15.963 Management Accounting and Control
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- Three companies, A, B and C have net income of $100m, $120m and $80m, respectively.
  - Rank them on performance.
    - What is the benchmark?
    - Problem is differences in size or invested capital.
- Now suppose they have Return on Investment (ROI) of 8%, 6% and 10% respectively.
  - Now rank them on performance.
  - Again, this is difficult. We do not know how risky these firms are.
  - Risk will determine the required return.
  - We have to compare the ROI with the required return for each firm – suppose it is 4%, 8% and 10%, respectively.
  - Now we can say that A (B) [C] performed better than (worse than) [as] expected.

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- To maximize firm value, the firm must earn more than its cost of capital.
- The third performance metric is in %, but captures the spirit of two important (and essentially similar) metrics:
  - Residual income, and
  - Economic Value Added (EVA).
  - These differ only in certain details.
- EVA is, broadly speaking, = Income – (Expected income) = Income – (Cost of Capital*Invested Capital).
  - This is a dollar amount, not percentage, so larger firms will generally have higher EVA.

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- Why did Vedrine introduce EVA?
  - Prior CEO focused on earnings per share, without regard to invested capital.
  - Prior system also had a large subjective component.
- How will EVA help?
  - Forces balance sheet accountability.
  - Will help identify, and therefore manage, EVA drivers, and thereby increase firm value.

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- What are the features of the EVA system at Vyaderm?
  - EVA centers
  - EVA drivers
  - EVA incentive program, i.e., compensation tied directly to EVA.
- The first two features use EVA to measure *business unit* performance. The third uses EVA to measure *managers'* performance. Should these be linked?
- Consider EVA centers, and the definition of EVA.
- How do you determine the cost of capital for, e.g., the Dermatology division?
  - The division does not issue its own debt.
  - It does not have its own separately traded equity.
  - Does this introduce subjectivity and distrust?

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- How do you the determine the investment base for the dermatology division?
  - Can we construct a balance sheet for separate divisions?
  - Are there shared resources?
  - This will be very difficult and subjective.
- So, determining divisional EVA is problematic.
- Vedrine would like to establish a single, global EVA center. Is this a good idea?
  - The company as a whole has a clearly defined balance sheet, and cost of capital may be easier to estimate.
  - The main problem with this is that it weakens the link between an individual manager's effort (say, manager in Singapore) and her compensation.
  - This will foster mistrust, and will reduce employee motivation.
  - This weaker link will also promote free-riding and therefore decrease efficiency.

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- This may be one reason to use EVA for measuring business performance but not compensation.
- Let's consider the accounting adjustments to "Income" or "Net Operating Income After Taxes" (NOPAT), at Vyaderm.
- In calculating 'Economic' Value Added, we need 'Economic' income.
  - i.e., accounting income has to be adjusted to better approximate economic income.
- Accounting income has to conform to GAAP, which tends to be conservative. For example…….

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- R&D is expensed, not capitalized, under GAAP.
  - For R&D to qualify as an asset, and therefore be capitalized, the timing and extent of future benefits would have to be verifiable.
  - GAAP takes the position that this is not the case, and therefore does not allow R&D capitalization.
  - However, an economic asset does not have to satisfy the verifiability (of timing and extent) criteria of GAAP.
    - It simply needs to have some value in expectation, to be considered an economic asset.
  - The expected value (or full value in this case) of R&D is considered an economic asset and therefore capitalized for EVA calculation.

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- However, this asset also has a finite life, and should therefore be amortized over this period.
  - Vyaderm amortizes R&D over five years, straight line.
- The same logic applies to marketing expenses.
  - Since these will yield benefits over a shorter period, they are amortized by Vyaderm over three years, straight line.
- Goodwill from an acquisition is the excess of purchase price over the fair market value of the separable net assets.
  - This is a measure of such things as reputation, client base and other intangible assets.
  - This capitalized by Vyaderm for EVA purposes, and not amortized.
- These are by no means all the adjustments. Consultants offer a litany of adjustments (the idea of diminishing marginal benefits probably applies).

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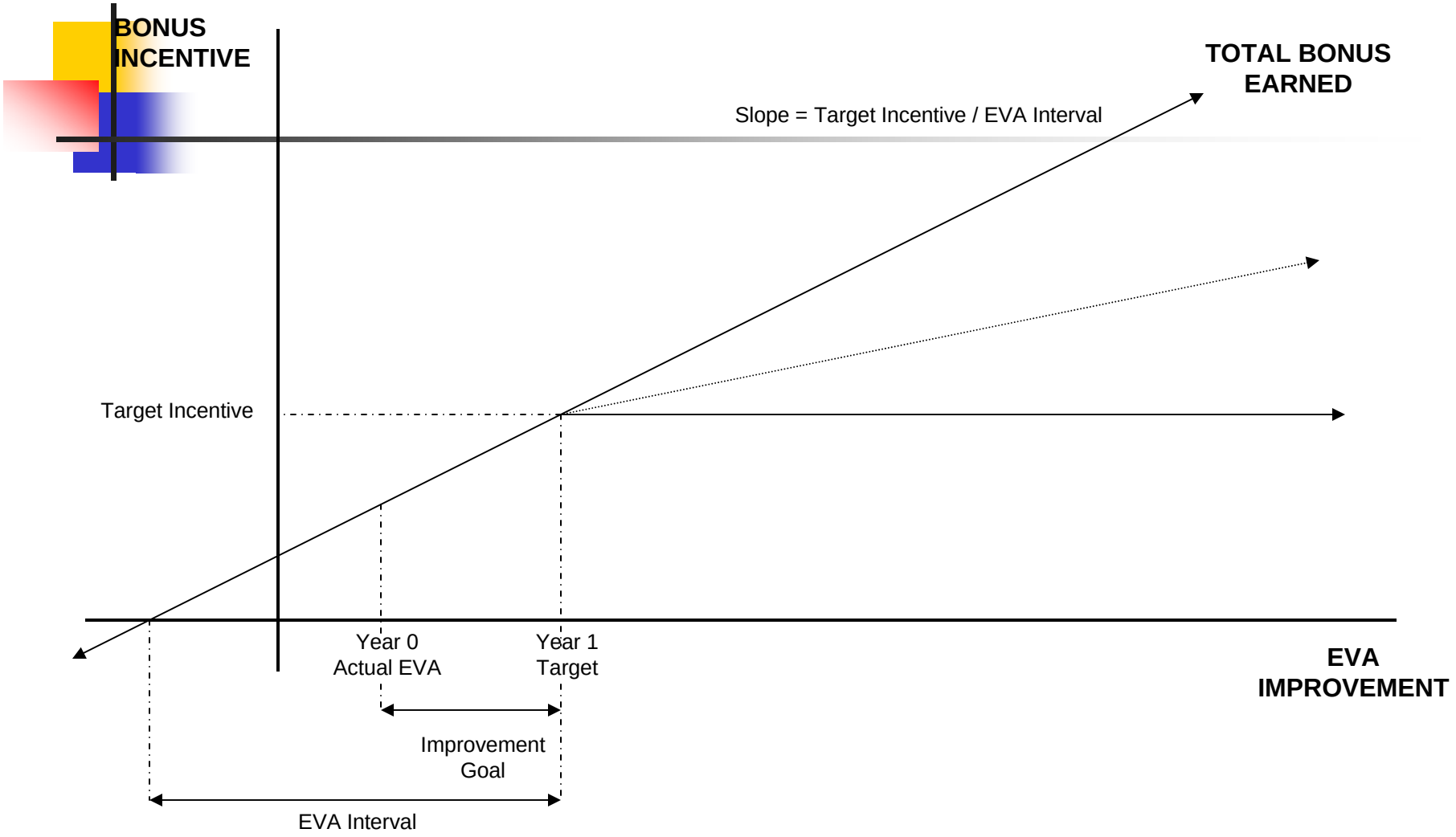
- How does the bonus calculation work?
- There is a bonus bank, or a *stock* of funds from which a bonus can be distributed. This bank has to be calculated first.
- Second, a formula determines the bonus paid out from this bank.
- The formula is based on *improvements* over the prior year.
  - Improvement is the value *added*.
  - This motivates continuous growth, but ratchets might introduce other behavioral distortions.
    - In good years, some sales may be deferred at year-end.
  - It is not as good after a windfall year and better after a poor year.
  - It does not penalize good managers who take over poorly performing divisions.

Exhibit 2



Note: The EVA interval is the shortfall from target that eliminates the bonus.
An EVA center's performance (%) = 1 + [actual improvement – improvement goal) / EVA interval].

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- What is the role of the EVA interval?
- It allows risk taking, by allowing positive additions to the bonus bank even for shortfalls from target.
  - Allowing managers to take calculated risks, or preventing them from being overly risk averse, is important.
  - The shorter the interval, the greater the risk imposed on managers, and the more risk-averse they might generally be when the bank balance is positive.
  - On the other hand, they might also engage in excessive risk taking when the balance is hopelessly negative.
- It acts as a lever for bonus payments.
  - The bonus payment per dollar of improvement beyond the bottom of the interval is (target bonus / interval).
  - The shorter the interval, the higher the payment per dollar of EVA improvement, and the greater the risk imposed on managers.
  - This is the risk/reward tradeoff.

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- What is the role of the bonus bank?
  - It smoothes intertemporal fluctuations in managers' income, and therefore reduces the risk imposed on them.
  - In expectation, this will reduce the firm's compensation costs.
- Let us calculate the 2000 EVA for the Dermatology Division.
- The divisional cost of capital is given as 11% in exhibit 8.
- We need the economic NOPAT, and the economic capital base.
- For economic NOPAT, start with the adjustments, e.g., R&D.
- For each year, on the income statement:
  - add this back to income before taxes, and
  - subtract the amortization charge for this and past years.

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- For each year, on the balance sheet,
  - add R&D, and
  - subtract the amortization expense for this and previous years.

R&D Adjustments

($000s)		1995	1996	1997	1998	1999	2000	2001E	2002E
R&D Expense as Reported on P&L		10673	12487	14610	17094	20000	39000	27378	32032
(5 Year Amortization Period)	1995	2135	2135	2135	2135	2135			
	1996		2497	2497	2497	2497	2497		
	1997			2922	2922	2922	2922	2922	
	1998				3419	3419	3419	3419	3419
	1999					4000	4000	4000	4000
	2000						7800	7800	7800
	2001							5476	5476
	2002								6406
R&D Amortization Under EVA		2135	4632	7554	10973	14973	20638	23616	27101
Cumulative R&D Expense (P&L)		10673	23160	37770	54864	74864	113864	141242	173274
Less: Cumulative Amortization (EVA)		2135	6767	14321	25293	40266	60904	84521	111622
Capitalized R&D for EVA Calculation of Capital		8538	16393	23449	29571	34598	52960	56721	61652

Advertising Adjustments

($000s)		1998	1999	2000	2001E	2002E
Advertising Expense as Reported on P&L		41	45	50	55	61
(3 Year Amortization Period)	1996	11				
	1997	13	13			
	1998	14	14	14		
	1999		15	15	15	
	2000			17	17	17
	2001				18	18
	2002					20
Advertising Amortization Under EVA		38	41	46	50	55
Cumulative Advertising Expense (P&L)		113	158	208	263	324
Less: Cumulative Amortization (EVA)		73	114	160	210	265
Capitalized Advertising for EVA Calculation of Capital		40	44	48	53	59

2000 EVA for Dermatology

($000s)	1999	2000	2001E	2002E
NOPAT:				
Net Income Before Tax	20000	51000	27848	32861
Research & Development Expense	20000	39000	27378	32032
1. R&D Adjustment	-14973	-20638	-23616	-27101
Advertising Expense	45	50	55	61
2. Advertising Adjustment	-41	-46	-50	-55
3. Goodwill Amortization	2500	2500	2500	2500
Net Operating Profit Before Taxes (NOPBT)	27531	71866	34114	40297
Current Year's Income Tax Payments	-7875	-18725	-10622	-12376
Net Operating Profit After Taxes (NOPAT)	**19656**	**53141**	**23493**	**27921**
CAPITAL:				
Net Operating Assets (NOA)	110000	135000	153164	180734
1. Capitalized R&D	34598	52960	56721	61653
2. Capitalized Advertising	44	48	53	59
3. Accumulated Goodwill Amortization	7500	10000	12500	15000
Capital	**152142**	**198008**	**222439**	**257445**
Capital Charge (11%)	-16736	-21781	-24468	-28319
Economic Value Added (EVA)	**2920**	**31360**	**-976**	**-398**

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- The projections for 2001 and 2002 are based on assumed growth rates of:
  - 18% for net income before tax (as between 1995 and 1999);
  - 17% for R&D (as between 1995 and 1999);
  - 10% for advertising (as between 1995 and 1999);
  - 18% for net operating assets (as between 1995 and 1999).
- Why is the projected EVA negative for 2001 and 2002?
  - The growth rate of (capitalized) R&D expense is over 30% per year, outstripping the income growth rate.

Manager's Bonus Calculation

- The target bonus is salary x fixed rate = 200k x 60% = $120k
- Addition to bonus bank = 120k x (1+(unexpected EVA improvement) / interval))
- = 120k x (1+ (28440/12000) = $382,897
- Opening balance of bonus bank in 2000 = $0.
- 2000 bonus payout = $120k + half of remaining balance = 120k + 131,449 = $251,449
- 2000 ending bonus bank balance = $131,449
- What about bonus payouts in 2001 and 2002?

Projected Bonus Payouts in 2001 and 2002

($000s except bonus)	1999 Old Model	2000 EVA Year 1	2001E EVA Year 2	2002E EVA Year 3
Economic Value Added (EVA)	$2,920	$31,360	-$976	-$398
EVA Improvement Goal		$2,150	$2,150	$2,150
EVA Target		$5,070	$33,510	$1,174
Interval		$12,000	$12,000	$12,000
Actual EVA Improvement		**$28,440**	**-$32,336**	**$578**
EVA Performance		**319%**	**-187%**	**87%**
North American Manager's Bonus				
Base Salary		$200,000	$200,000	$200,000
Target EVA Bonus (60% Base Salary)		$120,000	$12,000	$120,000
Starting Bank Balance		-	$131,449	-$93,410
1. Calculated Bonus		$382,897	-$224,858	$104,279
New Bank Balance		**$382,897**	**-$93,410**	**$10,869**
Pay Out 100% of Available Target		$120,000	-	$10,869
Plus 50% Remaining Bank Balance		$131,449	-	-
2. Total Bonus Payout		**$251,449**	**-**	**$10,869**
Ending Bank Balance		**$131,449**	**-$93,410**	**-**

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- Why is the bonus payout so low immediately after 2000?
  - Because the bonus formula is based on improvements over the prior year.
  - It is hard to improve over a windfall year.
  - It will take a few years to build the bank back up.
- Consider spillover effects of this bonus scheme. If the company wishes to hire new managers in 2001 or 2002, will it be successful?
  - Should it make exceptions to the formula for new hires in these years?
  - Will this affect the credibility of the system, or foster resentment from existing employees?

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- Another feature of the bonus system is that, for individual managers, the bonus bank is portable within the company.
- Rotating managers between divisions for development purposes is a an important HR tool at companies.
- How will this system affect rotation?
  - Those being rotated out of Dermatology will generally be better off than those staying another couple of years.
  - Who would want to rotate in to Dermatology in 2001?
- What should Vyaderm do?

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- The essential problem is that excessive risk is being imposed on managers.
  - The bonus payout is very volatile.
  - Manager's compensation will therefore be higher on average, which is more costly for the firm.
- Risk is controlled through the interval in the bonus formula.
  - Widening the interval will reduce risk.
  - It will reduce the bonus payout this year (reward will be commensurate with risk).
  - The advantage is that it will also penalize the bank less in 2001, per dollar of unexpected EVA improvement.

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- Other takeaways:
  - EVA is better at measuring business performance than managerial performance.
  - Consider delinking the two roles of EVA at Vyaderm.
  - Managerial performance may be better measured through key EVA drivers within the manager's control.
  - If the link between managerial effort (or performance) and the performance measure is weak, a host of problems arise, including:
    - demotivation;
    - free-riding;
    - difficulty in recruitment and retention;
    - possibly excessive risk and therefore compensation cost, etc.
- Consider using multiple performance measures, e.g., Citibank case next week.