GLOBAL COST OF CAPITAL: THE CASE OF GLOBAL COMPUTER SYSTEMS

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CASE DESCRIPTION

Global Computer Systems (GCS) is a hypothetical multinational company in the IT industry. The company is a major player in the industry catering to clients from a variety of industries. GCS has different segments specializing in major areas of its operation. The case provides an opportunity to examine various issues that need consideration while making capital budgeting decisions. One of the significant issues is that of determining the cost of capital on the basis of which the hurdle rate is calculated in deciding whether a project is worth accepting. This forms the central issue around which the case is structured. This case is suitable for use in a core Finance courses of MBA programs, and for use in MBA and under-graduate senior level international finance courses. Ideally, the case should be distributed well before the session so that students have adequate preparation time to go through the case and visit relevant internet sources mentioned therein. The case discussion may take up anywhere between 60 minutes to 90 minutes depending on the depth to which the students are intellectually stimulated to delve into.

Gordon Crown, Chief Financial Officer of GCS, would like you to help him develop a company-wide cost of capital policy that is consistent with modern finance theoretical constructs. He would also like you to provide your recommendation on the acceptability of the projects. He also feels that since stock prices often fluctuate, it would be advisable to use book value weights in computing the component capital costs and the cost of capital.

However, his young deputy, Helen Chang who is a recent MBA graduate, feels that market prices are very important indicators of the health of the company and they provide very good signals to the corporation in terms of the future directions. As such, she feels that the market value weights approach would be the best approach.

She is also of the opinion that the Required Rate of Return on any given project, in addition to the WACC, should also include various risk premiums like stand-alone or project specific risk which can be further broken down into political risk, repatriation risk, exchange rate risk etc. Further, she believes that the required rate of return should be increased by about 1% to allow for capital investment projects that have no cash inflows, such as pollution control equipment and safety equipment.

KEYWORDS: Cost of capital, computer systems, finance education, case study

JEL: A23, D24, I22

CASE INFORMATION

Global Computer Systems (GCS) is an IT company that develops and manufactures IT products and services worldwide. Its major operating segments include Global Technology Services, Global Business Services, Software, Systems and Technology, and Global Financing. The majority of the company's enterprise business, which excludes the company's original equipment manufacturer (OEM) technology business, occurs in industries that are broadly grouped into six sectors –

financial services, public, industrial, distribution and communications as well as small and medium sized businesses.

In spite of the current global financial crisis, GCS appears to be doing very well. In January of 2009, it announced better than expected fourth quarter earnings with net income of US$4.4 billion, up from US$4 billion the previous year. According to its CEO, GCS "performed well in an extremely difficult economic environment" in year N+4 and that the company will "enter the year in a very strong position". Table 1 summarizes the recent trend across some of the popular parameters.

Table 1: GCS's Summary Financial Data (N+2–N+4)

Consolidated results (US$, in millions)	**Year N+4**	**Year N+3**	**Year N+2**
Net Sales	$103,630.0	$ 98,786.0	$ 91,423.0
Net Sales Growth	4.91%	8.1%	0.31%
Operating Profit	$15,938.0	$13,516.0	$11,928.0
Operating Profit Growth	17.91%	13.31%	27.21%
Diluted EPS Excluding Extraordinary Items	8.93	7.18	6.06
Growth Rate	24.37%	18.48%	23.42%

The table presents a summary of consolidated results of GCS's financial data from N+2 to N+4 years.

The Consolidated Income Statement of GCS is presented in Table 2 pertaining to the years, Year N through Year N+3.

Table 2: GCS Income Statement (N–N+3) Values in Millions (Except for per share items)

	Year N+3	**Year N+2**	**Year N+1**	**Year N**
Period End Date	12/31/N+3	12/31/N+2	12/31/N+1	12/31/N
Period Length	12 Months	12 Months	12 Months	12 Months
Stmt Source	10-K	10-K	10-K	10-K
Stmt Source Date	02/26/N+4	02/26/N+4	02/26/N+4	02/27/N+3
Stmt Update Type	Updated	Reclassified	Reclassified	Reclassified
Revenue	98,785.0	91,423.0	91,134.0	96,293.0
Other Revenue, Total	1.0	0.0	0.0	0.0
Total Revenue	**98,786.0**	**91,423.0**	**91,134.0**	**96,293.0**
Cost of Revenue, Total	57,057.0	53,129.0	54,602.0	60,724.0
Gross Profit	**41,728.0**	**38,294.0**	**36,532.0**	**35,569.0**
Selling/General/Administrative Expenses, Total	22,060.0	20,259.0	21,314.0	20,079.0
Research & Development	6,153.0	6,107.0	5,842.0	5,874.0
Depreciation/Amortisation	0.0	0.0	0.0	0.0
Interest Expense (Income), Net Operating	0.0	0.0	0.0	0.0
Unusual Expense (Income)	0.0	0.0	0.0	0.0
Other Operating Expenses, Total	0.0	0.0	0.0	0.0
Operating Income	**13,516.0**	**11,928.0**	**9,376.0**	**9,616.0**
Interest Income (Expense), Net Non-Operating	-217.0	293.0	-220.0	-139.0
Gain (Loss) on Sale of Assets	18.0	41.0	0.0	0.0
Other, Net	1,172.0	1,054.0	3,070.0	1,192.0
Income Before Tax	**14,489.0**	**13,316.0**	**12,226.0**	**10,669.0**
Income Tax - Total	4,071.0	3,901.0	4,232.0	3,172.0
Income After Tax	**10,418.0**	**9,415.0**	**7,994.0**	**7,497.0**
Tax rate	28.10%			
Minority Interest	0.0	0.0	0.0	0.0
Equity In Affiliates	0.0	0.0	0.0	0.0
U.S. GAAP Adjustment	0.0	0.0	0.0	0.0

Net Income Before Extra. Items	**10,418.0**	**9,415.0**	**7,994.0**	**7,497.0**
Total Extraordinary Items	0.0	76.0	-60.0	-18.0
Net Income	**10,418.0**	**9,491.0**	**7,934.0**	**7,479.0**
Total Adjustments to Net Income	0.0	0.0	0.0	0.0
Basic Weighted Average Shares	1,423.04	1,530.81	1,600.59	1,674.96
Basic EPS Excluding Extraordinary Items	7.32	6.15	4.99	4.48
Basic EPS Including Extraordinary Items	7.32	6.2	4.96	4.47
Diluted Weighted Average Shares	1,450.57	1,553.54	1,627.63	1,707.23
Diluted EPS Excluding Extraordinary Items	7.18	6.06	4.91	4.39
Diluted EPS Including Extraordinary Items	7.18	6.11	4.87	4.38
Dividends per Share - Common Stock Primary Issue	1.5	1.1	0.78	0.7
Gross Dividends - Common Stock	2,147.0	1,683.0	1,250.0	1,174.0
Interest Expense, Supplemental	611.0	278.0	220.0	139.0
Depreciation, Supplemental	4,038.0	3,907.0	4,147.0	3,959.0
Normalised EBITDA	18,717.0	16,911.0	14,564.0	14,531.0
Normalised EBIT	13,516.0	11,928.0	9,376.0	9,616.0
Normalised Income Before Tax	14,471.0	13,275.0	12,226.0	10,669.0
Normalised Income After Taxes	10,405.0	9,386.0	7,994.0	7,497.0
Normalised Income Available to Common	10,405.0	9,386.0	7,994.0	7,497.0
Basic Normalised EPS	7.31	6.13	4.99	4.48
Diluted Normalised EPS	7.17	6.04	4.91	4.39
Amortisation of Intangibles	1,163.0	1,076.0	1,041.0	956.0

This table presents the consolidated income statement of GCS from N to N+3 years

The consolidated Balance Sheet of GCS is presented in Table 3 pertaining to the years, Year N through Year N+3.

Table 3: GCS Consolidated Balance Sheet (in millions) (N–N+3) Financial data in US$ Values in Millions (Except for per share items)

	N+3	**N+2**	**N+1**	**N**
Period End Date	12/31/N+3	12/31/N+2	12/31/N+1	12/31/N
Stmt Source	10-K	10-K	10-K	10-K
Stmt Source Date	02/26/N+4	02/27/N+3	02/28/N+2	02/28/N+2
Stmt Update Type	Updated	Updated	Updated	Restated
Assets				
Cash and Short Term Investments	16,146.0	10,656.0	13,686.0	10,570.0
Total Receivables, Net	28,789.0	26,848.0	24,428.0	28,136.0
Total Inventory	2,664.0	2,810.0	2,841.0	3,316.0
Prepaid Expenses	3,891.0	2,539.0	2,941.0	2,708.0
Other Current Assets, Total	1,687.0	1,806.0	1,765.0	2,413.0
Total Current Assets	**53,177.0**	**44,659.0**	**45,661.0**	**47,143.0**
Property/Plant/Equipment, Total - Net	15,082.0	14,439.0	13,756.0	15,175.0
Goodwill, Net	14,285.0	12,854.0	9,441.0	8,437.0
Intangibles, Net	2,107.0	2,203.0	1,663.0	1,789.0
Long Term Investments	5,248.0	4,501.0	3,142.0	2,444.0
Note Receivable - Long Term	11,603.0	10,068.0	9,628.0	10,950.0
Other Long Term Assets, Total	18,930.0	14,509.0	22,457.0	25,065.0
Other Assets, Total	0.0	0.0	0.0	0.0
Total Assets	**120,432.0**	**103,233.0**	**105,748.0**	**111,003.0**
Liabilities and Shareholders' Equity				
Accounts Payable	8,054.0	7,964.0	7,349.0	9,444.0
Payable/Accrued	0.0	0.0	0.0	0.0
Accrued Expenses	10,546.0	9,967.0	8,558.0	10,340.0
Notes Payable/Short Term Debt	8,545.0	6,134.0	4,228.0	4,491.0
Current Port. of LT Debt/Capital Leases	3,690.0	2,768.0	2,988.0	3,608.0

Other Current Liabilities, Total	13,475.0	13,257.0	12,029.0	11,903.0
Total Current Liabilities	**44,310.0**	**40,090.0**	**35,152.0**	**39,786.0**
Total Long Term Debt	23,039.0	13,780.0	15,425.0	14,828.0
Deferred Income Tax	1,064.0	665.0	1,616.0	1,770.0
Minority Interest	0.0	0.0	0.0	0.0
Other Liabilities, Total	23,549.0	20,192.0	20,457.0	22,931.0
Total Liabilities	**91,962.0**	**74,727.0**	**72,650.0**	**79,315.0**
Redeemable Preferred Stock	0.0	0.0	0.0	0.0
Preferred Stock - Non Redeemable, Net	0.0	0.0	0.0	0.0
Common Stock	35,188.0	31,271.0	28,926.0	26,673.0
Retained Earnings (Accumulated Deficit)	60,640.0	52,432.0	44,734.0	38,148.0
Treasury Stock - Common	-63,945.0	-46,296.0	-38,546.0	-31,072.0
Other Equity, Total	-3,414.0	-8,901.0	-2,016.0	-2,061.0
Total Equity	**28,469.0**	**28,506.0**	**33,098.0**	**31,688.0**
Total Liabilities & Shareholders' Equity	**120,431.0**	**103,233.0**	**105,748.0**	**111,003.0**
Total Common Shares Outstanding	1,385.23	1,506.48	1,573.98	1,645.59
Total Preferred Shares Outstanding	0.0	0.0	0.0	0.0

This table presents the consolidated balance sheet of GCS from N to N+3 years

The detailed composition of total long term debt of US$ 23,039 million reported on the consolidated Balance Sheet for the year N+3 is presented in Table 4. The table provides details for debt securities of various maturities along with the coupon rates payable on them.

Table 4: Details of Long-Term Debt (US$, in millions)

Coupon Interest Rate	**Maturities**	**Balance on N+3**	**Annual Interest Expense**
4.48%	N+4–N+7	$12,295***	$551
5.34%	N+8–N+9	3,545	189
5.69%	N+10–N+14	3,026	172
8.375%	N+15	750	63
7.00%	N+21	600	42
6.22%	N+23	469	29
6.50%	N+24	313	20
5.875%	N+28	600	35
7.00%	N+41	150	11
7.125%	N+92	850	61
Other currencies (average interest rate at December 31, N+3, in parentheses)			
Euros (3.4%)	N+4–N+9	2,466	84
Yen (2.2%)	N+6–N+10	767	17
Swiss francs (1.5%)	N+4	442	7
Other (2.7%)	N+4–N+9	89	2
Weighted average interest rate = $1,283/$26,362 = 4.87%		**26,362**	**1,283**
Less: Net unamortized discount		65	
Add: SFAS No. 133 fair value		432	
		26,729	
Less: Current maturities		3,690	
Total		23,039	

This table provides a detailed break-down of the composition of Long-term debt of GCS reported on its consolidated Balance Sheet for the year N+3

All GCS bonds are rated Aaa by Moody's and AAA by Standard & Poor's. Interpretation of bond rating categories normally assigned by both the credit rating agencies are summarized in Table 5.

Table 5: Credit Rating Categories

Rating Description	Moody's Ratings	Standard & Poor's Ratings	Rating Grades
Highest Quality	Aaa	AAA	Investment Grade
High Quality	Aa	AA	
Upper Medium	A-1, A	A	
Medium	Baa-1, Baa	BBB	
Speculative	Ba	BB	Not Investment Grade
Highly Speculative	B,Caa	B, CCC, CC	
Default	Ca, C	D	

The table describes the interpretation of various categories assigned by two credit rating agencies.

Currently, in the capital budgeting arena, each GCS division has its own method of calculating the cost of capital resulting in different hurdle rates; thus, it leads to non-uniformity with regard to accept/reject decisions on capital investments. GCS feels that in order to maximize shareholder value, it has to come up with company-wide guidelines for calculating its cost of capital and standardize the hurdle rates and accept/reject decisions throughout the company. For the year N+6, GCS is considering the following capital budgeting projects with these projects spread around the globe:

Table 6: GCS's N+6 New Projects Under Consideration

Project	Net Investment Cost (US$, in millions)	Proposed Location	Estimated IRR	Type of Project
1	$500	Europe	26.3%	Existing product, new market
2	$400	USA	13.5%	New product, new market
3	$650	Asia	8.6%	Expand existing product in existing market
4	$1,500	Asia	23.4%	New product, existing market
5	$350	USA	24.6%	Replace Equipment
6	$750	Europe	10.2%	Expand existing product in existing market
7	$250	Asia	26.7%	Existing product, new market
8	$325	Asia	18.8%	New product, existing market

This table provides details of new projects under consideration by GCS in year N+6

Further, GCS has a total budget allocation (capital constraint) of US$4.2 billion for the N+6 capital investment budget. Project risk tends to vary with project type, as described in table 7.

Table 7: Type of project and degree of risk

Type of Project	Degree of Risk
Routine replacement of equipment	Minimal
Cost reduction	Low
Expand existing products in existing markets	Moderate
Add new products in existing markets	Moderate-High
Expand existing products in new markets	Moderate-High
Add new products in new markets	High

This table describes the risk profiles of different kinds of projects normally undertaken by businesses.

You have been provided with an excellent opportunity to assist Gordon Crown and Helen Chang in your first exposure to a real world scenario. Having recently completed MBA Finance from a leading University, this is your best chance to launch your career in corporate finance by applying relevant concepts that you may have come across in the class room discussions at your University. A further

challenge is to justify the basis of your analysis in the most convincing manner to address Helen Chang's concerns, being an MBA herself. Gordon Crown is now eagerly awaiting your recommendations.

QUESTIONS

After a quick glance at the available information and the decision making requirements of the Gordon Crown, you have decided that at the minimum you have to do the following:

Question 1: For component costs:

A. Compute the before- and after-tax costs of GCS debt.
B. Compute the cost of equity (assuming all funds come from internal sources):
   i. Using the constant growth Gordon Dividend Valuation Model
   ii. Using the Security Market Line Equation (SML) from the Capital Asset Pricing Model (CAPM)

Question 2: Compute the Weighted Average Cost of Capital (WACC) based on cost of equity estimated under the Gordon's Constant Growth Dividend Valuation Model:

A. Using book value weights for debt and equity
B. Using market value weights for debt and equity

Question 3: Compute the WACC based on cost of equity estimated under the CAPM:

A. Using book value weights for debt and equity
B. Using market value weights for debt and equity

Question 4: Address the pros and cons of using market value weights versus book value weights and reconcile the divergent views of Crown and Chang.

Question 5: Compute the Required Rate of Return for the project(s), adding appropriate risk premiums subjectively to the WACC's in questions 2 and 3. These risk premiums can differ depending on the nature and continental location of the projects.

Question 6: Make a recommendation as to which, if any, of the investments identified in Table 6 should be accepted taking into account the capital constraint.

APPENDIX

i. GCS is part of several stock market indices such as the Dow Jones Composite Average, S&P 100, S&P 500 and S&P Composite 1500.

ii. The long-run average return on the S&P 500 Index is 12.4%.

iii. T-bills and T-bill rates can be found in Bonds Online (http://www.bondsonline.com/Todays_Market/Treasury_Yield_Curve.php).

iv. The beta of GCS is 0.91. Use 5% for the equity premium (sometimes called the market risk premium) which is the market-wide premium demanded by investors for investing in stocks rather than in virtually risk-free U.S. Treasury securities. GCS common stock is presently trading at $95 per share.

v. You can find daily interest rates for Moody's Aaa bonds at the following website http://www.federalreserve.gov/releases/h15/Update/. Essentially, you can find the current market value for the bonds listed in Table 4 by using these daily interest rates. For the foreign currency bonds listed in

Table 4, you have to use the book values in place of market values. You may want to recall that corporate bonds have a face value of $1,000 unless otherwise stated. Bond interest is normally paid twice yearly on June 30 and December 31. Assume that all bonds mature on December 31.

vi. Include charts and tables, where appropriate. Clearly state your assumptions and provide detailed calculations, where necessary.

BIOGRAPHY

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TEACHING NOTES

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QUESTIONS

Having recently completed MBA Finance at Ball State University, you feel that you are up to the task. At the minimum, you have decided that you have to do the following:

Question 1: For component costs:

A. Compute the before- and after-tax costs of GCS debt.
B. Compute the cost of equity (assuming all funds come from internal sources):
    i. Using the constant growth Gordon Dividend Valuation Model

ii. Using the Security Market Line Equation (SML) from the Capital Asset Pricing Model (CAPM).

Solution 1

In our ultimate quest of estimating the weighted average cost of capital, we need to first estimate the cost of each component in the capital structure of GCS. Debt and equity are the two most popular sources of financing used by most firms. As can be observed from the consolidated balance sheet presented in table 3 of the case, GCS too uses debt and equity in its capital structure. Let us therefore, begin by estimating the cost of debt for GCS. One of the significant advantages of using debt as a source of financing is the tax deductibility of interest expense. It is to be noted that the case requires us to compute the weighted average cost of capital using market and book value weights. We will hence need to arrive at the after-tax cost of debt using these two different methods. We will discuss the relative merits and appropriateness of following both these approaches a little later in this note. Let us therefore proceed to discuss the computation of cost of debt using both the weights as required by the case.

For component costs:
A. Compute the before- and after-tax cost of GCS debt.

GCS Debt at Book Value (from Table 4)	$26,362 million
Interest on Debt (from Table 4)	$1,283 million
Pretax Interest Cost (from Table 4)	4.87%
Tax Rate (from Table 2, Year N+3)	28.10%
After-tax Interest Cost on book value of all bonds	3.50%

Note that 4.87% is the before-tax cost of debt. In order to arrive at the after-tax rate cost of debt, we need to find the tax rate applicable to GCS. Table 2 of the case which presents the Income statement of GCS states the tax rate as 28.1%. Using this rate we can convert before-tax cost of debt that we just computed to an after-tax basis by simply multiplying it with "1-tax rate". As can be seen from the above computations, the after tax cost of debt is 1.37%, much lower than the before-tax cost of debt.

Discovering the market value weighted cost of debt is a more challenging task than the book value weighted cost that we just arrived at. The challenge is primarily to find the market value of debt holdings of GCS which is not readily available in the case. Thus, students would be forced to apply Yield-to-Maturity (YTM) concepts in valuing bonds. YTM is a very important and fundamental concept in finance to which students need to be exposed thoroughly. Note (V) at the end of the case provides an important clue regarding the starting point for YTM application in the case. When market value of bonds are not readily available, we can find the market rate of interest for similar bonds instead and then apply YTM concepts to arrive at the present value (market value) of the bonds. Applying YTM concept, the value (future value) of the bonds is simply discounted at the market rate of interest to arrive at the market value (present value) of bonds. In order to ensure that the students are on the same page, at this stage, the facilitator may pick up a simple illustration to refresh YTM concepts before proceeding further. The basic premise of YTM is that when there is a difference between the coupon rate of interest and market rate of interest, the market value of bonds would adjust accordingly to make the yield on such bonds equivalent to the market interest rate. Let us now apply YTM principle to find the market value of various bonds listed in table 4 of the case. To start with, students may refer market interest rate on Moody's Aaa bonds at federal reserve's website, the link to which is provided in note (V) at the end of the case. Since GCS bonds are also rated Aaa, the market rate on Moody's Aaa bonds provides us a comparable rate to work with. On the date the authors accessed the link, the market interest rate for Moody's Aaa bonds appeared at 5.48%. Table TN1 illustrates computation of market value of bonds for GCS, based on the market rate of 5.48%.

Table TN1: Details of Long-Term Debt (US$, in millions)

US Dollar Notes and Debentures					**Present Value Principal**	**Present Value Interest**	**Total Market Value**
Coupon Interest Rate	**Maturities**	**Balance on N+3**	**Annual Interest Expense**	**6 Month Interest Expense**	**12/31/N+3 Present Value at 5.48%***	**12/31/N+3 Present Value at 5.48%***	**12/31/N+3 Present Value at 5.48%***
4.48%	N+4–N+7	12,295	$551	276	10,779	1,255	12,034
5.34%	N+8–N+9	3,545	189	95	2,644	886	3,531
5.69%	N+10–N+14	3,026	172	86	1,877	2,252	4,130
8.38%	N+15	750	63	32	395	549	944
7.00%	N+21	600	42	21	230	477	706
6.22%	N+23	469	29	15	161	350	511
6.50%	N+24	313	20	10	102	248	350
5.88%	N+28	600	35	18	158	473	631
7.00%	N+41	150	11	6	20	175	195
7.13%	N+92	850	61	31	7	1,104	1,111
Subtotal $U.S. Bonds		22,598	$1,173	5.19%			24,143
Foreign Currency Bonds in $U.S.							
	Euros	2,466	84				
	Yen	767	17				
	Swiss Fr	442	7				
	Other	89	2				
Book Value of All Bonds		$26,362	$1,283				
Market Value of All Bonds (Foreign Currency Bonds taken at book value)							27,907

*The table presents all possible information required to compute the book value and market value of debts held by GCS. While the book value estimates have been obtained from table 4 of the case, the market value estimates have been built using YTM principle using current market rate of interest on similarly rated bonds. * Current market rate of interest on AAA bonds.*

The first four columns of table TN1 have simply been reproduced from Table 4 of the case. It is assumed that the maturities are in equal installments over the periods mentioned in column 2. It is also assumed that interest payment on GCS bonds are made semi-annually, as is the common practice in the real world. This assumption necessitates column 5. As a result, the present value of the principal and interest components of the bonds have been separately calculated in column 6 and 7. Column 8 is simply the summation of columns 6 and 7. For simplicity sake, we are assuming that the market value of foreign currency bonds is the same as their book value. Since the value of these bonds is a tiny proportion of total bonds, this assumption would not make a significant impact to total market value of all GCS bonds. Had the amount of foreign currency bonds been significantly higher (which is anyway quite rare to find even in the real world), an attempt could have been made to obtain the relevant market interest rates for each of the foreign currency denominations and then proceed with present value computations similar to what has been done for USD bonds. Table TN1 presents all the relevant information that we may need to compute the before- and after-tax cost of debt based on market value as well book value estimates. The final computations can be summarized as under.

Before-tax cost of debt (based on book value) = Total Interest / Book value of all Bonds
Before-tax cost of debt (based on book value) = $1,283/$26,362 = 4.87%
After-tax cost of debt (based on book value) = Before-tax cost of debt * (1 - tax rate)
After-tax cost of debt (based on book value) = 4.87% * (1 – 28.10%) = 3.50%

Before-tax cost of debt (based on market value) = Total Interest / Market value of all Bonds

Before-tax cost of debt (based on market value) = $1,283/$27,907 = 4.60%
After-tax cost of debt (based on market value) = Before-tax cost of debt * (1 - tax rate)
After-tax cost of debt (based on market value) = 4.60% * (1 – 28.10%) = 3.31%

B. Compute the cost of equity (assuming all funds come from internal sources):
In order students do not lose sight of the big picture, they may be reminded at this stage to note that our ultimate objective is to arrive at weighted average cost of capital. We have already computed the after-tax cost of debt in the previous step. The next logical step in determining the weighted average cost of capital is the computation of cost of equity. There are various approaches to determine cost of equity. However, as suggested by the requirements of the case, we would be using two approaches to estimate the cost of equity, namely:

(a) Gordon's Constant Growth Dividend Valuation Model, and (b) Security Market Line Equation (SML) from the Capital Asset Pricing Model (CAPM).

i. Using the Constant Growth Gordon's Dividend Valuation Model

The Gordon dividend valuation model is based on the premise that the intrinsic (current market) value of equity is the present value of future dividends which grow at a constant rate. The model can be quantitatively stated as follows:

$P_0 = D_1/(k_s-g)$ (1)

where, P_0= Current market value of equity
D_1= Expected dividend one year hence
k_s = Cost of equity
g = Constant growth rate of dividends

As with any model, we can solve equation (1) to find any unknown variable if all remaining variables are given. Obviously, the application of the model in the current context is to solve for 'k_s' or cost of equity. The model can be expressed as follows:

$k_s = (D_1 / P_0) + g$ (2)

In note (iv) at the end of the case, the current market price of GCS common stock is stated as $95 per share. The current dividend per share is $1.5 as provided in table 2 of the case. Previous years' dividend per share is also given in the same table, which can be used to arrive at a growth rate of 20.99%. The current dividend can then be multiplied with the growth rate to arrive at dividend per share for the next year. To summarize, we have the following known variables:

P_0= $95
$D_1= D_0 \times (1 + g)^1 = \$1.5 \times (1 + 0.2099)^1 = \$1.81$

Solving equation (2) with the help of known variables, we arrive at cost of equity of 22.90% as explained below.

$k_s = (\$1.81 / \$95) + 0.2099 = 0.229 = 22.90\%$

A point worth noting here is that the Gordon model applies only to companies whose dividends reflect a virtually constant growth rate. GCS seems to fit the constant growth case quite closely.

ii. Using the Security Market Line Equation (SML) from the Capital Asset Pricing Model (CAPM)

The CAPM estimates the required rate of return (cost of equity), based on firm's beta, the risk free rate of return, and the market return and can be expressed as follows:

$$k_s = r_f + (r_m - r_f) \times \beta_s \quad (3)$$

Where, k = Cost of equity
r_f = Risk free return
r_m = Market return
β_s = Beta of the stock GCS (i.e., stock's sensitivity to market movements)

We can estimate of cost of equity by solving equation (3) with the help of information made available in the case as follows:

Beta (as given in note-iv at the end of case)	= 0.91
Risk free return (10-year U.S treasury from link provided in note-v at the end of case)	= 2.76%
$r_m - r_f$ or market risk premium (as given in note-iv at the end of case)	= 5.00%
Cost of Equity, k_s = 2.76 %+(5%*0.91)	= 7.31%

A point worth noting at this stage is the large difference between the estimates of cost of equity under CAPM and Gordon model. One of the reasons for the lower estimate under CAPM could be attributed to the low beta of GCS. The other reasons could be attributed to the fact that Gordon's model ignores risk free rate and market return while giving more weight to the rate of growth in dividends.

Question 2: Compute the Weighted Average Cost of Capital (WACC) based on cost of equity estimated under the Gordon Dividend Valuation Model.

A. Using book value weights for debt and equity
B. Using market value weights for debt and equity

Solution 2: Computing the Weighted Average Cost of Capital (WACC) based on cost of equity estimated under the Gordon Dividend Valuation Model.

A. Using book value weights for debt and equity

The cost of equity estimated using Gordon's model would now have to be integrated with cost of debt to arrive at WACC using book value weights for debt and equity.

Components	$ millions	Weight	Cost	WACC
Debt	26,362	48.08%	3.50%	1.68%
Equity	28,469	51.92%	22.90%	11.89%
Total	54,831	100.00%		13.57%

Thus, WACC using book value weights is 13.57%.

B. Using market value weights for debt and equity

The market value of equity can be computed as follows.

Total Common Shares Outstanding (table 3 of case)	= 1,385.23 million
Current price per share (given in case)	= $95
Market value of common equity (1,385.23 million x $95)	= $131,597 million

WACC using market value weights for debt and equity can then be arrived as follows.

Components	$ millions	Weight	Cost	WACC
Debt	27,907	17.50%	3.31%	0.58%
Equity	131,597	82.50%	22.90%	18.89%
Total	159,504	100.00%		19.47%

Thus, the WACC using market value weights is 19.47%.

Question 3: Compute the WACC based on cost of equity estimated under the CAPM.

A. Using book value weights for debt and equity
B. Using market value weights for debt and equity

Solution 3: Compute the WACC based on cost of equity estimated under the CAPM.

A. Using book value weights for debt and equity

The cost of equity estimated under CAPM would now have to be integrated with cost of debt to arrive at weighted average cost of capital using, book value weights for debt and equity.

Components	$ millions	Weight	Cost	WACC
Debt	26,362	48.08%	3.50%	1.68%
Equity	28,469	51.92%	7.31%	3.80%
Total	54,831	100.00%		5.48%

Thus, WACC using book value weights is 5.48%.

B. Using market value weights for debt and equity

Similarly, the cost of equity estimated under CAPM would now have to be integrated with cost of debt to arrive at weighted average cost of capital using, market value weights for debt and equity.

Components	$ millions	Weight	Cost	WACC
Debt	27,907	17.50%	3.31%	0.58%
Equity	131,597	82.50%	7.31%	6.03%
Total	159,504	100.00%		6.61%

Thus, the WACC using market value weights is 6.61%.

As expected, due to lower cost of debt, the effect of higher cost of equity is moderated downward in the WACC. The Gordon model applies only to companies whose dividends reflect a virtually constant growth rate. If this is not the case, using the CAPM model might be appropriate. GCS seems to fit the constant growth case.

Question 4: Address the pros and cons of using market value weights versus book value weights and reconcile the divergent views of Crown and Chang.

Solution 4:

The case presents divergent views of Crown and Chang regarding the weights to be used for the company wide cost of capital policy. Crown is in favor of book value weights since market values fluctuate too often. Chang on the other hand prefers market values as they are forward looking.

For convenience, the views of Crown and Chang are restated below. Gordon Crown, Chief Financial Officer of GCS, would like you to help him develop a company-wide cost of capital policy that is consistent with modern finance theoretical constructs. He would also like you to provide your recommendation on the acceptability of the projects. He also feels that since stock prices often fluctuate, it would be advisable to use book value weights in computing the component capital costs and the cost of capital.

One simple argument is to use book value weights if existing funds are likely to be used for financing selected projects. Similarly, market value weights might be appropriate in the case of projects that are to be financed using fresh financing. WACC must obviously form the basis for the company wide cost of capital policy that Crown wants to put in place. As stated earlier, GCS might use the Gordon constant growth model since its dividend growth is reasonably constant. A firm is likely to use only one WACC applicable to the entire entity since most capital projects of the firm are assumed to use the approximate corporate average debt-equity mix given the fungible nature of cash flows. Hence, the corporate WACC may suffice while evaluating most capital projects. However, the WACC may need to be adjusted appropriately if certain projects of the firm are expected to utilize significantly different debt-equity mix from the corporate average debt-equity mix. Crown may have to incorporate this realization while attempting to develop a company-wide WACC.

A company-wide cost of capital policy that is consistent with modern finance theoretical constructs would be as follows:

Start with WACC.

Use book values if existing funds will be used for the selected projects, but use market values in the case of projects that will use newly raised funds.

Use Gordon constant growth model if dividend growth is reasonably constant – which is the case for GCS.

Question 5: Compute the Required Rate of Return for the project(s), adding appropriate risk premiums subjectively. These risk premiums can differ depending on the nature and continental location of the projects.

Solution 5:

The required rate of return is supposed to be a project specific version of WACC. Depending on the riskiness of a project's forecasted cash flows, the WACC is normally revised upward to arrive at the relevant required rate of return. For instance, new projects may involve new customers, new processes or new products. Therefore, such projects may be perceived as more risky than existing time-tested operations of the firm. Moreover, certain unprofitable projects may have to be undertaken for strategic reasons. Thus, other projects may be required to generate sufficiently higher rate of return in order to subsidize such 'strategic' projects. Similarly, foreign projects may demand an even higher required rate of return considering the additional risks involved in terms of repatriation, political, and exchange rate risks. The above reasons tend to justify the required rate of return to always exceed the WACC.

In the context of GCS, assuming that existing funds are to be used, the relevant WACC is 13.57% as per Gordon's model. To this, as suggested by Chang, we may add 1% as an allowance for projects without

cash inflows. These capital expenditure projects are required by law, but earn no cash inflows. The required rate of return is therefore 14.57%. To this rate, a premium for projects according to risk type needs to be added. The risk type of various projects are provided in Table 7 of the case. One approach to assign the risk premium to these risk types is exhibited in Table TN2.

Gordon Model

If existing funds are to be used, then the book value of WACC is 13.57%
Add an allowance for projects without cash inflows 1.00%
Additionally, projects in foreign countries generally have an added risk premium of 2% to 4% depending on the country and the degree of political risk, repatriation risk, exchange rate risk, etc.

Add a premium for projects according to risk type (Table 7)

Table TN2: Risk type of projects (ROR Based on Book-Value weights)

Type of Project	Degree of Risk	Suggested Risk Premium	Required Rate of Return
Routine replacement of equipment	Minimal	0.00%	14.57%
Cost reduction	Low	1.00%	15.57%
Expand existing products in existing markets	Moderate	2.00%	16.57%
Add new products in existing markets	Moderate-High	3.00%	17.57%
Expand existing products in new markets	Moderate-High	5.00%	19.57%
Add new products in new markets	High	6.00%	20.57%

The table presents one possible approach to assign risk premium to projects of varying risk profile. The impact of risk adjusted required rate of return can be observed from the table, in line with the basic relationship between risk and return suggested in financial theory.

Gordon Model

If existing funds are to be used, then the market value of WACC is 19.47%
Add an allowance for projects without cash inflows 1.00%
Additionally, projects in foreign countries generally have an added risk premium of 2% to 4% depending on the country and the degree of political risk, repatriation risk, exchange rate risk, etc.

Add a premium for projects according to risk type (Table 7)

Table TN3: Risk types of projects (ROR Based on Market-Value weights)

Type of Project	Degree of Risk	Suggested Risk Premium	Required Rate of Return
Routine replacement of equipment	Minimal	0.00%	20.47%
Cost reduction	Low	1.00%	21.47%
Expand existing products in existing markets	Moderate	2.00%	22.47%
Add new products in existing markets	Moderate-High	3.00%	23.47%
Expand existing products in new markets	Moderate-High	5.00%	25.47%
Add new products in new markets	High	6.00%	26.47%

This table presents one possible approach in assigning risk premium to the ROR based on Market-Value weights. The impact of the risk adjusted required rate of return can be observed from the table, in correspondence with the risk and return relationship suggested in financial theory.

Question 6: Make a recommendation as to which, if any, of the investments identified in Table 6 should be accepted taking into account the capital constraint.

Solution 6:
Table 6 of the case lists various projects under consideration along with their IRRs. Based on the nature of these projects, their IRR, and the required rate of return that we determined in table TN2 earlier, we are now well equipped to decide which of those projects should be accepted. Table TN4 summarizes the decision criteria.

Table TN4: GCS's N+6 New Projects Under Consideration (ROR Based on Book-Value weights)

Project	Net Investment Cost (US$, in millions)	Proposed Location	Estimated IRR	Type of Project	International Risk Premium	Required Rate of Return (RRR)	DECISION
1	$500	Europe	26.30%	Existing product, new market	2%	21.57%	**ACCEPT**
2	$400	USA	13.50%	New product, new market	0%	20.57%	REJECT
3	$650	Asia	8.60%	Expand existing product in existing market	3%	22.57%	REJECT
4	$1,500	Asia	23.40%	New product, existing market	3%	20.57%	**ACCEPT**
5	$350	USA	24.60%	Replace Equipment	0%	14.57%	**ACCEPT**
6	$750	Europe	10.20%	Expand existing product in existing market	2%	18.57%	REJECT
7	$250	Asia	26.70%	Existing product, new market	3%	22.57%	**ACCEPT**
8	$325	Asia	18.80%	New product, existing market	3%	20.57%	REJECT

The table compares the estimated IRR and RRR to arrive at accept-reject decisions for projects of different risk profiles. The IRR must exceed RRR for the project to be accepted, else it has to be rejected.

Note that the capital constraint for all projects is US$4.2 billion. If we total the net investment for all the projects which have been accepted in TN4, these amount to only US$2.6 billion. Therefore, there is no need for capital rationing.

Also note that table TN4 is a result of using WACC under Gordon's model with book value weights. Students may find it interesting to analyze the outcome when market value weights are used instead, as shown in table TN3 and TN5. When market value weight is used under Gordon's model, the required rate of return would work out to be higher by 5.90%. This is the differential between 13.57% and 19.47% as presented earlier. When the market value weight is used instead of book value, all projects listed in TN5, except for project 5 would stand rejected. IRR of project 5 alone would exceed its required rate of return and hence would be accepted. The net investment required in that case works out to be $350 million. The current year balance sheet lists cash and equivalents at more than $6 billion. Therefore it is most unlikely that new capital funds will have to be raised in the market in order to finance this project.

Since book-value weights are based on historical data while market-value weights are based on more current data, an argument can be made for the superiority of the market-value weights based on results and outcomes.

Table TN5: GCS's N+6 New Projects Under Consideration (ROR Based on Market-Value weights)

Project	Net Investment Cost (US$, in millions)	Proposed Location	Estimated IRR	Type of Project	International Risk Premium	Required Rate of Return (RRR)	DECISION
1	$500	Europe	26.30%	Existing product, new market	2%	27.47%	REJECT
2	$400	USA	13.50%	New product, new market	0%	26.47%	REJECT
3	$650	Asia	8.60%	Expand existing product in existing market	3%	25.47%	REJECT
4	$1,500	Asia	23.40%	New product, existing market	3%	26.47%	REJECT
5	$350	USA	24.60%	Replace Equipment	0%	20.47%	**ACCEPT**
6	$750	Europe	10.20%	Expand existing product in existing market	2%	24.47%	REJECT
7	$250	Asia	26.70%	Existing product, new market	3%	28.47%	REJECT
8	$325	Asia	18.80%	New product, existing market	3%	26.47%	REJECT

The table compares the estimated IRR and RRR to arrive at accept-reject decisions for projects of different risk profiles. The IRR must exceed RRR for the project to be accepted, else it has to be rejected.

CONCLUSIONS

The case provides an excellent opportunity to students to apply Gordon's dividend valuation and Capital Asset Pricing Models in estimating the cost of equity. They are led to appreciate the significance of WACC in determining the criteria for acceptance of capital investment projects. Moreover, students get insights into the appropriateness of book value and market value weights while determining WACC. The case also builds an international context for capital investment projects and discusses various considerations that include incorporation of various risk premiums in calculation the required rate of return.