

# Firm Betas versus divisional Betas

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- Firm Betas as weighted averages: The beta of a firm is the weighted average of the betas of its individual projects.
- Firm Betas and Business betas: At a broader level of aggregation, the beta of a firm is the weighted average of the betas of its individual division.

# Bottom-up versus Top-down Beta

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- The top-down beta for a firm comes from a regression
- The bottom up beta can be estimated by doing the following:
  - ▣ Find out the businesses that a firm operates in
  - ▣ Find the unlevered betas of other firms in these businesses
  - ▣ Take a weighted (by sales or operating income) average of these unlevered betas
  - ▣ Lever up using the firm's debt/equity ratio
- The bottom up beta is a better estimate than the top down beta for the following reasons
  - ▣ The standard error of the beta estimate will be much lower
  - ▣ The betas can reflect the current (and even expected future) mix of businesses that the firm is in rather than the historical mix

# Disney's businesses: The financial breakdown (from 2013 annual report)

<i>Business</i>	<i>Revenues</i>	<i>Operating Income</i>	<i>D&amp;A</i>	<i>EBITDA</i>	<i>S, G &amp; A Costs</i>	<i>Cap Ex</i>	<i>Identifiable Assets</i>
Media Networks	\$20,356	\$6,818	\$251	\$7,069	\$2,768	\$263	\$28,627
Parks & Resorts	\$14,087	\$2,220	\$1,370	\$3,590	\$1,960	\$2,110	\$22,056
Studio Entertainment	\$5,979	\$661	\$161	\$822	\$2,145	\$78	\$14,750
Consumer Products	\$3,555	\$1,112	\$146	\$1,258	\$731	\$45	\$7,506
Interactive	\$1,064	-\$87	\$44	-\$43	\$449	\$13	\$2,311

# Unlevered Betas for businesses

Unlevered Beta  
 $(1 - \text{Cash} / \text{Firm Value})$

<i>Business</i>	<i>Comparable firms</i>	<i>Sample size</i>	<i>Median Beta</i>	<i>Median D/E</i>	<i>Median Tax rate</i>	<i>Company Unlevered Beta</i>	<i>Median Cash/ Firm Value</i>	<i>Business Unlevered Beta</i>
Media Networks	US firms in broadcasting business	26	1.43	71.09%	40.00%	1.0024	2.80%	1.0313
Parks & Resorts	Global firms in amusement park business	20	0.87	46.76%	35.67%	0.6677	4.95%	0.7024
Studio Entertainment	US movie firms	10	1.24	27.06%	40.00%	1.0668	2.96%	1.0993
Consumer Products	Global firms in toys/games production & retail	44	0.74	29.53%	25.00%	0.6034	10.64%	0.6752
Interactive	Global computer gaming firms	33	1.03	3.26%	34.55%	1.0085	17.25%	1.2187

# A closer look at the process...

## Studio Entertainment Betas

Company Name	Levered Beta	Market Capitalization	+ Total Debt including Leases	=Firm Value	-Cash	= Enterprise Value	Cash/Firm Value	Pre-tax cost of debt	Marginal tax rate	Gross D/E ratio	Revenue (Sales)	EV/Sales
SFX Entertainment Inc. (NasdaqGS:SFXE)	1.12	\$738.8	\$98.9	\$837.7	\$143.6	\$694.1	17.14%	8.46%	40.00%	13.39%	62.0	11.20
Mass Hysteria Entertainment Company, Inc. (OTCPK:MHYS)	1.19	\$0.2	\$1.1	\$1.4	\$-	\$1.4	0.00%	10.00%	40.00%	477.94%	0	12.45
Medient Studios, Inc. (OTCPK:MDNT)	0.93	\$3.2	\$3.2	\$6.4	\$0.1	\$6.3	0.81%	4.84%	40.00%	99.07%	5.22	1.21
POW! Entertainment, Inc. (OTCPK:POWN)	0.94	\$4.0	\$0.3	\$4.3	\$0.4	\$3.9	9.85%	4.00%	40.00%	8.65%	2.03	1.92
MGM Holdings Inc. (OTCPK:MGMB)	1.29	\$3,631.7	\$142.2	\$3,773.9	\$140.7	\$3,633.2	3.73%	10.00%	40.00%	3.91%	1,892.6	1.92
Lions Gate Entertainment Corp. (NYSE:LGF)	1.20	\$4,719.6	\$1,283.2	\$6,002.8	\$67.2	\$5,935.6	1.12%	6.34%	40.00%	27.19%	2,597.8	2.28
DreamWorks Animation SKG Inc. (NasdaqGS:DWA)	1.32	\$2,730.0	\$348.3	\$3,078.3	\$156.4	\$2,921.9	5.08%	3.00%	40.00%	12.76%	767.3	3.81
Twenty-First Century Fox, Inc. (NasdaqGS:FOXA)	1.28	\$77,743.5	\$20,943.0	\$98,686.5	\$6,681.0	\$92,005.5	6.77%	6.15%	40.00%	26.94%	28,733.0	3.20
Independent Film Development Corporation (OTCPK:IFLM)	1.61	\$1.3	\$1.0	\$2.3	\$-	\$2.2	2.20%	10.00%	40.00%	72.35%	1	3.37
Odyssey Pictures Corp. (OTCPK:OPIX)	2.60	\$0.3	\$1.6	\$1.9	\$0.0	\$1.9	0.10%	3.00%	40.00%	551.12%	0.669	2.90
Average	1.35						4.68%	6.58%	40.00%	129.33%		4.43
Aggregate	1.35		\$22,822.82	\$112,395.45	\$7,189.43	\$105,206.02	6.40%	6.58%	40.00%	25.48%	34,061.4	3.09
Median	1.24						2.96%	6.24%	40.00%	27.06%		3.05

# Backing into a pure play beta: Studio Entertainment

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	<i>Value</i>	<i>Beta</i>		<i>Value</i>	<i>Beta</i>
Movie Business	97.04	1.0993	Debt	21.3	0
Cash Business	2.96	0	Equity	78.7	1.24
Movie Company	100	1.0668			

1. Start with the median regression beta (equity beta) of 1.24
2. Unlever the beta, using the median gross D/E ratio of 27.06%  

$$\text{Gross D/E ratio} = 21.30/78.70 = 27.06\%$$

$$\text{Unlevered beta} = 1.24 / (1 + (1-.4) (.2706)) = 1.0668$$
3. Take out the cash effect, using the median cash/value of 2.96%  

$$(.0296) (0) + (1-.0296) (\text{Beta of movie business}) = 1.0668$$

$$\text{Beta of movie business} = 1.0668 / (1-.0296) = 1.0993$$

**Alternatively, you could have used the net debt to equity ratio**

$$\text{Net D/E ratio} = (21.30-2.96)/78.70 = 23.30\%$$

$$\text{Unlevered beta for movies} = 1.24 / (1+(1-.4)(.233)) = 1.0879$$

# Disney's unlevered beta: Operations & Entire Company

<i>Business</i>	<i>Revenues</i>	<i>EV/Sales</i>	<i>Value of Business</i>	<i>Proportion of Disney</i>	<i>Unlevered beta</i>	<i>Value</i>	<i>Proportion</i>
Media Networks	\$20,356	3.27	\$66,580	49.27%	1.03	\$66,579.81	49.27%
Parks & Resorts	\$14,087	3.24	\$45,683	33.81%	0.70	\$45,682.80	33.81%
Studio Entertainment	\$5,979	3.05	\$18,234	13.49%	1.10	\$18,234.27	13.49%
Consumer Products	\$3,555	0.83	\$2,952	2.18%	0.68	\$2,951.50	2.18%
Interactive	\$1,064	1.58	\$1,684	1.25%	1.22	\$1,683.72	1.25%
Disney Operations	\$45,041		\$135,132	100.00%	0.9239	\$135,132.11	

Disney has \$3.93 billion in cash, invested in close to riskless assets (with a beta of zero).  
 You can compute an unlevered beta for Disney as a company (inclusive of cash):

$$\beta_{\text{Disney}} = \beta_{\text{Operating Assets}} \frac{\text{Value}_{\text{Operating Assets}}}{(\text{Value}_{\text{Operating Assets}} + \text{Value}_{\text{Cash}})} + \beta_{\text{Cash}} \frac{\text{Value}_{\text{Cash}}}{(\text{Value}_{\text{Operating Assets}} + \text{Value}_{\text{Cash}})}$$

$$= 0.9239 \left( \frac{135,132}{(135,132 + 3,931)} \right) + 0.00 \left( \frac{3,931}{(135,132 + 3,931)} \right) = 0.8978$$

# The levered beta: Disney and its divisions

- To estimate the debt ratios for division, we allocate Disney's total debt (\$15,961 million) to its divisions based on identifiable assets.

<i>Business</i>	<i>Identifiable assets (2013)</i>	<i>Proportion of debt</i>	<i>Value of business</i>	<i>Allocated debt</i>	<i>Estimated equity</i>	<i>D/E ratio</i>
Media Networks	\$28,627	38.04%	\$66,580	\$6,072	\$60,508	10.03%
Parks & Resorts	\$22,056	29.31%	\$45,683	\$4,678	\$41,005	11.41%
Studio Entertainment	\$14,750	19.60%	\$18,234	\$3,129	\$15,106	20.71%
Consumer Products	\$7,506	9.97%	\$2,952	\$1,592	\$1,359	117.11%
Interactive	\$2,311	3.07%	\$1,684	\$490	\$1,194	41.07%
Disney	\$75,250	100.00%		\$15,961	\$121,878	13.10%

- We use the allocated debt to compute D/E ratios and levered betas.

<i>Business</i>	<i>Unlevered beta</i>	<i>Value of business</i>	<i>D/E ratio</i>	<i>Levered beta</i>	<i>Cost of Equity</i>
Media Networks	1.0313	\$66,580	10.03%	1.0975	9.07%
Parks & Resorts	0.7024	\$45,683	11.41%	0.7537	7.09%
Studio Entertainment	1.0993	\$18,234	20.71%	1.2448	9.92%
Consumer Products	0.6752	\$2,952	117.11%	1.1805	9.55%
Interactive	1.2187	\$1,684	41.07%	1.5385	11.61%
Disney Operations	0.9239	\$135,132	13.10%	1.0012	8.52%