Finding the Right Financing Mix: The Capital Structure Decision

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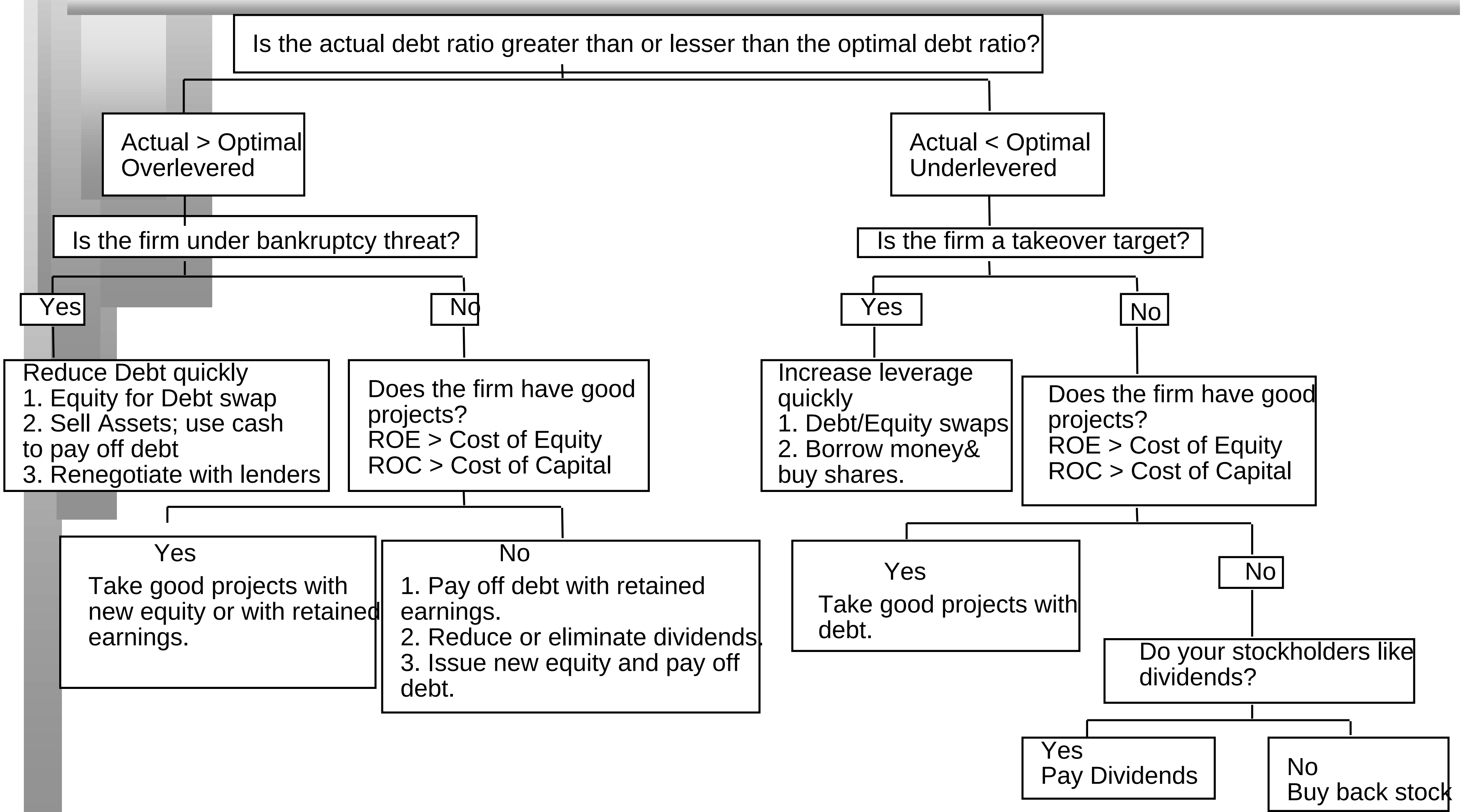
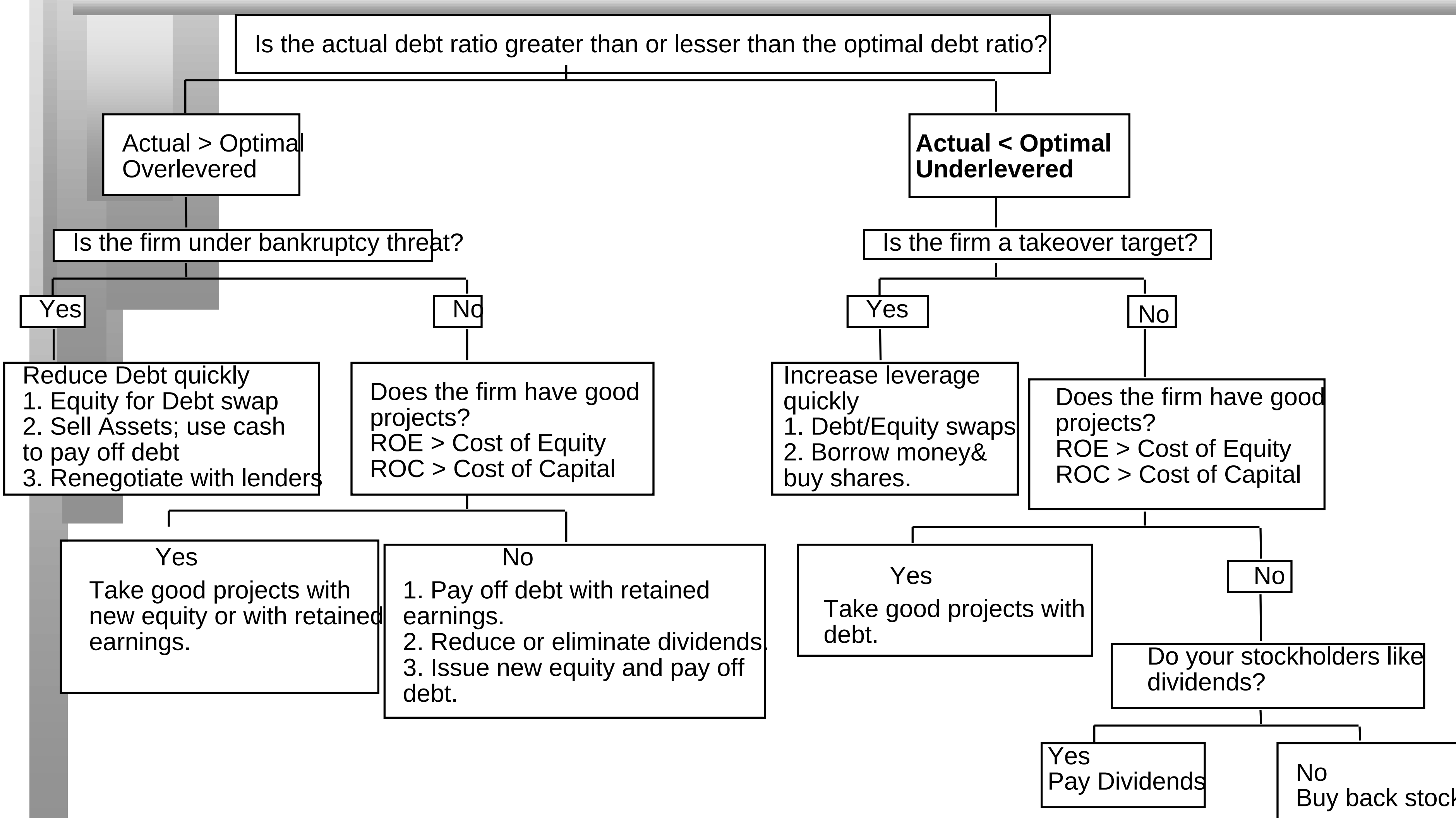
First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- **Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.**
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

A Framework for Getting to the Optimal



Disney: Applying the Framework



Designing Debt

Start with the Cash Flows on Assets/ Projects

- Duration
- Currency
- Effect of Inflation Uncertainty about Future
- Growth Patterns
- Cyclicality & Other Effects

Define Debt Characteristics

- Duration/ Maturity
- Currency Mix
- *Fixed vs. Floating Rate*
  * More floating rate
  - if CF move with inflation
  - with greater uncertainty on future
- *Straight versus Convertible*
  - Convertible if cash flows low now but high exp. growth
- *Special Features on Debt*
  - Options to make cash flows on debt match cash flows on assets

Design debt to have cash flows that match up to cash flows on the assets financed

Commodity Bonds
Catastrophe Notes

Overlay tax preferences

- Deductibility of cash flows for tax purposes
- Differences in tax rates across different locales

If tax advantages are large enough, you might override results of previous step

Zero Coupons

Consider ratings agency & analyst concerns

- Analyst Concerns
  - Effect on EPS
  - Value relative to comparables
- Ratings Agency
  - Effect on Ratios
  - Ratios relative to comparables
- Regulatory Concerns
  - Measures used

Can securities be designed that can make these different entities happy?

Operating Leases
MIPs
Surplus Notes

Factor in agency conflicts between stock and bond holders

- Observability of Cash Flows by Lenders
  - Less observable cash flows lead to more conflicts
- Type of Assets financed
  - Tangible and liquid assets create less agency problems
- Existing Debt covenants
  - Restrictions on Financing

If agency problems are substantial, consider issuing convertible bonds

Convertibiles
Puttable Bonds
Rating Sensitive Notes
LYONs

Consider Information Asymmetries

- Uncertainty about Future Cashflows
  - When there is more uncertainty, it may be better to use short term debt
- Credibility & Quality of the Firm
  - Firms with credibility problems will issue more short term debt

Approaches for evaluating Asset Cash Flows

- I. Intuitive Approach
  - Are the projects typically long term or short term? What is the cash flow pattern on projects?
  - How much growth potential does the firm have relative to current projects?
  - How cyclical are the cash flows? What specific factors determine the cash flows on projects?
- II. Project Cash Flow Approach
  - Project cash flows on a typical project for the firm
  - Do scenario analyses on these cash flows, based upon different macro economic scenarios
- III. Historical Data
  - Operating Cash Flows
  - Firm Value

Coming up with the financing details: Intuitive Approach

Business	*Project Cash Flow Characteristics*	*Type of Financing*
Creative Content	Projects are likely to 1. be short term 2. have cash outflows are primarily in dollars (but cash inflows could have a substantial foreign currency component 3. have net cash flows which are heavily driven by whether the movie or T.V series is a "hit"	Debt should be 1. short term 2. primarily dollar 3. if possible, tied to the success of movies.
Retailing	Projects are likely to be 1. medium term (tied to store life) 2. primarily in dollars (most in US still) 3. cyclical	Debt should be in the form of operating leases.
Broadcasting	Projects are likely to be 1. short term 2. primarily in dollars, though foreign component is growing 3. driven by advertising revenues and show success	Debt should be 1. short term 2. primarily dollar debt 3. if possible, linked to network ratings.

Financing Details: Other Divisions

Theme Parks	Projects are likely to be 1. very long term 2. primarily in dollars, but a significant proportion of revenues come from foreign tourists. 3. affected by success of movie and broadcasting divisions.	Debt should be 1. long term 2. mix of currencies, based upon tourist make up.
Real Estate	Projects are likely to be 1. long term 2. primarily in dollars. 3. affected by real estate values in the area	Debt should be 1. long term 2. dollars 3. real-estate linked (Mortgage Bonds)

II. QUANTITATIVE APPROACH

1. Operating Cash Flows
   - The question of how sensitive a firm's asset cash flows are to a variety of factors, such as interest rates, inflation, currency rates and the economy, can be directly tested by regressing changes in the operating income against changes in these variables.
   - Change in Operating Income(t)= a + b Change in Macro Economic Variable(t)
   - This analysis is useful in determining the coupon/interest payment structure of the debt.
2. Firm Value
   - The firm value is clearly a function of the level of operating income, but it also incorporates other factors such as expected growth & cost of capital.
   - The firm value analysis is useful in determining the overall structure of the debt, particularly maturity.

The Historical Data

Year	Firm Value	% Change	Operating Income	% Change
1981	$ 1,707		$ 119.35	
1982	$ 2,108	23.46%	$ 141.39	18.46%
1983	$ 1,817	-13.82%	$ 133.87	-5.32%
1984	$ 2,024	11.4%	$ 142.60	6.5%
1985	$ 3,655	80.6%	$ 205.60	44.2%
1986	$ 5,631	54.1%	$ 280.58	36.5%
1987	$ 8,371	48.7%	$ 707.00	152.0%
1988	$ 9,195	9.8%	$ 789.00	11.6%
1989	$ 16,015	74.2%	$ 1,109.00	40.6%
1990	$ 14,963	-6.6%	$ 1,287.00	16.1%
1991	$ 17,122	14.4%	$ 1,004.00	-22.0%
1992	$ 24,771	44.7%	$ 1,287.00	28.2%
1993	$ 25,212	1.8%	$ 1,560.00	21.2%
1994	$ 26,506	5.1%	$ 1,804.00	15.6%
1995	$ 33,858	27.7%	$ 2,262.00	25.4%
1996	$ 39,561	16.8%	$ 3,024.00	33.7%

The Macroeconomic Data

Long Bond Rate	nge in Interest	Real GNP	GNP Growth	Weighted Dolla	Change in Dolla	Inflation Rate	Change in Inflat
13.98%		3854		115.65		8.90%	
10.47%	-3.51%	3792	-1.6%	123.14	6.48%	3.80%	-5.10%
11.80%	1.33%	4047	6.7%	128.65	4.47%	3.80%	0.00%
11.51%	-0.29%	4216	4.2%	138.89	8.0%	4.00%	0.20%
8.99%	-2.52%	4350	3.2%	125.95	-9.3%	3.80%	-0.20%
7.22%	-1.77%	4431	1.9%	112.89	-10.4%	1.20%	-2.60%
8.86%	1.64%	4633	4.6%	95.88	-15.1%	4.40%	3.20%
9.14%	0.28%	4789	3.4%	95.32	-0.6%	4.40%	0.00%
7.93%	-1.21%	4875	1.8%	102.26	7.3%	4.60%	0.20%
8.07%	0.14%	4895	0.4%	96.25	-5.9%	6.10%	1.50%
6.70%	-1.37%	4894	0.0%	98.82	2.7%	3.10%	-3.00%
6.69%	-0.01%	5061	3.4%	104.58	5.8%	2.90%	-0.20%
5.79%	-0.90%	5219	3.1%	105.22	0.6%	2.70%	-0.20%
7.82%	2.03%	5416	3.8%	98.6	-6.3%	2.70%	0.00%
5.57%	-2.25%	5503	1.6%	95.1	-3.5%	2.50%	-0.20%
6.42%	0.85%	5679	3.2%	101.5	6.7%	3.30%	0.80%

Sensitivity to Interest Rate Changes

- The answer to this question is important because it
  - it provides a measure of the duration of the firm’s projects
  - it provides insight into whether the firm should be using fixed or floating rate debt.

Firm Value versus Interest Rate Changes

- Regressing changes in firm value against changes in interest rates over this period yields the following regression –

  Change in Firm Value = 0.22 - 7.43 (Change in Interest Rates)

  (3.09) (1.69)

  T statistics are in brackets.

- Conclusion: The duration (interest rate sensitivity) of Disney's asset values is about 7.43 years. Consequently, its debt should have at least as long a duration.

Regression Constraints

Which of the following aspects of this regression would bother you the most?

- The low R-squared of only 10%
- The fact that Disney today is a very different firm from the firm captured in the data from 1981 to 1996
- Both
- Neither

Why the coefficient on the regression is duration..

- The duration of a straight bond or loan issued by a company can be written in terms of the coupons (interest payments) on the bond (loan) and the face value of the bond to be –

$$\text{Duration of Bond} = dP/dr = \frac{\left[\sum_{t=1}^{t=N} \frac{t * \text{Coupon}_t}{(1+r)^t} + \frac{N * \text{Face Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{\text{Coupon}_t}{(1+r)^t} + \frac{\text{Face Value}}{(1+r)^N}\right]}$$

- Holding other factors constant, the duration of a bond will increase with the maturity of the bond, and decrease with the coupon rate on the bond.

Duration of a Firm's Assets

- This measure of duration can be extended to any asset with expected cash flows on it. Thus, the duration of a project or asset can be estimated in terms of the pre-debt operating cash flows on that project.

$$\text{Duration of Project/Asset} = dPV/dr = \frac{\left[\sum_{t=1}^{t=N} \frac{t * CF_t}{(1+r)^t} + \frac{N * \text{Terminal Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}\right]}$$

where,

CFt = After-tax operating cash flow on the project in year t

Terminal Value = Salvage Value at the end of the project lifetime

N = Life of the project

- The duration of any asset provides a measure of the interest rate risk embedded in that asset.

Duration of Disney Theme Park

Year	*FCFF*	*Terminal Value*	*Total FCFF*	*PV of FCFF*	*PV * t*
1	($39,078 Bt)		($39,078 Bt)	(31,180 Bt)	-31180.4
2	($36,199 Bt)		($36,199 Bt)	(23,046 Bt)	-46092.4
3	($11,759 Bt)		($11,759 Bt)	(5,973 Bt)	-17920
4	16,155 Bt		16,155 Bt	6,548 Bt	26193.29
5	21,548 Bt		21,548 Bt	6,969 Bt	34844.55
6	33,109 Bt		33,109 Bt	8,544 Bt	51264.53
7	46,692 Bt		46,692 Bt	9,614 Bt	67299.02
8	58,169 Bt		58,169 Bt	9,557 Bt	76454.39
9	70,423 Bt	838,720 Bt	909,143 Bt	119,182 Bt	1072635
Sum				100,214 Bt	1,233,498

Duration of the Project = 1,233,498/100,214 = 12.30 years

Duration: Comparing Approaches

Traditional Duration Measures

Uses:
1. Projected Cash Flows

Assumes:
1. Cash Flows are unaffected by changes in interest rates
2. Changes in interest rates are small.

$\delta P/\delta r$=
Percentage Change in Value for a percentage change in Interest Rates

Regression:
$\delta P = a + b\,(\delta r)$

Uses:
1. Historical data on changes in firm value (market) and interest rates

Assumes:
1. Past project cash flows are similar to future project cash flows.
2. Relationship between cash flows and interest rates is stable.
3. Changes in market value reflect changes in the value of the firm.

Operating Income versus Interest Rates

- Regressing changes in operating cash flow against changes in interest rates over this period yields the following regression –

  Change in Operating Income = 0.31 - 4.99 (Change in Interest Rates)

  (2.90) (0.78)

  - Conclusion: Disney's operating income, like its firm value, has been very sensitive to interest rates, which confirms our conclusion to use long term debt.
- Generally speaking, the operating cash flows are smoothed out more than the value and hence will exhibit lower duration that the firm value.

Sensitivity to Changes in GNP

- The answer to this question is important because
  - it provides insight into whether the firm's cash flows are cyclical and
  - whether the cash flows on the firm's debt should be designed to protect against cyclical factors.
- If the cash flows and firm value are sensitive to movements in the economy, the firm will either have to issue less debt overall, or add special features to the debt to tie cash flows on the debt to the firm's cash flows.

Regression Results

- Regressing changes in firm value against changes in the GNP over this period yields the following regression –

Change in Firm Value = 0.31 + 1.71 (GNP Growth)

(2.43) (0.45)

  - Conclusion: Disney is only mildly sensitive to cyclical movements in the economy.

- Regressing changes in operating cash flow against changes in GNP over this period yields the following regression –

Change in Operating Income = 0.17 + 4.06 (GNP Growth)

(1.04) (0.80)

  - Conclusion: Disney's operating income is slightly more sensitive to the economic cycle. This may be because of the lagged effect of GNP growth on operating income.

Sensitivity to Currency Changes

- The answer to this question is important, because
  - it provides a measure of how sensitive cash flows and firm value are to changes in the currency
  - it provides guidance on whether the firm should issue debt in another currency that it may be exposed to.
- If cash flows and firm value are sensitive to changes in the dollar, the firm should
  - figure out which currency its cash flows are in;
  - and issued some debt in that currency

Regression Results

- Regressing changes in firm value against changes in the dollar over this period yields the following regression –

Change in Firm Value = 0.26 - 1.01 (Change in Dollar)

(3.46) (0.98)

  - Conclusion: Disney's value has not been very sensitive to changes in the dollar over the last 15 years.

- Regressing changes in operating cash flow against changes in the dollar over this period yields the following regression –

Change in Operating Income = 0.26 - 3.03 (Change in Dollar)

(3.14) (2.59)

  - Conclusion: Disney's operating income has been much more significantly impacted by the dollar. A stronger dollar seems to hurt operating income.

Sensitivity to Inflation

- The answer to this question is important, because
  - it provides a measure of whether cash flows are positively or negatively impacted by inflation.
  - it then helps in the design of debt; whether the debt should be fixed or floating rate debt.
- If cash flows move with inflation, increasing (decreasing) as inflation increases (decreases), the debt should have a larger floating rate component.

Regression Results

- Regressing changes in firm value against changes in inflation over this period yields the following regression –

Change in Firm Value = 0.26 - 0.22 (Change in Inflation Rate)

(3.36) (0.05)

  - Conclusion: Disney's firm value does not seem to be affected too much by changes in the inflation rate.

- Regressing changes in operating cash flow against changes in inflation over this period yields the following regression –

Change in Operating Income = 0.32 + 10.51 (Change in Inflation Rate)

(3.61) (2.27)

  - Conclusion: Disney's operating income seems to increase in periods when inflation increases. However, this increase in operating income seems to be offset by the increase in discount rates leading to a much more muted effect on value.

Overall Recommendations

- The debt issued should be long term, and should have an average duration of approximately 7.5 years.
- Since the cashflows tend to weaken when the dollar strengthens, some of the debt should be in foreign currency, with the magnitude of the exposure and the currency used being determined by the mix of tourists that arrive at the theme parks and the expansion plans for the creative content and television businesses.
- Since the cash flows tend to move with inflation, a portion of the debt should be floating rate debt.

First Principles

- Invest in projects that <u>yield a return greater</u> than the <u>minimum acceptable hurdle rate</u>.
  - The hurdle rate should be <u>higher for riskier projects</u> and reflect the <u>financing mix</u> used - owners' funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on <u>cash flows</u> generated and the <u>timing</u> of these cash flows; they should also consider both <u>positive and negative side effects</u> of these projects.
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- If there are not enough investments that earn the hurdle rate, <u>return the cash</u> to stockholders.
  - The <u>form of returns</u> - dividends and stock buybacks - will depend upon the <u>stockholders' characteristics</u>.