

## 23-21 (15 min.) ROI, RI, EVA®.

Requirements 1 and 2 are answered together:

	Atlantic Division	Pacific Division
Total assets	\$1,000,000	\$5,000,000
Operating income	\$ 200,000	\$ 750,000
Return on investment	$\$200,000 \div 1,000,000 = 20\%$	$\$750,000 \div 5,000,000 = 15\%$
Residual income at 12% required rate of return*	\$80,000	\$150,000

\* $\$200,000 - (0.12 \times \$1,000,000) = \$80,000$ ;  $\$750,000 - (0.12 \times \$5,000,000) = \$150,000$

The tabulation shows that, while the Atlantic Division earns the higher return on investment, the Pacific Division earns the higher residual income at the 12% required rate of return.

3. After-tax cost of debt financing =  $(1 - 0.4) \times 10\% = 6\%$   
 After-tax cost of equity financing = 14%

The weighted-average cost of capital (WACC) is given by

$$\text{WACC} = \frac{(0.06 \times \$3,500,000) + (0.14 \times \$3,500,000)}{\$3,500,000 + \$3,500,000} = \frac{\$210,000 + \$490,000}{\$7,000,000}$$

$$= \$700,000 / \$7,000,000 = .1 \text{ or } 10\%$$

Economic value added (EVA) calculations are as follows:

Division	After-Tax Operating Income	-	Weighted-Average Cost of Capital	×	Total Assets Minus Current Liabilities	=	Economic Value Added (EVA)
Atlantic	$\$200,000 \times 0.6$	-	[10%	×	$(\$1,000,000 - \$250,000)$	=	$\$120,000 - \$75,000 = \$45,000$
Pacific	$\$750,000 \times 0.6$	-	[10%	×	$(\$5,000,000 - \$1,500,000)$	=	$\$450,000 - \$350,000 = \$100,000$

Potomac should use the EVA measure for evaluating the economic performance of its divisions for two reasons: (a) It is a residual income measure and, so, does not have the dysfunctional effects of ROI-based measures. That is, if EVA is used as a performance evaluation measure, divisions would have incentives to make investments whenever after-tax operating income exceeds the weighted-average cost of capital employed. These are the correct incentives to maximize firm value. ROI-based performance evaluation measures encourage managers to invest only when the ROI on new investments exceeds the existing ROI. That is,

managers would reject projects whose ROI exceeds the weighted average cost of capital but is less than the current ROI of the division; using ROI as a performance evaluation measure creates incentives for managers to reject projects that increase the value of the firm simply because they may reduce the overall ROI of the division; (b) EVA calculations incorporate tax effects that are costs to the firm. It, therefore, provides an after-tax comprehensive summary of the effects of various decisions on the company and its shareholders.

## 23-22 (25 min.) RI, EVA<sup>®</sup>.

1.

	Truck Rental Division	Transportation Division
Total assets	\$650,000	\$950,000
Current liabilities	120,000	200,000
Investment (Total assets – current liabilities)	530,000	750,000
Required return (12% × Investment)	63,600	90,000
Operating income before tax	75,000	160,000
Residual income (Optg. inc. before tax – reqd. return)	11,400	70,000

2. After-tax cost of debt financing =  $(1 - 0.4) \times 10\% = 6\%$

After-tax cost of equity financing = 15%

$$\text{Weighted average cost of capital} = \frac{\$900,000 \times 6\% + 600,000 \times 15\%}{\$900,000 + 600,000} = 9.6\%$$

Required return for EVA

9.6% × Investment

$(9.6\% \times \$530,000; 9.6\% \times \$750,000)$	\$50,880	\$72,000
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Operating income after tax

$0.6 \times \text{operating income before tax}$	45,000	96,000
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EVA (Optg. inc. after tax – reqd. return)	(5,880)	24,000
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3. Both the residual income and the EVA calculations indicate that the Transportation Division is performing better than the Truck Rental Division. The Transportation Division has a higher residual income (\$70,000 versus \$11,400) and a higher EVA [\$24,000 versus \$(5,880)]. The negative EVA for the Truck Rental Division indicates that, on an after-tax basis, the division is destroying value—the after-tax economic return from the Truck Rental Division's assets is less than the required return. If EVA continues to be negative, Burlingame may have to consider shutting down the Truck Rental Division.

