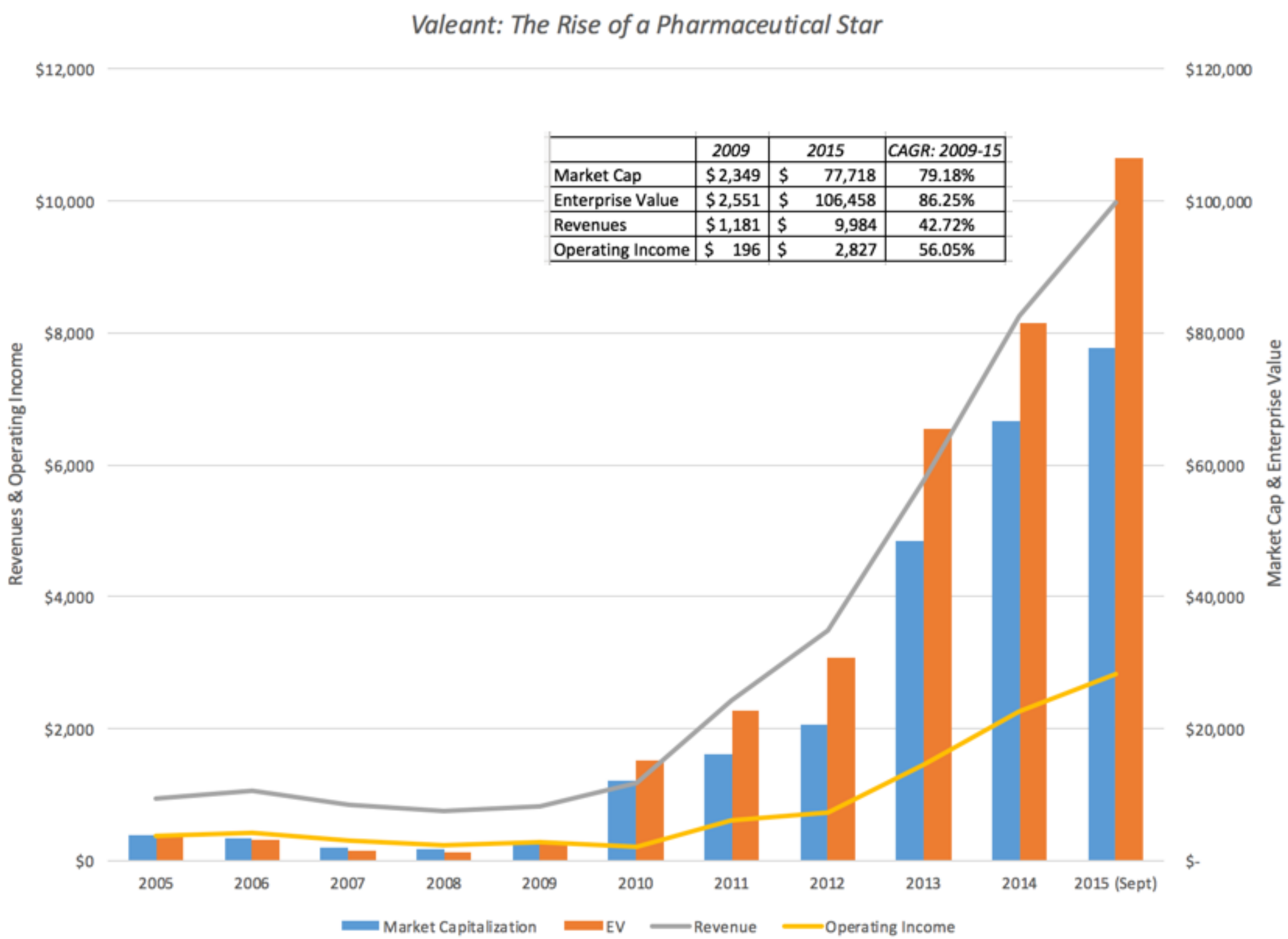
Should you a

Growth Stage	Stage 1 Start-up	Stage 2 Young Growth	Stage 3: High Growth	Stage 4 Mature Growth	Stage 5 Mature Stable	Stage 6 Decline
R&D focus	R&D for potential	R&D for viability	R&D for development	R&D for growth	R&D to maintain profits	R&D for divestiture
Investor focus	Market Size	Drug approval process	Revenues & Growth	Pricing and Margins	Earnings and Cash flows	Cash flows

From Business to Company

The Valeant Story

Valeant's Star Turn



	2009	2015	CAGR: 2009-15
Market Cap	$ 2,349	$ 77,718	79.18%
Enterprise Value	$ 2,551	$ 106,458	86.25%
Revenues	$ 1,181	$ 9,984	42.72%
Operating Income	$ 196	$ 2,827	56.05%

The Business Model that made it a star

Online Pharmacies to pass through price icnreases.

Acquisition Accounting Debris (goodwill, acquisition charges) obscures financial performance.

Low effective tax rate

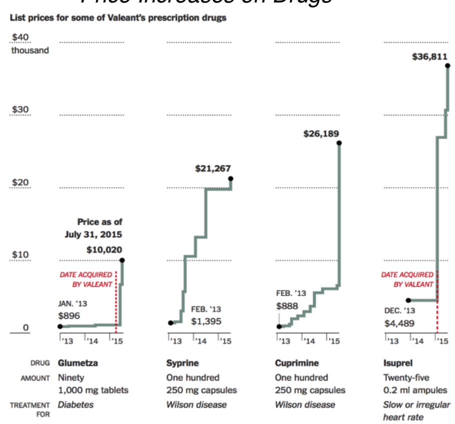
Higher profitability, with supercharged EPS growth.

Acquisition-driven growth

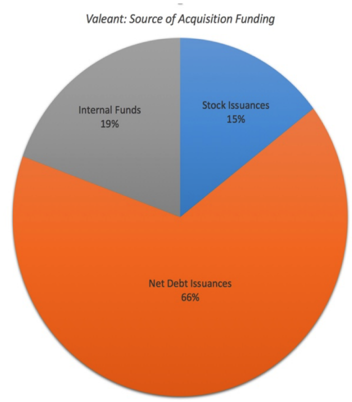
Valeant | Acquisitions Since 2013

Announce Date	Target Name	Seller	Announced Value ($M)	Consideration	Acq. Price Per Share	Price 1 Day Prior to Initial Ann.(1)	Premium
02-Sep-15	Synergetics USA Inc		$160	Cash	$6.50	$4.39	48.1%
20-Aug-15	Sprout Pharmaceuticals Inc		$1,000	Cash		Not Public	
23-Jul-15	US & Canada business/Comm	Commonwealth	undisclosed	Cash		Not Public	
17-Jul-15	Amoun Pharmaceutical Co		$800	Cash		Not Public	
13-Jul-15	Unilens Vision Inc		$27	Cash	$12.75	$10.25	24.4%
08-May-15	Paragon Vision Sciences Inc		undisclosed	Cash		Not Public	
04-Mar-15	Altace rights	Sanofi	undisclosed	Cash		Not Public	
24-Feb-15	Portfolio of Branded Hospital	Marathon Pharm	undisclosed	Cash		Not Public	
22-Feb-15	Salix Pharmaceuticals Ltd		$12,524	Cash	$173.00	$137.34	26.0%
29-Jan-15	PROVENGE product & certain	Dendreon Corp	$495	Cash		Not Public	
17-Nov-14	Nicox Inc	Nicox	$10	Cash		Not Public	
04-Nov-14	CROMA Pharma Canada Ltd	Croma-Pharma	undisclosed	Undisclosed		Not Public	
25-Aug-14	Dermatology portfolio/Valeo	Valeo Pharma	$23	Cash		Not Public	
20-Jun-14	ECR Pharmaceuticals Co Inc	Akorn Inc	$41	Cash		Not Public	
03-Feb-14	PreCision Dermatology Inc		$475	Cash		Not Public	
16-Dec-13	Solta Medical Inc		$263	Cash	$2.92	$2.09	39.7%
30-Oct-13	Euvipharm Pharmaceutical JSC		$20	Cash		Not Public	
10-Oct-13	Ideal Implant	Ideal Implant	undisclosed	Cash		Not Public	
29-May-13	Ekomir Pharma		$15	Cash		Not Public	
27-May-13	Bausch & Lomb Inc		$8,700	Cash		Not Public	
20-Mar-13	Obagi Medical Products Inc		$376	Cash	$19.75	$15.39	28.3%
21-Feb-13	Targretin	Eisai Co	$65	Cash		Not Public	
13-Feb-13	OTC Pharmaceutical assets	Lek-Am Sp zoo	undisclosed	Cash		Not Public	
Total			$24,993				

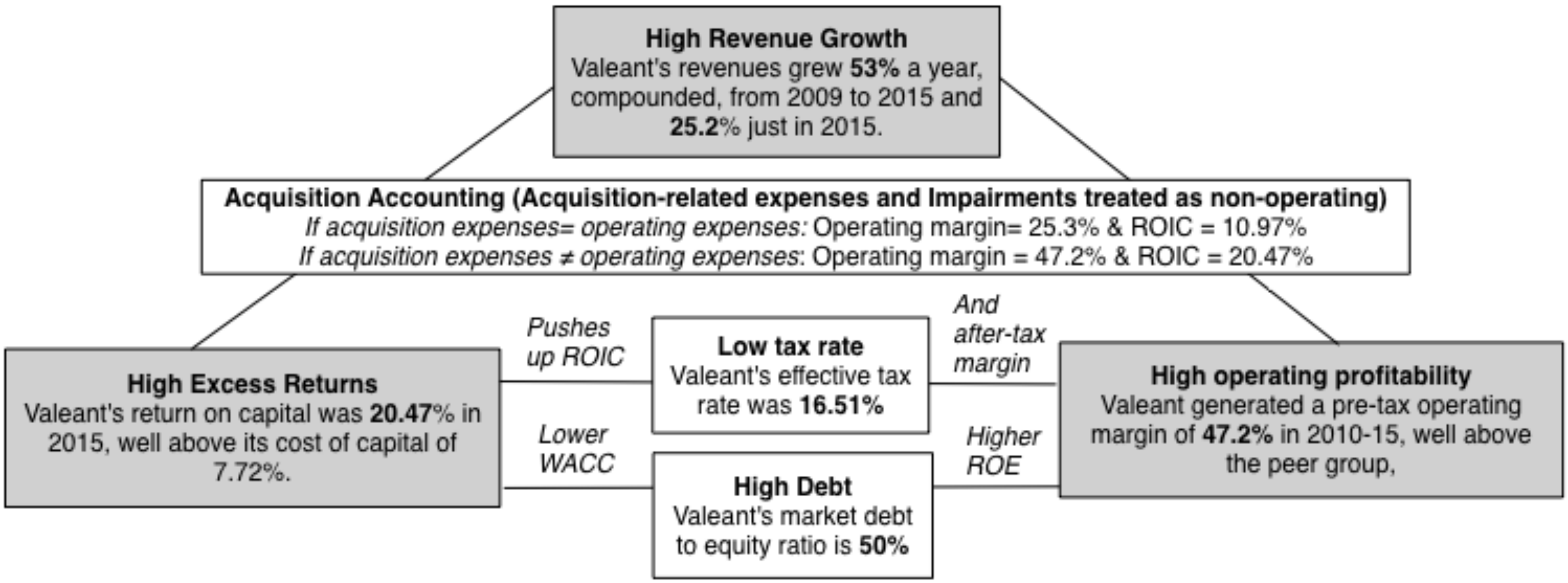
Price Increases on Drugs



Funded with debt



The numbers don't lie (or do they?)



Valuing a Star

Valeant continues on its path of acquisition-driven growth, with a compounded revenue growth of 12% a year for the next 10 years.

	0	1	2	3	4	5	6	7	8	9	10
Revenues	$ 9,990	$ 11,189	$ 12,532	$ 14,035	$ 15,720	$ 17,606	$ 19,719	$ 22,085	$ 24,735	$ 27,703	$ 31,028
Operating Margin	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%
Operating Income	$ 4,977	$ 5,574	$ 6,243	$ 6,992	$ 7,832	$ 8,771	$ 9,824	$ 11,003	$ 12,323	$ 13,802	$ 15,458
After-tax Operating Income		$ 4,654	$ 5,213	$ 5,838	$ 6,539	$ 7,323	$ 8,202	$ 9,186	$ 10,289	$ 11,523	$ 12,906
- Reinvestment	$ 2,506	$ 2,807	$ 3,144	$ 3,521	$ 3,944	$ 4,417	$ 4,947	$ 5,540	$ 6,205	$ 6,950	$ 3,344
FCFF	$ (2,506)	$ 1,847	$ 2,069	$ 2,317	$ 2,595	$ 2,906	$ 3,255	$ 3,646	$ 4,083	$ 4,573	$ 9,562
Terminal Value											$ 170,555
Value today @7.72%	$ 101,258										
+ Cash	$ 1,420										
- Debt	$ 30,883										
Value of Equity	$ 71,795										
Value per share	**208.16**										

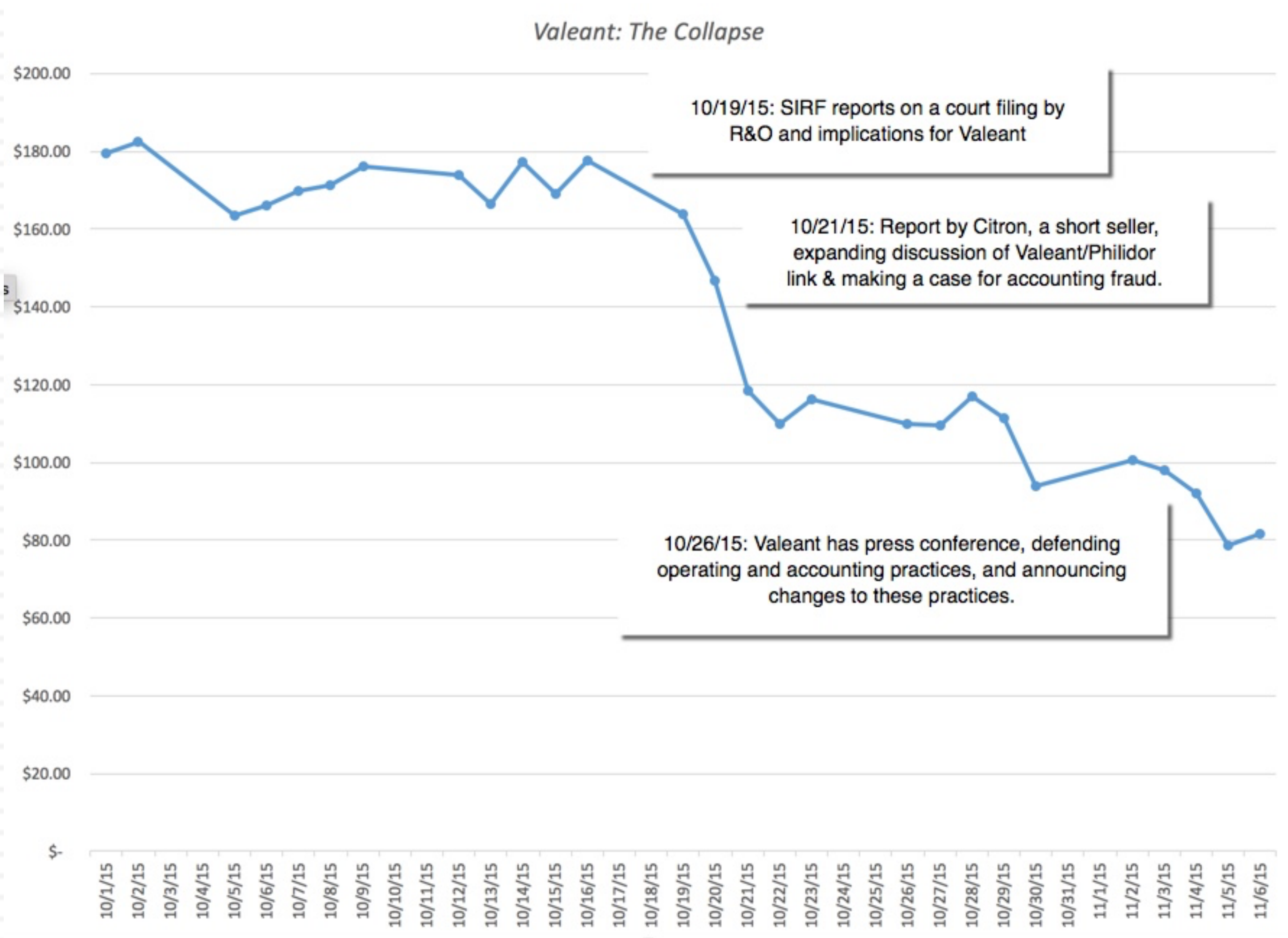
Operating margin settles in at 49.82%, Valeant's operating margin (prior to acquisition expenses)

Effective tax rate stays at 16.51%.

Valeant maintains its current ROIC of 19.90% as its grows, with reinvestment rate =g/ 19.90%.

Valeant's continues its use of debt in funding acquisitions. This creates a tax benefit, without substantial default risk. Cost of capital for the firm is 7.72%.

The Short Seller's Strike



The Unraveling of a Business Model

1. Acquisition accounting comes under scrutiny: A portion (and the magnitude is debatable) of Valeant's success can be attributed to acquisition accounting (moving normal operating expenses into the extraordinary accounting expense column).
2. Drug price increases draw attention: To the extent that health care is a business that has political overtones and Valeant has to negotiate with the government and big insurers, being labeled as a "price increaser" will make it difficult.
3. The steroids have limited life: The high debt and low taxes that characterized Valeant's business model both come with costs.

Valeant, the Cash Cow

Valeant settles for mature drug company growth, with a compounded revenue growth of 3% a year for the next 10 years.

	0	1	2	3	4	5	6	7	8	9	10
Revenues	$10,557	$10,874	$11,200	$11,536	$11,882	$12,238	$12,606	$12,984	$13,373	$13,774	$14,188
Operating Margin	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%	43.66%
Operating Income	$ 4,609	$ 4,747	$ 4,890	$ 5,037	$ 5,188	$ 5,343	$ 5,504	$ 5,669	$ 5,839	$ 6,014	$ 6,194
After-tax Operating Income		$ 3,798	$ 3,912	$ 4,029	$ 4,150	$ 4,275	$ 4,403	$ 4,535	$ 4,671	$ 4,811	$ 4,955
- Reinvestment	$627	$645	$665	$685	$705	$726	$748	$771	$794	$817	$1,318
FCFF	-$627	$3,153	$3,247	$3,345	$3,445	$3,549	$3,655	$3,765	$3,878	$3,994	$3,638
Terminal Value											$67,227
Value today @7.72%	$56,059										
+ Cash	$ 1,420										
- Debt	$30,883										
Value of Equity	$26,596										
Value per share	**77.11**										

Operating margin drops to 43.66%, as Valeant backs away from drug price increases.

Effective tax rate rises to 20% as acquisition tax shields dissipate.

Valeant maintains its current ROIC of 17.66% as its grows, with reinvestment rate =g/ 17.66%.

Valeant's continues to use debt, albeit with less growth (fewer acquisitions and more R&D). Cost of capital for the firm is 7.52%.

The Dark Side gets Darker

- Information blackout: The 10K that was expected to be filed in February has been delayed and is now more than 2 months late.
- Managerial Double talk: In the intervening months, Valeant's managers have been in the news, and the arguments they made were so much at odds with the facts that they lost credibility first and their CEO in December to an undisclosed illness.
- Legal Jeopardy: The company, after claiming that separation from Philidor would be low-cost and easy backtracked in January and February with disclosures that suggested deeper links.
- Debt load: Debt is a double edged sword, increasing earnings per share and providing tax benefits in good times but potentially making bad times worse. Not only was the $30 billion in debt looming larger, but covenants in the debt were on the verge of being triggered by the delay in financial filings.

And the market reacts…

Debt, from benefit to burden..

- The debt at Valeant has become more burden than a help, as it has not only triggered worries about covenants being violated but has opened up the possibility that that the company will have trouble making its payments.
- The effects on the valuation are two fold:
  - Moody's lowered its bond rating for the company to B1, causing the cost of debt to jump and the cost of capital to rise to 8.29% (from 7.52% in November 2015).
  - The debt is creating the possibility (albeit small) that the company may not survive as a going concern. I have attached a 5% chance of failure, with the assumption that liquidation will be at a 25% discount on fair value.

What's in the delayed report?

- Delayed news is almost never good news and are two key operating numbers where the delayed report can contain bad news.
- There are two effects on valuation:
  - Revenues may have be reduced to reflect the Philidor and other problems. I assumed that revenues would be reduced only a small amount (2%).
  - The company may disclose that some or a big chunk of the acquisition-related expenses from prior years were really operating expenses (reducing operating margins). I assumed that the operating margin would drop to 40.39% from 43.66% (that I used in my November 2015 valuation).

Valeant, the Dog

Valeant settles for mature drug company growth, with a compounded revenue growth of 3% a year for the next 10 years. Accounting adjustments reduce base year revenues by 2%.

	0	1	2	3	4	5	6	7	8	9	10
Revenues	$ 10,346	$ 10,656	$ 10,976	$ 11,305	$ 11,645	$ 11,994	$ 12,354	$ 12,724	$ 13,106	$ 13,499	$ 13,904
Operating Margin	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%
Operating Income	$ 4,179	$ 4,304	$ 4,433	$ 4,566	$ 4,703	$ 4,844	$ 4,990	$ 5,139	$ 5,294	$ 5,452	$ 5,616
After-tax Operating Income		$ 3,443	$ 3,546	$ 3,653	$ 3,762	$ 3,875	$ 3,991	$ 4,111	$ 4,234	$ 4,362	$ 4,492
- Reinvestment	$ 627	$ 645	$ 665	$ 685	$ 705	$ 726	$ 748	$ 771	$ 794	$ 817	$ 976
FCFF	$ (627)	$ 2,798	$ 2,882	$ 2,968	$ 3,057	$ 3,149	$ 3,243	$ 3,341	$ 3,441	$ 3,544	$ 3,516
Terminal Value											$ 55,193
Value today @7.72%	$ 45,051										
Value adjusted for default	$ 44,488										
+ Cash	$ 1,420										
- Debt	$ 30,883										
Value of Equity	$ 15,024										
Value per share	**$ 43.56**										

Operating margin drops to 40.39%, as half of acquisition expenses are moved back to operating expenses.

Effective tax rate rises to 20% as acquisition tax shields dissipate.

Valeant maintains its ROIC of 16.01% as its grows, with reinvestment rate =g/ 16.01%.

Valeant's debt is exposing the company to default risk, as rating drops to below investment grade. Cost of capital for the firm is 8.29%. There is also a 5% chance that the firm will default (and receive only 75% of fair value.)

What could go wrong?

		% of Acquisition Expenses Reclassified as Operating Expenses					
		0%	20%	40%	60%	80%	100%
% Drop in Revenues	0%	$ 86.13	$ 70.27	$ 54.42	$ 38.56	$ 22.71	$ 6.85
	2%	$ 82.41	$ 66.87	$ 51.33	$ 35.79	$ 20.26	$ 4.72
	4%	$ 78.69	$ 63.47	$ 48.25	$ 33.02	$ 17.80	$ 2.58
	6%	$ 74.97	$ 60.06	$ 45.16	$ 30.26	$ 15.35	$ 0.45
	8%	$ 71.25	$ 56.66	$ 42.07	$ 27.49	$ 12.90	$ (1.69)
	10%	$ 67.53	$ 53.26	$ 38.99	$ 24.72	$ 10.45	$ (3.82)

Valeant

The Story

Valeant is a tainted company in a business where that taint can be a hindrance in operations, reducing pricing power (because of its past history in pricing) in the near term (leading to negative revenue growth & depressed margins). Transitioning from its past status as an acquisitive company to a more conventional mature drug company, with R&D driving a low growth rate, is feasible but will take time and perserverence. Changes in the US tax code will also push up effective tax rates for teh company.

The Assumptions

	Base year	*Years 1-5*	*Years 6-10*		*After year 10*	*Link to story*
Revenues (a)	$ 9,674	-2.00%	3.00%		Terminal year	Declining sales as pricing power muted
Operating margin (b)	35.03%	35.03%	40.69%		40.69%	Margins will stay low for same reason.
Tax rate	20.00%	20.00%	30.00%		30.00%	Tax rate rises as US tax code changes
Reinvestment (c)		Sales to capital ratio =	0.70	RIR =	28.99%	Shift from high growth acquisitions to low growth R&D
Return on capital	7.99%	Marginal ROIC =	111.23%		6.90%	Earn cost of capital in steady state
Cost of capital (d)		9.00%	6.90%		6.90%	High risk from debt in near term

The Cash Flows

	Revenues	*Operating Margin*	*EBIT*	*EBIT (1-t)*	*Reinvestment*	*FCFF*
1	$ 9,481	35.03%	$ 3,321	$ 2,657	$ (276)	$ 2,933
2	$ 9,291	35.03%	$ 3,255	$ 2,604	$ (271)	$ 2,875
3	$ 9,105	35.03%	$ 3,190	$ 2,552	$ (265)	$ 2,817
4	$ 8,923	35.84%	$ 3,198	$ 2,559	$ (260)	$ 2,819
5	$ 8,745	36.65%	$ 3,205	$ 2,564	$ (255)	$ 2,819
6	$ 9,007	37.46%	$ 3,374	$ 2,632	$ 375	$ 2,257
7	$ 9,277	38.27%	$ 3,550	$ 2,698	$ 386	$ 2,312
8	$ 9,555	39.08%	$ 3,734	$ 2,763	$ 398	$ 2,366
9	$ 9,842	39.89%	$ 3,926	$ 2,826	$ 410	$ 2,417
10	$ 10,137	40.69%	$ 4,125	$ 2,888	$ 422	$ 2,466
Terminal year	$ 10,340	40.69%	$ 4,208	$ 2,945	$ 854	$ 2,092

The Value

Terminal value	$ 42,688		
PV(Terminal value)	$ 19,113		
PV (CF over next 10 years)	$ 17,222		
Value of operating assets =	$ 36,335		
Adjustment for distress	$ 1,817	Probability of failure =	10.00%
- Debt & Mnority Interests	$ 30,301		
+ Cash & Other Non-operating assets	$ 543		
Value of equity	$ 4,759		
- Value of equity options	$ -		
Number of shares	347.80		
Value per share	$ 13.68	Stock was trading at =	$12.00