

Measuring and Controlling Assets Employed

Introduction

- In some **business units**, the focus is **on profit**
 - as measured by the **difference** between **revenues** and **expenses**.
- In **other business units**, **profit** is **compared** with the **assets employed** in **earning** it.
- We refer to the **latter group** of **responsibility centers** as *investment centers* and,
- in this section, discuss the **measurement problems** involved in such **responsibility centers**.

Introduction

We then discuss **two methods** of relating profit to the **investment base**:

- (1) the percentage *return on investment*, referred to as **ROI**, and
- (2) *economic value added*, called **EVA**.

We describe the **advantages** and **qualifications** of using each to **measure performance**

Introduction

The **purposes of measuring assets** employed are

- To **provide information**
 - that is **useful in making sound decisions** about **assets employed** and
- to **motivate managers** to make these **sound decisions** that are in the **best interests** of the **company**.
- To **measure the performance** of the **business unit** as an **economic entity**

Introduction

In general, business unit managers have **two performance objectives**.

- **First**, they **should** generate **adequate profits** from the resources at their disposal.
- **Second**, they should **invest** in **additional resources** only **when** the **investment** will **produce** an **adequate return**.
 - Conversely, they **should disinvest** if the **expected annual profits** of any resource, **discounted** at the company's required **earnings rate**, are **less** than the **cash** that could be **realized** from **its sale**.
- The **purpose** of **relating profits** to **investments** is to **motivate business unit managers** to **accomplish** these **objectives**.

Example for ROI calculation

EXHIBIT 7.1 Business Unit Financial Statements

Balance Sheet (\$000s)			
Current assets:		Current liabilities:	
Cash	\$ 50	Accounts payable	\$ 90
Receivables	150	Other current	110
Inventory	<u>200</u>		
Total current assets	400	Total current liabilities	<u>200</u>
Fixed assets:		Corporate equity	
Cost	\$600		500
Depreciation	<u>-300</u>		
Book value	<u>300</u>		
Total assets	<u>\$700</u>	Total equities	<u>\$700</u>
Income Statement			
Revenue			\$1,000
Expenses, except depreciation	\$850		
Depreciation	50		<u>900</u>
Income before taxes			100
Capital charge (\$500 * 10%)			<u>50</u>
Economic value added (EVA)			<u><u>50</u></u>
Return on investment = $\frac{\$100}{\$500} = 20\%$			

ROI

- *Return on investment (ROI) is a ratio.*
- *The numerator is income, as reported on the income statement.*
- *The denominator is assets employed.*
 - In Exhibit 7.1, the **denominator** is taken as the **corporation's equity** in the business unit.
- This amount **corresponds** to the **sum of noncurrent liabilities plus shareholders' equity**
 - in the **balance sheet** of a **separate company**.
 - It is **mathematically equivalent** to **total assets less current liabilities**, and
 - to **noncurrent assets plus working capital**.

EVA

- ***Economic value added (EVA)** is a **dollar amount**, rather than a ratio.*
- *It is found by **subtracting a capital charge** from the **net operating profit**.*
- This **capital charge** is found by **multiplying** the **amount** of assets **employed** by a **rate**,
 - which is **10 percent** in Exhibit 7.1.

Measuring Assets Employed

In deciding what **investment base** to use to **evaluate** investment center managers, headquarters asks **two questions**:

- **First**, what **practices** will **induce** business unit managers to **use** their **assets** most **efficiently** and to acquire the proper amount and kind of new assets?
 - Presumably, when their **profits** are **related** to **assets** employed, business unit managers **will try** to **improve** their **performance** as **measured** in this way.
- **Senior management** wants the **actions** that they **take toward** this **end** to be in the **best interest** of the **whole corporation**.
- **Second**, what **practices** best **measure** the **performance** of the unit as an **economic entity**?

Cash

- **Most companies control cash centrally because central control permits use of a smaller cash balance than would be the case if each business unit held the cash balances it needed to weather the unevenness of its cash inflows and outflows.**
- **the actual cash balances at the business unit level tend to be much smaller than would be required if the business unit were an independent company.**
- **Many companies therefore use a formula to calculate the cash to be included in the investment base.**
 - **For example, General Motors was reported to use 4.5 percent of annual sales;**
 - **Du Pont was reported to use two months' costs of sales minus depreciation.**

Receivables

- **Business unit managers can influence the level of receivables indirectly,**
 - by their **ability to generate sales**, and
- **directly,**
 - by **establishing credit terms and approving individual credit accounts and credit limits**
- In the **interest of simplicity, receivables often are included at the actual end-of-period balances,**
- although the **average of intraperiod balances is conceptually a better measure of the amount that should be related to profits.**

Inventories

- **Inventories** ordinarily are **treated** in a manner **similar** to **receivables**
- that is, **they are** often **recorded at end-of-period amounts**
 - even though **intraperiod averages** would be **preferable conceptually**.
- If the **company** uses **LIFO** (last in, first out) for **financial accounting purposes**,
 - a **different valuation** method usually is **used** for **business unit profit** reporting
 - because **LIFO inventory** balances **tend** to be **unrealistically low** in **periods of inflation**.
- In these **circumstances**, **inventories** should be valued at **standard** or **average costs**, and these **same costs** should be **used** to **measure cost of sales** on the **business unit income statement**

Inventories

- If **work-in-process inventory** is financed by *advance payments* or by *progress payments* from the **customer**,
 - as is **typically** the case with **goods** that require a **long manufacturing** period,
- these **payments** either are **subtracted** from the **gross inventory** amounts or **reported** as **liabilities**.

Inventories

- Some companies **subtract *accounts payable*** from **inventory** on the grounds that **accounts payable** represent **financing** of part of the inventory by **vendors**,
 - at **zero cost** to the **business unit**.
- The **corporate capital required** for **inventories** is only the **difference** between the **gross inventory** amount and **accounts payable**.
- **If the business unit can influence the payment period** allowed by **vendors**,
 - then **including accounts payable** in the calculation **encourages the manager** to **seek the most favorable** terms

Working Capital in General

- The **treatment** of working capital items **varies** greatly.
- **At one extreme**, companies include **all current assets** in the **investment base**
 - with **no offset** for any **current liabilities**.
- This **method** is **sound** from a **motivational standpoint** if the business **units cannot influence accounts payable** or **other current liabilities**.
- It does **overstate** the **amount** of corporate **capital** required **to finance** the **business unit**,
 - however, because the **current liabilities** are a **source of capital**, often **at zero interest cost**

Working Capital in General

- At the **other extreme**,
- **all current liabilities** may be **deducted** from **current assets**,
 - as was done in calculating the investment base in Exhibit 7.1.
- This **method** provides a **good measure** of the **capital** provided by the corporation, on which it **expects** the **business unit** to **earn a return**.
- However, it may **imply** that business unit managers are **responsible** for certain **current liabilities**
- over which **they** have **no control**.

Property, Plant, and Equipment

- In **financial accounting**, **fixed assets** are **initially** recorded at their acquisition **cost**, and
- this cost is **written off** over the asset's **useful life** through **depreciation**.
- **Most** companies use a **similar approach** in **measuring profitability** of the **business unit's asset base**.
- This **causes** some **serious problems** in using the system for its intended purposes.

EXHIBIT 7.3 Incorrect Motivation for Asset Acquisition (\$000)

A. Economic calculation

Investment in machine	\$100
Life, 5 years	
Cash inflow, \$27,000 per year	
Present value of cash inflow ($\$27,000 \times 3.791$)*	<u>102.4</u>
Net present value	<u>2.4</u>
Decision: Acquire the machine.	

B. As reflected on business unit income statement

	As in Exhibit 7.1		First Year with Machine
Revenue	\$1,000		\$1,000
Expenses, except depreciation	\$850	\$823	
Depreciation	<u>50</u>	<u>900</u>	<u>893</u>
Income before taxes	100		107
Less capital charge at 10% [†]	<u>50</u>	<u>50</u>	<u>60</u>
EVA	<u><u>50</u></u>		<u><u>47</u></u>

Note: Income taxes are not shown separately for simplicity. Assume they are included in the calculation of the cash flow.

*3.791 is the present value of \$1 per year for five years at 10 percent.

[†]Capital charge on the new machine is calculated at its beginning book value, which for the first year is $\$100 \times 10\% = 10$. We have used the beginning-of-the-year book value for simplicity. Many companies use the average book value— $(100 + 80) \div 2 = 90$. The results will be similar.

Property, Plant, and Equipment

- If **profitability** is measured by **return on investment**, the same **inconsistency exists**,
 - as the last column of Exhibit 7.4 shows.
- Although we know from the **present value calculation** that the **true return is about 11 percent**,
- the **business unit financial statement reports** that it is **less than 10 percent** in the first year and **increases thereafter**.
- the **average** of the five **annual percentages** shown is **16 percent**,
 - which far **exceeds** what **we know** to be the **true annual return**.
- It is **evident** that if **depreciable assets** are included in the investment base at net book value, business unit **profitability** is **misstated**, and
- **business unit managers** may not be **motivated** to make **correct acquisition decisions**.

Acquisition of New Equipment

- **Suppose** a business unit could buy a **new machine** for \$100,000.
- This machine is **estimated to produce** cash savings of **\$27,000 a year** for **five** years.
- If the company has a **required return of 10 percent**, the **investment is attractive**,
 - as the **calculations** in section A of **Exhibit 7.3** illustrate.
- The **proposed investment** has a **net present value** of **\$2,400** and, therefore, **should be undertaken**.
- However, if the **machine is purchased** and the business unit measures its asset base as shown in Exhibit 7.1, the unit's **reported economic value added** will **decrease**, rather than increase, in the first year.

EXHIBIT 7.4 Effect of Acquisition on Reported Annual Profits (\$000)

Year	Book Value at Beginning of Year (a)	Incremental Income* (b)	Capital Charge† (c)	EVA (b - c)	ROI b ÷ a
1	100	7	10	-3	7%
2	80	7	8	-1	9
3	60	7	6	1	12
4	40	7	4	3	18
5	20	7	2	5	35

Note: True return = approximately 11 percent.

*\$27,000 cash inflow - \$20,000 depreciation = \$7,000.

†10 percent of beginning book value.

Property, Plant, and Equipment

- Exhibit 7.4 shows how, in later years, **the amount of economic value added will increase** as the **book value** of the **machine declines**,
 - going from **-\$3,000** in year 1 to **+\$5,000** in year 5.
- The **increase in economic value added** each year **does not represent real economic change**.
- Although there **appears** to be constantly **improving profitability**,
- **in fact** there is **no real change** in **profitability** after the year the machine was acquired.

Generalizing from this example:

- it is **evident** that **business units** that have **old**, almost **fully depreciated assets** will **tend to report larger economic value added** than **units** that have **newer assets**.

Gross Book Value

- The **fluctuation in economic value added** and **return on investment** from year to year in Exhibit 7.4 can be **avoided** by
- **including depreciable assets** in the **investment base** at **gross book value** rather than at **net book value**.
- Some **companies do** this.
- If this were done in this case, the **investment** each year would be **\$100,000 (original cost)**, and
- the **additional income** would be **\$7,000**
 - \$27,000 cash inflow - \$20,000 depreciation

Gross Book Value

- The **economic value added**, however, would **decrease by \$3,000** (\$7,000 — \$10,000 interest), and
- **return on investment** would be **7 percent** (\$7,000/\$100,000).
- **Both** of these numbers **indicate** that the **business unit's profitability** has **decreased**, which, in fact, is **not true**.

Conclusion:

- **Return on investment calculated on gross book value always understates the true return.**

Disposition of Assets

- If a **new machine** is being **considered** to **replace** an **existing machine** that has some **undepreciated book value**,
- we know that this **undepreciated book value** is **irrelevant** in the **economic analysis** of the **proposed purchase**
 - except indirectly as it may affect income taxes
- **Removing** the **book value** of the **old machine** can substantially **affect** the **calculation** of **business unit profitability**

Disposition of Assets

- **Gross book value will increase only by the difference**
 - between the **net book value after year 1** of the **new machine** and
 - the **net book value of the old machine**.
- In either case, the relevant amount of **additional investment** is **understated**, and
- the **economic value added** is correspondingly **overstated**.
- This **encourages managers to replace old equipment with new equipment**,
 - even when **replacement** is not **economically justified**.

Disposition of Assets

- In sum,
- if **assets** are **included** in the **investment base** at their **original cost**,
- then the business unit **manager** is **motivated** to **get rid of them**
—**even if** they have some **usefulness**—
- **because** the business unit's **investment base** is **reduced** by the full **cost** of the **asset**.

Leased Assets

- **Suppose** the business unit
 - whose financial statements are shown in Exhibit 7.1
- **sold its fixed assets** for their **book value** of **\$300,000**,
- **returned the proceeds** of the sale to corporate **headquarters**, and then **leased back** the assets at a **rental** rate of **\$60,000 per year**.
- As **Exhibit 7.8 shows**, the business **unit's income** before taxes would **decrease**
 - because the **new rental expense** would be **higher** than the **depreciation charge** that was **eliminated**
- Nevertheless, **economic valued added** would **increase** because the **higher cost** would be **more than offset** by the **decrease** in the **capital charge**.

Leased Assets

EXHIBIT 7.8 Effect of Leasing Assets

		Income Statement (\$000)	
		As in Exhibit 7.1	If Assets Are Leased
Revenue		\$1000	<u>\$1,000</u>
Expenses other than below	\$850		\$850
Depreciation	<u>50</u>	900	
Rental expense			<u>60</u>
Income before taxes		<u>100</u>	<u>90</u>
Capital charge \$500 * 10%		50	
\$200 * 10%			<u>20</u>
EVA		<u>50</u>	<u><u>70</u></u>

Leased Assets

- Because of this,
- business unit managers are **induced**
- to **lease, rather than own, assets**
- **whenever the interest charge** that is built into the rental cost is **less** than the **capital charge**
 - that is **applied** to the business unit's **investment base**.

This **generalization oversimplifies**

- because, in the real world, the **impact of income taxes** must also be taken into **account**

Idle Assets

- If a **business unit** has **idle assets** that **can** be used by **other units**, it may be **permitted** to **exclude** them from the **investment base**
 - if it **classifies** them as **available**.
- The **purpose** of this **permission** is to **encourage** business unit **managers** to **release underutilized assets** to units that may have better use for them.
- However, if the **fixed assets cannot** be **used** by **other** units,
- **permitting** the business unit manager
- to **remove** them **from** the **investment base** could **result in dysfunctional actions**

Intangible Assets

- Some companies **tend** to be **R&D intensive**
 - e.g., pharmaceutical firms such as Novartis spend **huge amounts** on **developing new products**
- others tend to be **marketing intensive**
 - e.g., consumer products firms such as Unilever spend **huge amounts** on **advertising**
- There are **advantages** to capitalizing **intangible** assets such as **R&D** and **marketing** and then **amortizing** them over a selected life.
- This method should **change** how the **business unit manager views** these **expenditures**.
- By **accounting** for these **assets** as **long-term investments**,
 - the **business unit manager** will **gain less short-term benefit** from reducing **outlays** on such items.

Noncurrent Liabilities

- Ordinarily, a business unit **receives** its **permanent capital** from the **corporate pool of funds**.
- The **corporation obtained** these **funds** from
 - **debt** providers, equity **investors**, and **retained earnings**.
- **To the business unit**, the total amount of these funds is **relevant** but **not the sources** from which they were **obtained**.

Noncurrent Liabilities

- In **unusual situations**, however, a **business unit's financing** may be **specific** to its own situation.
 - For example, a **business unit** that **builds** or **operates** residential housing or office buildings uses a **much larger proportion** of **debt capital** than would a typical **manufacturing** or marketing unit.
- Since this **capital** is obtained **through mortgage** loans on the **business unit's assets**,
- it may be **appropriate** to **account** for the **borrowed** funds **separately** and to **compute** an **economic value added**
 - **based** on the **assets** obtained from **general corporate sources**
 - **rather** than on **total assets**

The Capital Charge

- Corporate **headquarters sets** the **rate** used to **calculate** the **capital charge**.
- It should be **higher** than the **corporation's** rate for **debt financing**
 - because the **funds involved** are a **mixture** of **debt** and **higher-cost equity**.
- Usually, the **rate** is **set** somewhat **below** the company's **estimated cost of capital**
- so that the **economic value added** of an **average business** unit will be **above zero**

The Capital Charge

- **Some companies** use a **lower rate** for **working capital** than for fixed assets.
- This may represent a **judgment** that **working capital** is **less risky** than **fixed assets** because the **funds** are **committed** for a **shorter time period**.
- In **other cases**, the **lower rate** is a **way** to **compensate** for the fact that the company **included inventory** and **receivables** in the **investment base** at their **gross amount**
 - i.e., without a **deduction** for **accounts payable**
- It **recognizes** the fact that **funds** obtained from **accounts payable** have **zero interest cost**

EVA

EVA is measured as follows:

$$\text{EVA} = \text{Net profit} - \text{Capital charge}$$

where

$$\text{Capital charge} = \text{Cost of capital} * \text{Capital employed} \quad (1)$$

Another way to state the equation would be:

$$\text{EVA} = \text{Capital employed} * (\text{ROI} - \text{Cost of capital}) \quad (2)$$

The following **actions** can **increase** EVA as shown in the equation (2):

- (i) **increase** in **ROI** through business process **reengineering** and **productivity gains**, without increasing the asset base;
- (ii) **divestment** of **assets, products, and/or businesses** whose **ROI** is **less than the cost of capital**;
- (iii) **aggressive new investments** in **assets, products, and/or businesses** whose **ROI exceeds the cost of capital**; and
- (iv) **increase** in **sales, profit margins, or capital efficiency** (ratio of sales to capital employed), or **decrease in cost of capital percentage**, *without affecting the other variables in equation (2)*.
- These actions **clearly** are in the **best interests** of **shareholders**

Differences between ROI and EVA

- Assume that the company's **required rate of return** for investing in fixed assets is **10 percent after taxes**, and
- that the **companywide cost of money tied up in inventories and receivables** is **4 percent** after taxes.
- The top section of Exhibit 7.12 shows the **ROI calculation**.
- **Columns (1) through (5)** show the amount of **investment in assets** that each **business unit budgeted** for the **coming year**.
- **Column (6)** is the amount of **budgeted profit**.
- **Column (7)** is the **budgeted profit divided** by the **budgeted investment**;
 - therefore, this **column**, shows the **ROI objectives** for the **coming year** for **each of the business units**.

Differences between ROI and EVA

EXHIBIT 7.12 Difference between ROI and EVA (\$000)

ROI Method							
Business Unit	(1) Cash	(2) Receivables	(3) Inventories	(4) Fixed Assets	(5) Total Investment	(6) Budgeted Profit	(7) ROI Objective (6) ÷ (5)
A	\$10	\$20	\$30	\$60	\$120	\$24.0	20%
B	20	20	30	50	120	14.4	12
C	15	40	40	10	105	10.5	10
D	5	10	20	40	75	3.8	5
E	10	5	10	10	35	(1.8)	(5)

EVA Method								
Business Unit	Current Assets			Fixed Assets			Budgeted EVA (1) – [(4) + (7)]	
	(1) Profit Potential	(2) Amount	(3) Rate	(4) Required Earnings	(5) Amount	(6) Rate		(7) Required Earnings
A	24.0	\$60	4%	\$2.4	\$60	10%	\$6.0	\$15.6
B	14.4	70	4	2.8	50	10	5.0	6.6
C	10.5	95	4	3.8	10	10	1.0	5.7
D	3.8	35	4	1.4	40	10	4.0	(1.6)
E	(1.8)	25	4	1.0	10	10	1.0	(3.8)

EVA vs. ROI

- Only in Business **Unit C** is the **ROI objective consistent** with the **companywide cutoff rate**, and
- in **no unit** is the **objective consistent** with the companywide **4 percent** cost of **carrying current** assets.
- Business **Unit A** would **decrease** either **current** or **fixed** assets,
- whereas **Units D** and **E** would **benefit** from **investments** with a much **lower return**.

EVA vs. ROI

- **EVA corrects these inconsistencies.**
- **The investments,**
 - **multiplied** by the **appropriate rates** (representing the companywide rates),
are
- **subtracted** from the **budgeted profit.**
- The **resulting amount** is the **budgeted EVA.**
- Periodically, the **actual EVA** is **calculated** by **subtracting** from the **actual profits** the **actual investment multiplied** by the **appropriate rates**

EVA vs. ROI

If **Business Unit A** earned **\$28,000** and employed average current assets of **\$65,000** and average fixed assets of **\$65,000**, its **actual EVA** would be **calculated** as follows:

$$\begin{aligned} \text{EVA} &= 28,000 - 0.04 * (65,000) - 0.10 * (65,000) \\ &= 28,000 - 2,600 - 6,500 = 18,900 \end{aligned}$$

This is **\$3,300** (**\$18,900 - \$15,600**) **better** than its **objective**.

EVA vs. ROI

- **If any business unit earns more than 10 percent** on added fixed assets, it will **increase its EVA**.
- In the **cases of C and D**, the additional profit will **decrease** the amount of **negative EVA**,
 - which amounts to the same thing.
- A **similar result** occurs for **current assets**.
- **Inventory decision rules** will be **based** on a **cost of 4 percent** for **financial carrying charges**.
- In **this way** the **financial decision** rules of the business **units** will be **consistent with** those of the **company**

EVA solution

- **EVA solves the problem of differing profit objectives** for the same asset in different business units and
- **the same profit objective for different assets in the same unit.**
- For example, assume the capital investment decision rules call for a **10 percent return on general-purpose assets** and a **15 percent return on special-purpose assets.**
 - Business unit fixed assets can be **classified** accordingly, and **different rates applied** when **measuring performance.**
 - **Managers** may be **reluctant to invest in improved working conditions, pollution-control** measures, or **other social goals**
 - if they **perceive** them to be **unprofitable.**