

# Application Test: Estimating a Cost of Debt

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- Based upon your firm's current earnings before interest and taxes, its interest expenses, estimate
  - An interest coverage ratio for your firm
  - A synthetic rating for your firm (use the tables from prior pages)
  - A pre-tax cost of debt for your firm
  - An after-tax cost of debt for your firm

# Costs of Hybrids

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- Preferred stock shares some of the characteristics of debt - the preferred dividend is pre-specified at the time of the issue and is paid out before common dividend -- and some of the characteristics of equity - the payments of preferred dividend are not tax deductible. If preferred stock is viewed as perpetual, the cost of preferred stock can be written as follows:
  - $kps = \text{Preferred Dividend per share} / \text{Market Price per preferred share}$
- Convertible debt is part debt (the bond part) and part equity (the conversion option). It is best to break it up into its component parts and eliminate it from the mix altogether.

# Weights for Cost of Capital Calculation

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- The weights used in the cost of capital computation should be market values.
- There are three specious arguments used against market value
  - Book value is more reliable than market value because it is not as volatile: While it is true that book value does not change as much as market value, this is more a reflection of weakness than strength
  - Using book value rather than market value is a more conservative approach to estimating debt ratios: For most companies, using book values will yield a lower cost of capital than using market value weights.
  - Since accounting returns are computed based upon book value, consistency requires the use of book value in computing cost of capital: While it may seem consistent to use book values for both accounting return and cost of capital calculations, it does not make economic sense.

# Disney: From book value to market value for interest bearing debt...

- In Disney's 2013 financial statements, the debt due over time was footnoted.

Time due	Amount due	Weight	Weight *Maturity
0.5	\$1,452	11.96%	0.06
2	\$1,300	10.71%	0.21
3	\$1,500	12.36%	0.37
4	\$2,650	21.83%	0.87
6	\$500	4.12%	0.25
8	\$1,362	11.22%	0.9
9	\$1,400	11.53%	1.04
19	\$500	4.12%	0.78
26	\$25	0.21%	0.05
28	\$950	7.83%	2.19
29	\$500	4.12%	1.19
	\$12,139		7.92

The debt in this table does not add up to the book value of debt, because Disney does not break down the maturity of all of its debt.

- Disney's total debt due, in book value terms, on the balance sheet is \$14,288 million and the total interest expense for the year was \$349 million. Using 3.75% as the pre-tax cost of debt:

- Estimated MV of Disney Debt = 
$$349 \left[ \frac{1 - \frac{1}{(1.0375)^{7.92}}}{0.0375} \right] + \frac{14,288}{(1.0375)^{7.92}} = \$13,028 \text{ million}$$

# Operating Leases at Disney

- The “debt value” of operating leases is the present value of the lease payments, at a rate that reflects their risk, usually the pre-tax cost of debt.
- The pre-tax cost of debt at Disney is 3.75%.

Year	Commitment	Present Value @3.75%
1	\$507.00	\$488.67
2	\$422.00	\$392.05
3	\$342.00	\$306.24
4	\$272.00	\$234.76
5	\$217.00	\$180.52
6-10	\$356.80	\$1,330.69
Debt value of leases		\$2,932.93

Disney reported \$1,784 million in commitments after year 5. Given that their average commitment over the first 5 years, we assumed 5 years @ \$356.8 million each.

- Debt outstanding at Disney = \$13,028 + \$ 2,933= \$15,961 million

# Accounting comes to its senses on operating leases

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- In 2019, both IFRS and GAAP made a major shift on operating leases, requiring companies to capitalize leases and show the resulting debt (and counter asset) on the balance sheets.
- That said, the accounting rules for capitalizing leases are far more complex than the simple calculations that I have used, for two reasons:
  - Accounting has to balance its desire to do the right thing with maintaining some connection to its legacy rules.
  - Companies have lobbied to modify rules in their sectors to cushion the impact.

# Application Test: Estimating Market Value

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- Estimate the
  - ▣ Market value of equity at your firm and Book Value of equity
  - ▣ Market value of debt and book value of debt (If you cannot find the average maturity of your debt, use 3 years):  
Remember to capitalize the value of operating leases and add them on to both the book value and the market value of debt.
- Estimate the
  - ▣ Weights for equity and debt based upon market value
  - ▣ Weights for equity and debt based upon book value

# Current Cost of Capital: Disney

## □ Equity

- Cost of Equity = Riskfree rate + Beta \* Risk Premium  
= 2.75% + 1.0013 (5.76%) = 8.52%

- Market Value of Equity = \$121,878 million

- Equity/(Debt+Equity) = 88.42%

## □ Debt

- After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)  
= (2.75%+1%) (1-.361) = 2.40%

- Market Value of Debt = \$13,028+ \$2933 = \$ 15,961 million

- Debt/(Debt +Equity) = 11.58%

- Cost of Capital = 8.52%(.8842)+ 2.40%(.1158) = 7.81%



# Divisional Costs of Capital: Disney and Vale

## Disney

	Cost of equity	Cost of debt	Marginal tax rate	After-tax cost of debt	Debt ratio	Cost of capital
Media Networks	9.07%	3.75%	36.10%	2.40%	9.12%	8.46%
Parks & Resorts	7.09%	3.75%	36.10%	2.40%	10.24%	6.61%
Studio Entertainment	9.92%	3.75%	36.10%	2.40%	17.16%	8.63%
Consumer Products	9.55%	3.75%	36.10%	2.40%	53.94%	5.69%
Interactive	11.65%	3.75%	36.10%	2.40%	29.11%	8.96%
Disney Operations	8.52%	3.75%	36.10%	2.40%	11.58%	7.81%

## Vale

<i>Business</i>	<i>Cost of equity</i>	<i>After-tax cost of debt</i>	<i>Debt ratio</i>	<i>Cost of capital (in US\$)</i>	<i>Cost of capital (in \$R)</i>
Metals & Mining	11.35%	2.67%	35.48%	8.27%	15.70%
Iron Ore	11.13%	2.67%	35.48%	8.13%	15.55%
Fertilizers	12.70%	2.67%	35.48%	9.14%	16.63%
Logistics	10.29%	2.67%	35.48%	7.59%	14.97%
Vale Operations	11.23%	2.67%	35.48%	8.20%	15.62%

# Costs of Capital: Tata Motors, Baidu and Bookscape

- To estimate the costs of capital for Tata Motors in Indian rupees:

$$\text{Cost of capital} = 14.49\% (1 - .2928) + 6.50\% (.2928) = 12.15\%$$

- For Baidu, we follow the same path to estimate a cost of equity in Chinese RMB:

$$\text{Cost of capital} = 12.91\% (1 - .0523) + 3.45\% (.0523) = 12.42\%$$

- For Bookscape, the cost of capital is different depending on whether you look at market or total beta:

	Cost of equity	Pre-tax Cost of debt	After-tax cost of debt	D/(D+E)	Cost of capital
Market Beta	7.46%	4.05%	2.43%	17.63%	6.57%
Total Beta	11.98%	4.05%	2.43%	17.63%	10.30%

# Application Test: Estimating Cost of Capital

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- Using the bottom-up unlevered beta that you computed for your firm, and the values of debt and equity you have estimated for your firm, estimate a bottom-up levered beta and cost of equity for your firm.
- Based upon the costs of equity and debt that you have estimated, and the weights for each, estimate the cost of capital for your firm.
- How different would your cost of capital have been, if you used book value weights?

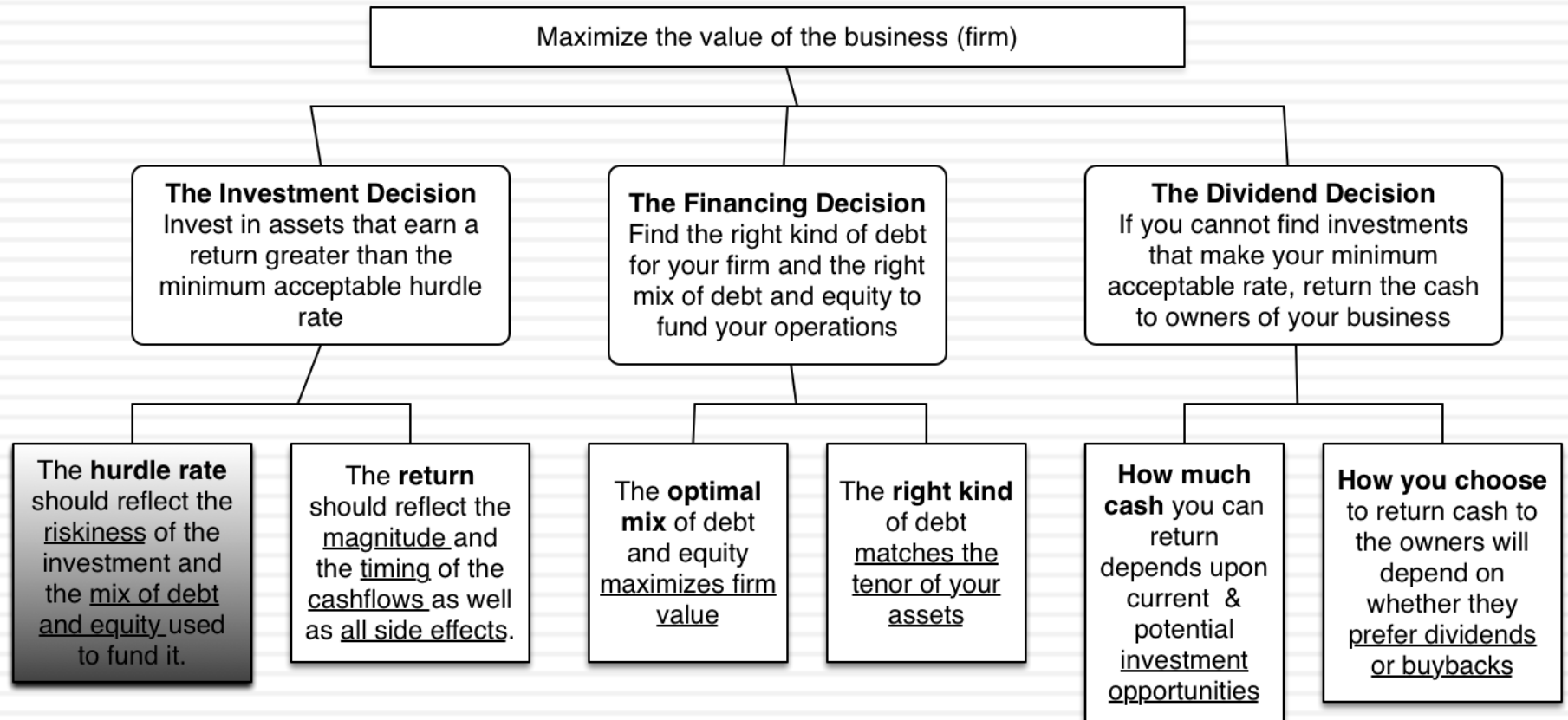
# Choosing a Hurdle Rate

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- Either the cost of equity or the cost of capital can be used as a hurdle rate, depending upon whether the returns measured are to equity investors or to all claimholders on the firm (capital)
- If returns are measured to equity investors, the appropriate hurdle rate is the cost of equity.
- If returns are measured to capital (or the firm), the appropriate hurdle rate is the cost of capital.

# Back to First Principles

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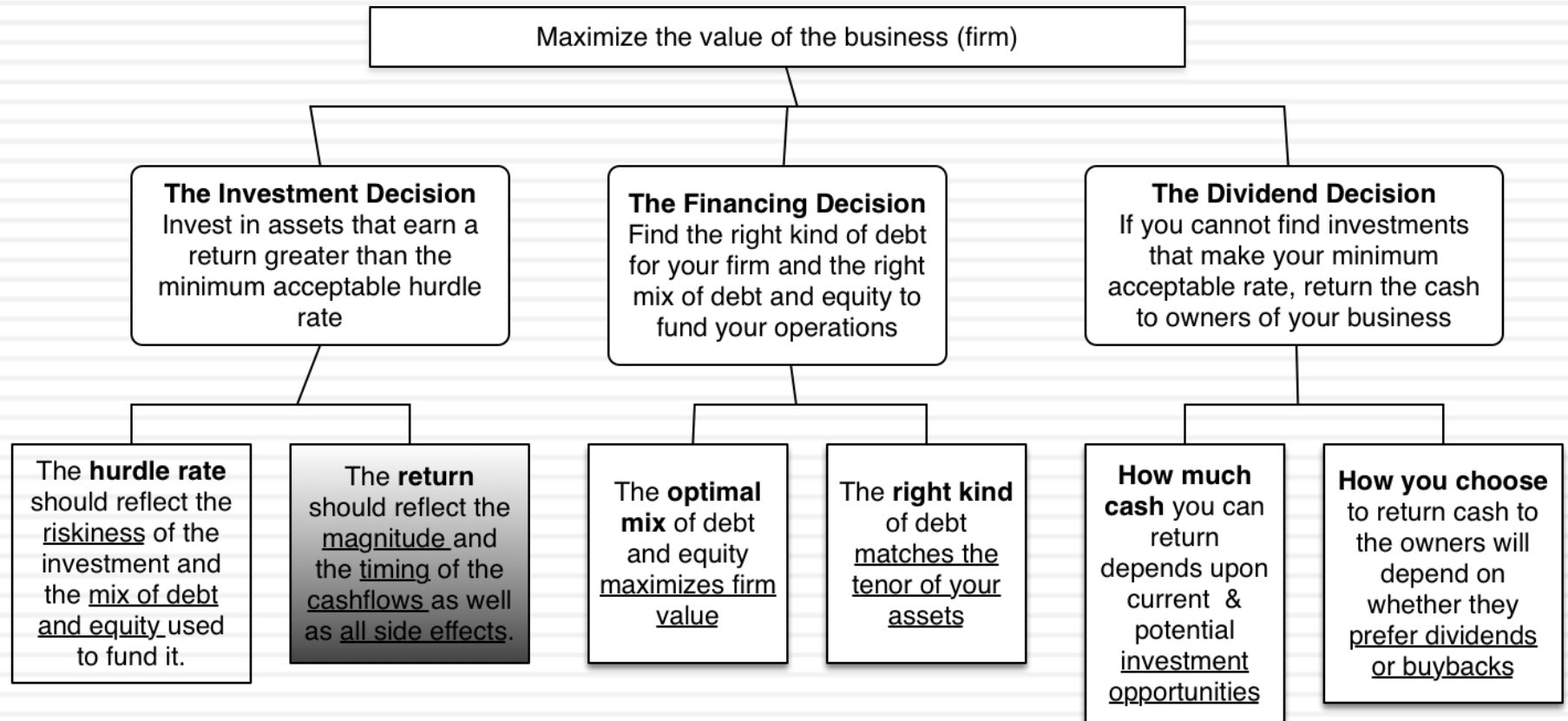
# MEASURING INVESTMENT RETURNS I: THE MECHANICS OF INVESTMENT ANALYSIS

“Show me the money”

from Jerry Maguire

# First Principles

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# Measures of return: earnings versus cash flows

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- Principles Governing Accounting Earnings Measurement
  - Accrual Accounting: Show revenues when products and services are sold or provided, not when they are paid for. Show expenses associated with these revenues rather than cash expenses.
  - Operating versus Capital Expenditures: Only expenses associated with creating revenues in the current period should be treated as operating expenses. Expenses that create benefits over several periods are written off over multiple periods (as depreciation or amortization)
- To get from accounting earnings to cash flows:
  - you have to add back non-cash expenses (like depreciation)
  - you have to subtract out cash outflows which are not expensed (such as capital expenditures)
  - you have to make accrual revenues and expenses into cash revenues and expenses (by considering changes in working capital).



# Measuring Returns Right: The Basic Principles

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- Use cash flows rather than earnings. You cannot spend earnings.
- Use “incremental” cash flows relating to the investment decision, i.e., cashflows that occur as a consequence of the decision, rather than total cash flows.
- Use “time weighted” returns, i.e., value cash flows that occur earlier more than cash flows that occur later.

**The Return Mantra: “Time-weighted, Incremental Cash Flow Return”**

# Setting the table: What is an investment/project?

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- An investment/project can range the spectrum from big to small, money making to cost saving:
  - ▣ Major strategic decisions to enter new areas of business or new markets.
  - ▣ Acquisitions of other firms are projects as well, notwithstanding attempts to create separate sets of rules for them.
  - ▣ Decisions on new ventures within existing businesses or markets.
  - ▣ Decisions that may change the way existing ventures and projects are run.
  - ▣ Decisions on how best to deliver a service that is necessary for the business to run smoothly.
- Put in broader terms, every choice made by a firm can be framed as an investment.

# Here are four examples...

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- Rio Disney: We will consider whether Disney should invest in its first theme parks in South America. These parks, while similar to those that Disney has in other parts of the world, will require us to consider the effects of country risk and currency issues in project analysis.
- New iron ore mine for Vale: This is an iron ore mine that Vale is considering in Western Labrador, Canada.
- An Online Store for Bookscape: Bookscape is evaluating whether it should create an online store to sell books. While it is an extension of their basis business, it will require different investments (and potentially expose them to different types of risk).
- Acquisition of Harman by Tata Motors: A cross-border bid by Tata for Harman International, a publicly traded US firm that manufactures high-end audio equipment, with the intent of upgrading the audio upgrades on Tata Motors' automobiles. This investment will allow us to examine currency and risk issues in such a transaction.

# Earnings versus Cash Flows: A Disney Theme Park

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- The theme parks to be built near Rio, modeled on Euro Disney in Paris and Disney World in Orlando.
- The complex will include a “Magic Kingdom” to be constructed, beginning immediately, and becoming operational at the beginning of the second year, and a second theme park modeled on Epcot Center at Orlando to be constructed in the second and third year and becoming operational at the beginning of the fourth year.
- The earnings and cash flows are estimated in nominal U.S. Dollars.

# Key Assumptions on Start Up and Construction

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- Disney has already spent \$0.5 Billion researching the proposal and getting the necessary licenses for the park; none of this investment can be recovered if the park is not built. This expenditure has been capitalized and will be depreciated straight line over ten years to a salvage value of zero.
- Disney will face substantial construction costs, if it chooses to build the theme parks.
  - The cost of constructing Magic Kingdom will be \$3 billion, with \$ 2 billion to be spent right now, and \$1 Billion to be spent one year from now.
  - The cost of constructing Epcot II will be \$ 1.5 billion, with \$ 1 billion to be spent at the end of the second year and \$0.5 billion at the end of the third year.
  - These investments will be depreciated based upon a depreciation schedule in the tax code, where depreciation will be different each year.

# Key Revenue Assumptions

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- Revenue estimates for the parks and resort properties (in millions)

Year	Magic Kingdom	Epcot II	Resort Properties	Total
1	\$0	\$0	\$0	\$0
2	\$1,000	\$0	\$250	\$1,250
3	\$1,400	\$0	\$350	\$1.750
4	\$1,700	\$300	\$500	\$2.500
5	\$2,000	\$500	\$625	\$3.125
6	\$2,200	\$550	\$688	\$3,438
7	\$2,420	\$605	\$756	\$3,781
8	\$2,662	\$666	\$832	\$4,159
9	\$2,928	\$732	\$915	\$4,575
10	\$2,987	\$747	\$933	\$4,667

□

# Key Expense Assumptions

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- The operating expenses are assumed to be 60% of the revenues at the parks, and 75% of revenues at the resort properties.
- Disney will also allocate corporate general and administrative costs to this project, based upon revenues
  - The G&A allocation will be 15% of the revenues each year.
  - It is worth noting that a recent analysis of these expenses found that only one-third of these expenses are variable (and a function of total revenue) and that two-thirds are fixed.

# Depreciation and Capital Maintenance

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<i>Year</i>	<i>Depreciation as % of Book Value</i>	<i>Capital Maintenance as % of Depreciation</i>
1	0.00%	0.00%
2	12.50%	50.00%
3	11.00%	60.00%
4	9.50%	70.00%
5	8.00%	80.00%
6	8.00%	90.00%
7	8.00%	100.00%
8	8.00%	105.00%
9	8.00%	110.00%
10	8.00%	110.00%

- The capital maintenance expenditures are low in the early years, when the parks are still new but increase as the parks age.



# Other Assumptions

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- Disney will have to maintain non-cash working capital (primarily consisting of inventory at the theme parks and the resort properties, netted against accounts payable) of 5% of revenues, with the investments being made at the end of each year.
- The income from the investment will be taxed at Disney's marginal tax rate of 36.1%.

# Laying the groundwork: Book Capital, Working Capital and Depreciation

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	0	1	2	3	4	5	6	7	8	9	10
<i>Book Value of Pre-project inv</i>	\$500	\$450	\$400	\$350	\$300	\$250	\$200	\$150	\$100	\$50	\$0
Depreciation: Pre-Project		\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
Magic Kingdom	\$2,000	\$1,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Epcot Rio	\$0	\$0	\$1,000	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital Maintenance		\$0	\$188	\$252	\$276	\$258	\$285	\$314	\$330	\$347	\$350
- Depreciation on fixed assets		\$0	\$375	\$419	\$394	\$322	\$317	\$314	\$314	\$316	\$318
<i>Book Value of new Fixed Assets</i>	<i>\$2,000</i>	<i>\$3,000</i>	<i>\$3,813</i>	<i>\$4,145</i>	<i>\$4,027</i>	<i>\$3,962</i>	<i>\$3,931</i>	<i>\$3,931</i>	<i>\$3,946</i>	<i>\$3,978</i>	<i>\$4,010</i>
Book Value of Working Capital			\$63	\$88	\$125	\$156	\$172	\$189	\$208	\$229	\$233
Total Capital Invested in Project	\$2,500	\$3,450	\$4,275	\$4,582	\$4,452	\$4,368	\$4,302	\$4,270	\$4,254	\$4,257	\$4,243

12.5% of book  
value at end of  
prior year  
(\$3,000)

# Step 1: Estimate Accounting Earnings on Project

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	0	1	2	3	4	5	6	7	8	9	10
Magic Kingdom - Revenues		\$0	\$1,000	\$1,400	\$1,700	\$2,000	\$2,200	\$2,420	\$2,662	\$2,928	\$2,987
Epcot Rio - Revenues		\$0	\$0	\$0	\$300	\$500	\$550	\$605	\$666	\$732	\$747
Resort & Properties - Revenues		\$0	\$250	\$350	\$500	\$625	\$688	\$756	\$832	\$915	\$933
<b>Total Revenues</b>			<b>\$1,250</b>	<b>\$1,750</b>	<b>\$2,500</b>	<b>\$3,125</b>	<b>\$3,438</b>	<b>\$3,781</b>	<b>\$4,159</b>	<b>\$4,575</b>	<b>\$4,667</b>
Magic Kingdom – Direct Expenses		\$0	\$600	\$840	\$1,020	\$1,200	\$1,320	\$1,452	\$1,597	\$1,757	\$1,792
Epcot Rio – Direct Expenses		\$0	\$0	\$0	\$180	\$300	\$330	\$363	\$399	\$439	\$448
Resort & Property – Direct Expenses		\$0	\$188	\$263	\$375	\$469	\$516	\$567	\$624	\$686	\$700
<b>Total Direct Expenses</b>			<b>\$788</b>	<b>\$1,103</b>	<b>\$1,575</b>	<b>\$1,969</b>	<b>\$2,166</b>	<b>\$2,382</b>	<b>\$2,620</b>	<b>\$2,882</b>	<b>\$2,940</b>
Depreciation & Amortization		\$50	\$425	\$469	\$444	\$372	\$367	\$364	\$364	\$366	\$368
Allocated G&A Costs		\$0	\$188	\$263	\$375	\$469	\$516	\$567	\$624	\$686	\$700
<b>Operating Income</b>		<b>-\$50</b>	<b>-\$150</b>	<b>-\$84</b>	<b>\$106</b>	<b>\$315</b>	<b>\$389</b>	<b>\$467</b>	<b>\$551</b>	<b>\$641</b>	<b>\$658</b>
Taxes		-\$18	-\$54	-\$30	\$38	\$114	\$141	\$169	\$199	\$231	\$238
<b>Operating Income after Taxes</b>		<b>-\$32</b>	<b>-\$96</b>	<b>-\$54</b>	<b>\$68</b>	<b>\$202</b>	<b>\$249</b>	<b>\$299</b>	<b>\$352</b>	<b>\$410</b>	<b>\$421</b>

# And the Accounting View of Return

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Year	After-tax Operating Income	BV of pre-project investment	BV of fixed assets	BV of Working capital	BV of Capital	Average BV of Capital	ROC(a)	ROC(b)
0		500	2000	0	\$2,500			
1	-\$32	\$450	\$3,000	\$0	\$3,450	\$2,975	-1.07%	-1.28%
2	-\$96	\$400	\$3,813	\$63	\$4,275	\$3,863	-2.48%	-2.78%
3	-\$54	\$350	\$4,145	\$88	\$4,582	\$4,429	-1.22%	-1.26%
4	\$68	\$300	\$4,027	\$125	\$4,452	\$4,517	1.50%	1.48%
5	\$202	\$250	\$3,962	\$156	\$4,368	\$4,410	4.57%	4.53%
6	\$249	\$200	\$3,931	\$172	\$4,302	\$4,335	5.74%	5.69%
7	\$299	\$150	\$3,931	\$189	\$4,270	\$4,286	6.97%	6.94%
8	\$352	\$100	\$3,946	\$208	\$4,254	\$4,262	8.26%	8.24%
9	\$410	\$50	\$3,978	\$229	\$4,257	\$4,255	9.62%	9.63%
10	\$421	\$0	\$4,010	\$233	\$4,243	\$4,250	9.90%	9.89%
Average							4.18%	4.11%

(a) Based upon average book capital over the year

(b) Based upon book capital at the start of each year

# What should this return be compared to?

- The computed return on capital on this investment is about 4.18%. To make a judgment on whether this is a sufficient return, we need to compare this return to a “hurdle rate”. Which of the following is the right hurdle rate? Why or why not?
  - a. The riskfree rate of 2.75% (T. Bond rate)
  - b. The cost of equity for Disney as a company (8.52%)
  - c. The cost of equity for Disney theme parks (7.09%)
  - d. The cost of capital for Disney as a company (7.81%)
  - e. The cost of capital for Disney theme parks (6.61%)
  - f. None of the above

# Should there be a risk premium for foreign projects?

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- The exchange rate risk should be diversifiable risk (and hence should not command a premium) if
  - ▣ the company has projects in a large number of countries (or)
  - ▣ the investors in the company are globally diversified.
  - ▣ For Disney, this risk should not affect the cost of capital used. Consequently, we would not adjust the cost of capital for Disney's investments in other mature markets (Germany, UK, France)
- The same diversification argument can also be applied against some political risk, which would mean that it too should not affect the discount rate. However, there are aspects of political risk especially in emerging markets that will be difficult to diversify and may affect the cash flows, by reducing the expected life or cash flows on the project.
- For Disney, this is the risk that we are incorporating into the cost of capital when it invests in Brazil (or any other emerging market)

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# Estimating a hurdle rate for Rio Disney

- We did estimate a cost of capital of 6.61% for the Disney theme park business, using a bottom-up levered beta of 0.7537 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- The only concern we would have with using this cost of equity for this project is that it may not adequately reflect the additional risk associated with the theme park being in an emerging market (Brazil). We first computed the Brazil country risk premium (by multiplying the default spread for Brazil by the relative equity market volatility) and then re-estimated the cost of equity:
  - Country risk premium for Brazil = 5.5% + 3% = 8.5%
  - Cost of Equity in US\$ = 2.75% + 0.7537 (8.5%) = 9.16%
- Using this estimate of the cost of equity, Disney's theme park debt ratio of 10.24% and its after-tax cost of debt of 2.40% (see chapter 4), we can estimate the cost of capital for the project:
  - Cost of Capital in US\$ = 9.16% (0.8976) + 2.40% (0.1024) = 8.46%



## Would lead us to conclude that...

- Do not invest in this park. The return on capital of 4.18% is lower than the cost of capital for theme parks of 8.46%; This would suggest that the project should not be taken.
- Given that we have computed the average over an arbitrary period of 10 years, while the theme park itself would have a life greater than 10 years, would you feel comfortable with this conclusion?
  - ▣ Yes
  - ▣ No