

# Introduction to Teaching Fair Value in Accounting

AAA Fair Value Task Force

August 2008

---

---

## Table of Contents

<b>Overview and Questions to Consider</b> .....	2
<b>Introductory Financial Accounting</b> .....	5
Example A – At What Amount Should Land Be Recorded?	
Example B – Does Measuring Asset Amounts Depend on the Type of Asset?	
Example C – Valuing Buildings With Market Multiples	
Example D – Valuing of Bonds Held as Investment Securities	
<b>Introductory Managerial Accounting</b> .....	13
Capital Budgeting Spreadsheet Assignment	
<b>Intermediate Financial Accounting</b> .....	19
Cash Flow Projection Models	
Introduction to Derivatives	
The Fair Value Option	
Fair Value Disclosures	

## Overview

1. Accounting students must be better educated in understanding the use of basic valuation models.
2. Once the students understand the use of those basic valuation models, they then need to be taught where the fair value numbers generated by valuation models are used in financial reporting.
3. Once students have practice with (1) and (2), they must learn how to prepare the Level 1, 2, and 3 disclosures required in SFAS No. 157.

This sequence is ordered by priority. The least important thing we need to educate our accounting students to do with respect to fair values is to prepare SFAS No. 157 disclosures. The most important thing we can do is to educate our students on the use of a variety of basic valuation models such as market multiples, discounted cash flow, residual income, and option pricing.

As college and university accounting instructors look at fair value requirements in general and SFAS No. 157 in particular, they are terrified because many of the illustrations and applications relate to financial instruments such as the following examples from paragraphs A24 and A25 of SFAS No. 157: “long-dated currency swap,” “three-year option on exchange-traded shares,” and “receive-fixed, pay-variable interest rate swap based on the LIBOR swap rate.” So another needed emphasis is as follows.

4. Instructors, and then their students, must learn more about the **basics** of derivatives.

---

---

## Questions to Consider

- a. **Should we be teaching about basic valuation models and derivatives in accounting classes (such as intermediate financial accounting), or should this coverage be subcontracted to the finance professors?**

We should treat valuation in the same way that we currently treat time value of money in the accounting curriculum. Students learn about the time value of money in both their finance and accounting classes. There is overlap, of course, but in the accounting classes they deal with more basic usage but they get to apply these basic tools in a variety of settings (lease accounting, impairment writedowns, capital budgeting, asset retirement obligations). In the finance classes they learn more complexities.

In this same way, we should educate our accounting students in the use of some basic valuation models, and then show them how these models would be applied in a variety of contexts (accounting for an acquisition, accounting for investments securities, accounting for derivatives, impairment). And just as we introduce the time value of money in introductory classes and come back to it over and over, we can do the same with basic valuation models.

**b. Where can we fit this material in an already-crowded accounting curriculum?**

What we should NOT do is to create a separate course or courses. As mentioned above, we should do just as we do with the time value of money and include coverage of fair value and valuation models sprinkled in various courses where appropriate. Here are some examples.

- In the first accounting course, when the topic of depreciation is introduced, we can also introduce a very simple valuation model, such as a market multiple (cost per square foot) and discuss what we should do with these fair value estimates. This would be a great place to make it clear to students that the depreciation process itself is also an estimate; is it more or less reliable than is the market multiple approach?
- In the first accounting course, when the topic of investment securities is introduced, we might also illustrate a simple use of the matrix method to estimate the fair value of a non-traded or thinly-traded security.
- In intermediate financial accounting, there are many places to discuss fair value and valuation models. Intangible asset valuation and goodwill valuation are good examples.
- Intermediate financial accounting is also a good place to give a simple introduction to the basic derivative types (swaps, futures, forwards, and options).
- Intermediate financial accounting is also a good place to introduce the basics of option valuation. This can be done when discussing stock-based compensation.
- Intermediate financial accounting is also a place where financial statement forecasting (construction of pro-forma financial statements) can be introduced. Alternatively, this can be done in another course.
- Managerial accounting is, of course, the place where we currently cover capital budgeting. Capital budgeting is a special case of discounted cash flow analysis. Perhaps we can expand our coverage in the capital budgeting module to not only address decision making (the traditional focus) but also valuation.
- Each accounting program should include some sort of case-based financial statement analysis course. In this course students can hone their skills in equity valuation.

Frankly, deciding where in the curriculum to introduce coverage of fair value and valuation models is easy. The hard part is convincing ourselves that we must give up some of our old, favorite topics. Some things will have to go.

**c. Where should accounting students learn about spreadsheet modeling?**

Students should be exposed to spreadsheet models in their first or second accounting course. This can be done by giving them a spreadsheet model and asking them to change the input parameters and draw conclusions from the changes in the outputs. In later courses, they should be required to create spreadsheet models, from scratch. A great exercise is to require students to construct a five-year forecast of cash flows based on operating parameters, sales growth assumptions, and financing assumptions; this is

always a great learning tool. Other modeling exercises can include capital budgeting spreadsheets, simple linear model analysis of cost behaviors, and so forth.

With respect to spreadsheet models specifically designed for valuation, these can be introduced in intermediate financial accounting when covering the valuation of intangibles and in financial statement analysis classes when covering equity valuation.

**In the following pages are specific examples of exercises that can be used to introduce skills and ideas related to fair values in various accounting courses.**

**Introductory Financial Accounting**

- Example A – At What Amount Should Land Be Recorded?
- Example B – Does Measuring Asset Amounts Depend on the Type of Asset?
- Example C – Valuing Buildings With Market Multiples
- Example D – Valuing of Bonds Held as Investment Securities

**Introductory Managerial Accounting**

- Capital Budgeting Spreadsheet Assignment

**Intermediate Financial Accounting**

- Cash Flow Projection Models
- Introduction to Derivatives
- The Fair Value Option
- Fair Value Disclosures

## ***Introductory Financial Accounting***

### Example A – At What Amount Should Land Be Recorded?

In addition to her regular job as an accountant and financial analyst at a mid-sized local company, Lorien Franklin also buys and sells real estate. Specifically, she closely monitors land sales in the area, buys a plot of land when the price is right, holds on to the land while she carefully waits for the right buyer to come along (usually between six months and a year), and then sells the land. She has been doing this for 15 years and has many contacts and information sources in the local real estate market.

Lorien has decided to prepare a personal balance sheet, using generally accepted accounting principles, and is considering the amount at which she should report the one piece of land that she currently owns. She has assembled the following facts about the land.

- a. One year ago when she purchased the land she paid \$220,000.
- b. Real estate prices have increased dramatically in the past year. Analysis of current land prices in the area indicate that Lorien would have to pay \$260,000 to buy an equivalent piece of land now. Remember, however, that Lorien is an exceptionally skilled buyer; other market participants would probably have to pay more for the same piece of land.
- c. Based on her historical track record for selling land, Lorien will be able to sell this land for \$310,000. It will cost her about \$20,000 in various fees to finalize the sale.
- d. Lorien has assembled land sales data for the past three months for comparable pieces of land in the area. The sales prices have averaged \$21.55 per square foot, with the low being \$20.06 per square foot and the high being \$24.78 per square foot. For general market transactions (not involving Lorien and her special skills), the price of \$21.55 per square foot is a good indication of what a piece of land would sell for. Lorien's land contains 13,000 square feet.

**Question: Lorien can use only a single number to report the value of the land in her balance sheet; at how much should Lorien report the land?**

### Solution A – At What Amount Should Land Be Recorded?

In *Statement of Financial Accounting Concepts No. 5*, the FASB describes five measurement attributes.

- Historical cost: amount paid to acquire an asset (adjusted for depreciation)
- Replacement cost: amount that would have to be paid to acquire the same or an equivalent asset
- Fair value: the price that would be received to sell an asset in an orderly transaction between market participants
- Net realizable value: amount of cash into which an asset is expected to be converted in due course of business less direct costs, if any, necessary to make that conversion

- Present value of future cash flows: present or discounted value of future cash inflows into which an asset is expected to be converted

Sources:

- *Statement of Financial Accounting Concepts No. 5*, “Recognition and Measurement in Financial Statements of Business Enterprises,” December 1984, par. 67.
- *Statement of Financial Accounting Standards No. 157*, “Fair Value Measurements,” September 2006, par. 5.

For this introductory financial accounting course, the “present value of future cash flows” attribute will be ignored. The appropriateness of each of the four other measurement attributes, with respect to Lorien’s land, is discussed below.

Historical cost = \$220,000 (see item a).

Replacement cost = \$260,000 (see item b).

Fair value =  $\$21.55 \times 13,000 = \$280,150$  (see item d).

Net realizable value =  $\$310,000 - \$20,000 = \$290,000$  (see item c).

According to existing U.S. accounting rules, Lorien would report her land at its historical cost of \$220,000. This number has the advantage of being verifiable and objective. However, it also has the disadvantage of being the least relevant of the four numbers.

If Lorien were to report the land at \$260,000, its replacement cost, she would be reflecting the general rise in land prices in the area. The \$260,000 number is similar to the \$220,000 number in that it is an entry price meaning that it reflects the cost to Lorien to purchase the land. This \$260,000 replacement cost can be viewed as merely an updated purchase price. The disadvantage of the replacement cost is that it is a hypothetical number. The more active the real estate market, the more reliable this hypothetical replacement cost.

The fair value of \$280,150 reflects the amount that the land would be expected to sell for between two unrelated market participants. This hypothetical selling price does not factor in Lorien’s above-average ability to negotiate in this market. The FASB is slowly moving U.S. financial reporting toward more reporting of fair values.

The net realizable value of \$290,000 is higher than the \$280,150 fair value because it reflects Lorien’s individual market skill in making land sales happen.

Which one number should Lorien include in her personal balance sheet? Well, if she wants to follow U.S. GAAP, she should report the land at its historical cost of \$220,000. The \$280,150 fair value reflects what the land would sell for between two random market participants, so a good argument can be made for reporting it at this number. The net realizable value of \$290,000 reflects the value in the land once Lorien brings her superior skills to bear in selling it.

Example B – Does Measuring Asset Amounts Depend on the Type of Asset?

Kamila Wholesaling has the following six different assets on its balance sheet.

1. Cash – Kamila has two bank accounts. One is an unrestricted account at its local bank. The other is a bank account in Zimbabwe. Kamila has discovered that bank “fees” averaging 10% of the amount of the withdrawal have been charged for all withdrawals made from this account in the past six months.
2. Accounts receivable – Kamila is owed money by approximately 1,200 different customers. Historical experience has shown that approximately 5% of the amount owed at any given time eventually proves to be uncollectible.
3. Inventory – The market for Kamila’s products has softened in recent months. Kamila has found itself stuck with a large amount of inventory. Because the purchase price of the inventory has declined, Kamila could replace its existing inventory for about 20% less than what it originally paid for it.
4. Investment securities – Kamila has an investment fund which it uses to satisfy unusual cash needs. The entire fund is invested in frequently-traded stocks that are listed on either the New York Stock Exchange or the NASDAQ.
5. Land – Kamila purchased its land 20 years ago. The overall level of land prices in the areas has tripled during that time. Kamila is quite happy with its current location and does not intend to sell its land and move in the foreseeable future.
6. Building – Kamila also purchased its building 20 years ago. Because of a local glut of warehouse buildings, the overall level of prices for buildings like the one Kamila owns has dropped by about 30% during that time. Kamila expects to use the building for about five more years.

The accountant for Kamila Manufacturing has searched the accounting standards literature and has found the following four alternative ways for measuring the amount that an asset should be reported at in the balance sheet.

- a. Historical cost: amount paid to acquire an asset (adjusted for depreciation)
- b. Replacement cost: amount that would have to be paid to acquire the same or an equivalent asset
- c. Fair value: the price that would be received to sell an asset in an orderly transaction between market participants
- d. Net realizable value: amount of cash into which an asset is expected to be converted in due course of business less direct costs, if any, necessary to make that conversion

<p><b>Question: For each of the six assets, state which one of the four measurement alternatives should be used. Explain your choice.</b></p>
---

## Solution B – Does Measuring Asset Amounts Depend on the Type of Asset?

1. Cash – The unrestricted bank account should be reported at its account balance which is really equal to all four of the measurement alternatives – it is the historical cost of the cash, it reflects the amount it would cost to replace the cash, it is the amount that two market participants would exchange for the cash, and it is the amount that can be obtained by liquidating the cash.  
For the bank account in Zimbabwe, an appropriate measure may be the net realizable value which reflects the amount that Kamila can actually get out of the account. In this case, it appears that the net realizable value is the account balance less 10%.
2. Accounts receivable – It is likely that Kamila will keep these accounts and collect them in the normal course of business. Accordingly, the amount that Kamila will end up with is the total of the account balances less the forecasted uncollectible amount. Thus, the net realizable value (the total balance less 5%) is an appropriate measurement for this asset.
3. Inventory – It clearly does not make sense to report this inventory at its historical cost because the market for this inventory has changed dramatically since it was purchased by Kamila. One possible number to use to reflect this fact is to report the inventory at its replacement cost, which in this case is the original cost less 20%. Alternatively, Kamila might consider reporting the inventory at the net amount for which it can be sold which is the net realizable value. In this case, the net realizable value is not as attractive as replacement cost because the net realizable value option results in reporting the inventory for what it might be sold for, making the assumption of the existence of a sale, rather than what it can be purchased for.
4. Investment securities – Because these investment securities can be bought and sold at any time in active markets, Kamila should report them at their fair value.
5. Land – This is a tough one. Clearly, the 20-year-old purchase price no longer means very much because land values have tripled. However, it also is questionable to report the land at its current value because Kamila does not intend to sell its land in the foreseeable future. – Fair value has some appeal in this situation because Kamila does in fact own the land, and the fair value measure reflects what an average market participant, with neither any particular skill or distress, could sell the land for in an orderly transaction. This number is a reasonable measure of the value of the land and represents a number that would make sense to financial statement users. – Under U.S. GAAP, the land would continue to be reported at its old, irrelevant purchase price.
6. Building – There is strong evidence in this case that the building has declined in value because of local market circumstances. It therefore is not reasonable to continue to report that building at its cost, serenely reduced by a regular depreciation amount. As with the land, fair value has some appeal in this situation because Kamila does in fact own the building, and the fair value measure reflects what an average market participant could sell the building for in an orderly transaction. – Under U.S. GAAP, when an asset such as a building has declined substantially in value, as in the case, the asset is to be reported in the balance sheet at its fair value.

### Example C – Valuing Buildings With Market Multiples

As part of a business acquisition, Taraz Company purchased five buildings. The buildings are to be reported in Taraz's books at their fair values on the purchase date. "Fair value" is defined as the price that would be received to sell an asset in an orderly transaction between market participants. Each of the buildings is unique, so Taraz cannot look to other building sales to directly determine how much each building would bring in a sales transaction. However, Taraz has assembled the following market data, based on commercial real estate sales in the area in the past six months, which can be used to indirectly estimate the selling price of each of the buildings Taraz purchased.

## **Selling Price**

<u>Capitalization Rate</u>	<u>Square Feet</u>				
	<u>10,000</u>	<u>20,000</u>	<u>30,000</u>	<u>40,000</u>	<u>50,000</u>
7%	700,000	1,425,000	2,000,000	2,500,000	3,000,000
8%	625,000	1,250,000	1,750,000	2,250,000	2,625,000
9%	550,000	1,100,000	1,550,000	2,000,000	2,300,000
10%	500,000	1,000,000	1,400,000	1,800,000	2,100,000

Taraz has learned that the selling price of a building is related to both its size (shown in the table above in square feet) and by the expected stability in the rental income that the building could generate if it were rented. This expected stability is represented by the "capitalization rate" which is the amount of rental income that the building can generate divided by the building's price. A higher capitalization rate indicates that market participants view the future income stream as being more risky. This riskiness is related to location, nature of surrounding properties, and so forth.

For the five buildings it purchased, Taraz has measured the size and has also estimated a capitalization rate based on location and surrounding properties. These estimates for the five buildings are as follows.

	<u>Square Feet</u>	<u>Capitalization Rate</u>
Building 1	15,000	9%
Building 2	22,000	10%
Building 3	38,000	7%
Building 4	41,000	8%
Building 5	46,000	10%

**Question: Estimate the fair value of each of the five buildings.**

## Solution C – Valuing Buildings With Market Multiples

### **Building 1**

- Look at the 9% capitalization rate row.
- Based on square footage, Building 1 is exactly halfway between \$550,000 and \$1,100,000.
- Estimated price of Building 1 = \$825,000

### **Building 2**

- Look at the 10% capitalization rate row.
- Based on square footage, Building 2 is 20% of the way from \$1,000,000 to \$1,400,000.
- Estimated price of Building 2 = \$1,080,000

### **Building 3**

- Look at the 7% capitalization rate row.
- Based on square footage, Building 3 is 80% of the way from \$2,000,000 to \$2,500,000.
- Estimated price of Building 3 = \$2,400,000

### **Building 4**

- Look at the 8% capitalization rate row.
- Based on square footage, Building 4 is 10% of the way from \$2,250,000 to \$2,625,000.
- Estimated price of Building 4 = \$2,287,500

### **Building 5**

- Look at the 10% capitalization rate row.
- Based on square footage, Building 5 is 60% of the way from \$1,800,000 to \$2,100,000.
- Estimated price of Building 5 = \$1,980,000

Example D – Valuing of Bonds Held as Investment Securities

Han Company has purchased five corporate bonds as temporary investments. The bond investments are to be reported in Han’s books at their fair values on the balance sheet date. “Fair value” is defined as the price that would be received to sell an asset in an orderly transaction between market participants. Each of the bonds has unique terms, and the bonds are not traded in active markets, so Han cannot look to quoted market prices to directly determine how much each bond would bring in a sales transaction. However, Han has assembled the following matrix of bond price data for actively traded bonds which can be used to indirectly estimate the selling price of each of Han’s bonds.

<b>Bond Prices (% of par)</b>	<b>Bond Ratings</b>					
	<b>Term (in years)</b>	<b>AAA</b>	<b>AA</b>	<b>A</b>	<b>BBB</b>	<b>BB</b>
	<b>2</b>	103.85	103.56	102.71	102.37	100.29
	<b>5</b>	103.66	102.53	101.45	100.17	98.50
	<b>10</b>	101.64	100.29	99.56	98.54	91.98
	<b>20</b>	95.66	91.49	90.00	89.31	82.06

Han has learned that the selling price of a bond is related to both its term (the number of years until the bond matures) and by the underlying riskiness of the company that issued the bond. [Note: Another important valuation variable is the amount of interest paid by the bond. In this example, that rate is assumed to be the same for all bonds and so is ignored in this analysis.] This underlying riskiness is represented by the “bond rating” which is a label attached to a bond by a bond rating agency such as Standard & Poor’s. The rating agency assigns the rating after an analysis of the bond issuing company’s finances and the strength of its industry. A lower bond rate (AAA is the highest in the table and BB is the lowest) indicates that rating agency views the bond issuing company as being more risky. The higher this risk, the lower the bond price if everything else is held constant. Also, somewhat independent of the underlying riskiness of the bond issuing company, the longer until a bond matures the more risk is associated with a bond. Thus, holding all else constant, bonds with longer times to maturity have lower prices.

For the five bonds it purchased, Taraz has determined the time to maturity and has also looked up the bond rating from Standard & Poor’s. These data for the five bonds are as follows.

	<b>Term</b>	<b>Bond Rating</b>
Bond 1	15	AA
Bond 2	6	BBB
Bond 3	3	AAA
Bond 4	18	BB
Bond 5	9	A

**Question: Estimate the fair value of each of the five bonds. Note: The par value of each of the bonds is \$1,000, and the numbers given in the matrix of bond prices are expressed in terms of a percentage of par value.**

## Solution D – Valuing of Bonds Held as Investment Securities

### **Bond 1**

- Look at the AA bond rating column.
- Based on the term of the bond, Bond 1 is exactly halfway between 100.29 and 91.49.
- Estimated price of Bond 1 =  $.9589 \times \$1,000 = \$958.90$

### **Bond 2**

- Look at the BBB bond rating column.
- Based on the term of the bond, Bond 2 is 20% of the way from 100.17 to 98.54.
- Estimated price of Bond 2 =  $.99844 \times \$1,000 = \$998.44$ .

### **Bond 3**

- Look at the AAA bond rating column.
- Based on the term of the bond, Bond 3 is one third of the way from 103.85 to 103.66.
- Estimated price of Bond 3 =  $1.03787 \times \$1,000 = \$1,037.87$ .

### **Bond 4**

- Look at the BB bond rating column.
- Based on the term of the bond, Bond 4 is 80% of the way from 91.98 to 82.06.
- Estimated price of Bond 4 =  $0.84044 \times \$1,000 = \$840.44$ .

### **Bond 5**

- Look at the A bond rating column.
- Based on the term of the bond, Bond 5 is 80% of the way from 101.45 to 99.56.
- Estimated price of Bond 5 =  $0.99938 \times \$1,000 = \$999.38$ .

## *Introductory Managerial Accounting*

Capital budgeting is a special case of discounted cash flow analysis and, as such, is a perfect lead-in to valuation analysis. Capital budgeting is also a good setting in which to help students hone (or learn) their spreadsheet skills.

Below is an example of a spreadsheet-based capital budgeting assignment that can be used in an introductory managerial accounting course. This assignment has the advantage of including both a worked-out example as well as an assignment that requires students to follow the worked-out example to construct their own spreadsheet.

A pre-prepared spreadsheet [Capital Budgeting Spreadsheet] accompanies the assignment.

---

Retrieve the “Capital Budgeting Spreadsheet.” You will use the spreadsheet in doing your analysis, but you should put your answers into a Word document.

The first two spreadsheets are labeled “Lily 1” and “Lily 2.” These spreadsheets are samples to help you see how present values and internal rates of return can be computed in Excel. These spreadsheets are based on a Lily Company machine example given below. You should take a few minutes to look through these spreadsheets, carefully following the explanations given below. This worked-out example will help you see how to use spreadsheet formulas to construct your own capital budgeting analysis.

Lily Company is considering purchasing a machine. The associated cash inflows and outflows are as follows.

- a. Cost of the machine is \$100,000.
- b. Cash revenues from the output from the machine are expected to be \$70,000 per year for 5 years.
- c. Cash expenses are expected to be \$30,000 per year for 5 years.
- d. At the end of 5 years, the machine is expected to have a salvage value of \$10,000.
- e. In order to operate the machine and sell the output, an investment of \$30,000 in working capital (inventory, accounts receivable, cash) will be required. This money will need to be invested at the beginning of the project but will be retrieved at the end of the project when all inventory is liquidated and receivables are collected.
- f. The required rate of return on this project is 10%.
- g. All cash flows occur at the end of the appropriate year, except for the \$100,000 initial cost and the \$30,000 initial investment in working capital.
- h. The machine will be depreciated for tax purposes on a straight-line basis with an assumed salvage value of \$0. At the end of 5 years, the machine is expected to have a salvage value of \$10,000, as noted in (d) above. This salvage value is ignored for the purposes of computing tax depreciation. Thus, when the machine is disposed of at the end of 5 years, the \$10,000 received will create a taxable gain.
- i. The tax rate is 40%.
- j. At the end of 3 years, a major overhaul of the machine will be needed. The cost will be \$20,000. This \$20,000 additional cost will be depreciated over the remaining two years of the life of the machine; tax savings from this depreciation will occur at the end of Years 4 and 5.

### Lily 1

1. Place the cursor on cell F9 in Lily 1. You should see the following formula:

`=-PV($J$2,5,0,E9,0)`

Now place your cursor on cell G9 (just to the right) to learn how to use this Excel present value function. Push the “Insert Function,” or  $f_x$  button, in Excel, and you can scan the menu of “Financial” functions and find the PV function. The function arguments for the PV function are as follows:

- Rate** The discount rate, which is 10% in this example. This discount rate is found in cell J2; entering the address as \$J\$2 means that Excel will always look to cell J2 for the discount rate, no matter where you copy this formula.
- Nper** The number of periods, which is 5 years in this example.
- Pmt** The amount of any regular annuity (or periodic, equal cash flow) amount. In this case, the annuity is \$0 because the cash flow we are computing the present value of is a one-time cash flow, the return of the \$30,000 in working capital.
- Fv** The amount of any single cash flow to occur in the future. In this case, the return of the working capital is a single cash flow at the end of 5 years of \$30,000; this amount is located in cell E9.
- Type** Indication of whether the cash flows occur at the beginning or the end of the periods. In the exercises done in this assignment, we will always assume that cash flows occur at the end of the periods; this is indicated by leaving this field blank or by inserting a zero. If the cash flows occur at the beginning of the period, this is indicated by entering a one in this field. In this case, we will enter a zero to indicate that the cash flows occur at the end of the periods.

Finally, note the minus sign in front of the PV function. Like your business calculator, Excel always returns negative numbers in its present value calculations. A minus sign in front of the PV function converts these numbers to positive.

2. Now place the cursor on cell F12 in Lily 1. You should see the following formula:

`=-PV($J$2,5,E12,0,0)`

This is the same PV function illustrated previously. The difference is that in this case an amount is entered for Pmt (E12, which is \$24,000), and 0 is entered for Fv because this cell is a computation of the present value of an annuity only.

3. Look at all of the formulas in the cells in the F column. Make sure you understand them because this Capital Budgeting Spreadsheet Assignment requires you to make a spreadsheet using them.

### Lily 2

Now click on the spreadsheet tab labeled Lily 2. This spreadsheet is an analysis of the exact same machine shown in Lily 1. Note that the net present value, in cell B19, is the same \$3,848 shown in cell F30 in Lily 1. The Lily 2 spreadsheet shows the individual cash flow items detailed by year. For example, in Year 0 (meaning right now), the two cash flows are \$100,000 out for the initial cost of the machine and \$30,000 out for the initial investment in working capital. In Year 5 (meaning at the end of Year 5), there are a number of cash flows:

- \$30,000 in for the retrieval of working capital,
- \$42,000 in for the after-tax cash revenues ( $\$70,000 \times [1 - 0.40]$ ),
- \$18,000 out for the after-tax cash expenses ( $\$30,000 \times [1 - 0.40]$ ),
- \$8,000 in for the income tax saved from the depreciation tax shield ( $\$20,000 \times 0.40$ ) for the initial investment,
- \$4,000 in for the income tax saved from the depreciation tax shield ( $\$10,000 \times 0.40$ ) for the second year of depreciation on the overhaul amount, and
- \$6,000 in for the net after-tax proceeds from the salvage value ( $\$10,000 \times [1 - 0.40]$ ) after subtracting the income tax on the gain.

An advantage of presenting the total net cash flows by year as shown in Lily 2 is that it allows for the use of the IRR function in Excel. Place the cursor on cell B20 in Lily 2. You should see the following formula:

=IRR(B15:G15,0.1)

Now put the cursor in cell c20 (one cell to the right) so that you can practice with this IRR function. If you push the “Insert Function,” or  $f_x$  button, in Excel, you can scan the menu of “Financial” functions and find the IRR function. The function arguments for the IRR function are as follows:

- Values** The range of spreadsheet cells containing the net annual cash flows. In this case, that range is B15:G15. The IRR function assumes that the first cash flow included in the function occurs immediately. Subsequent amounts in the range are assumed to occur at one-year intervals. Accordingly, Excel assumes that the (\$130,000) amount in cell B15 occurs right now whereas the \$32,000 amount in C15 occurs at the end of one year, and so forth.
- Guess** An initial estimate of the IRR. Because the IRR calculation involves an iterative interpolation process, the mathematical algorithm has to have a starting place. It is almost always safe to leave this field blank; if the field is blank, Excel uses 10% as the initial estimate. The function in cell B20 explicitly includes an initial estimate of 10% (or 0.1).

With these inputs, the value of the IRR function is 11.005%. We expected an IRR greater than 10% because our previous computations demonstrated that the NPV (using a 10% discount rate) is greater than zero.

## Doughnut Machine

Completion of the Capital Budgeting Spreadsheet Assignment involves constructing a spreadsheet to analyze the doughnut machine described below.

**Franklin Bakery is considering buying a new doughnut-making machine. The cost of the machine is \$10,000. The machine will last for ten years and is expected to be worth \$1,000 as scrap at that time. The new machine will reduce operating costs by \$700 per year. In addition, the new machine will allow for an increase in production of 15,000 doughnuts per year. Franklin makes 10 cents on each doughnut it sells. The required rate of return on this project is 16 percent.**

### Required:

1. **(2 points)** Click on the Doughnut 1 tab. Here you will see the cash flow items arranged in a way similar to that shown in Lily 1. Use the Excel PV function to construct a spreadsheet that will compute the net present value of the doughnut machine. You only need to input the PV function into the three cells shaded in light green. Your answer will appear in the blue cell. Instead of typing the actual numbers into the PV function, you should use the cell addresses for the numbers shaded in yellow. So, instead of typing 0.16 for the discount rate, use the cell address H7. Doing this will make it much easier to complete the remainder of this Assignment.

To get you started, we have already completed the computation of the present value of the initial \$10,000 cost ☺

Type your answer here: \_\_\_\_\_

2. **(4 points)** Compute the doughnut machine NPV under each of the following assumptions about required rate of return. If you constructed your spreadsheet correctly, you can just change the percentage in cell H7.

**Type your answer here**

- |        |       |
|--------|-------|
| a. 10% | _____ |
| b. 15% | _____ |
| c. 20% | _____ |
| d. 18% | _____ |

Hint: If you use 19%, the NPV is negative \$279.

3. **(3 points)** Return the discount rate to 16%. Compute the NPV of the doughnut machine under each of the following sets of assumptions about the number of additional doughnuts and the profit per doughnut. If you constructed your spreadsheet correctly, you can just change the numbers in cells H4 and H5.

**Type your answer here**

- |   |       |
|---|-------|
| a. 10,000 additional doughnuts at \$0.10 each | _____ |
| b. 15,000 additional doughnuts at \$0.07 each | _____ |
| c. 20,000 additional doughnuts at \$0.07 each | _____ |

Hint: If you use 13,000 additional doughnuts and a profit per doughnut of \$0.08, the NPV is negative \$1,364. If you don't get this, you may have forgotten to reset the discount rate to 16%.

4. **(3 points)** Return the number of additional doughnuts to 15,000 and the profit per doughnut to \$0.10. Compute the NPV under each of the following sets of assumptions about initial cost and machine life. In each case, the salvage value at the end of the machine life is still estimated to be \$1,000. If you constructed your spreadsheet correctly, you can just change the numbers in cells H1 and H3.

**Type your answer here**

- |                          |       |
|--------------------------|-------|
| a. \$12,000 and 12 years | _____ |
| b. \$20,000 and 20 years | _____ |
| c. \$10,000 and 8 years  | _____ |

Hint: If you use \$15,000 and 15 years, the NPV is negative \$2,626. If you don't get this, you may have forgotten to reset the discount rate to 16%, the additional doughnuts to 15,000, or the profit per doughnut to \$0.10.

5. **(4 points)** Click on the Doughnut 2 tab. Here you will see an arrangement similar to that shown in Lily 2. Use the Excel IRR function (input into cell B18) to construct a spreadsheet that will compute the

internal rate of return of the doughnut machine. You will first need to input the annual cash flows for each of the four categories listed: original cost, cost savings, increased profits, and salvage value. To get you started, we have already input the initial \$10,000 cost in the Year 0 (right now) column.

Type your IRR answer here (with one decimal point XX.X%): \_\_\_\_\_

Note: We have set up Doughnut 2 so that the NPV is calculated and displayed in cell B16. If this cell doesn't indicate a positive NPV of \$860, then you have input the annual cash flows incorrectly. If you have difficulty, look back at Lily 2.

6. **(4 points)** Compute the doughnut machine IRR (with one decimal point XX.X%) under each of the following assumptions about the cost savings per year. Remember, you are computing the IRR, not the NPV.

**Type your answer here**

a. \$500 per year (instead of \$700)

\_\_\_\_\_

b. \$800 per year (instead of \$700)

\_\_\_\_\_

Hint: If you use cost savings per year of \$1,000, the NPV is positive \$2,310 and the IRR is 21.8%.

---

---

## Capital Budgeting Assignment Spreadsheet SOLUTION

1.

**NPV = positive \$860**

2.

a. 10%

**positive \$3,904**

b. 15%

**positive \$1,288**

c. 20%

**negative \$615**

d. 18%

**positive \$78**

3.

a. 10,000 additional doughnuts at \$0.10 each

**negative \$1,557**

b. 15,000 additional doughnuts at \$0.07 each

**negative \$1,315**

c. 20,000 additional doughnuts at \$0.07 each

**positive \$376**

4.

a. \$12,000 and 12 years

**negative \$398**

b. \$20,000 and 20 years

**negative \$6,905**

c. \$10,000 and 8 years

**negative \$139**

5.

Type your IRR answer here (with one decimal point XX.X%): \_\_\_\_\_

**IRR = 18.2%**

6.

a. \$500 per year (instead of \$700)

**15.7%**

b. \$800 per year (instead of \$700)

**19.4%**

## *Intermediate Financial Accounting*

### **Business Valuation and Impairment-Related Asset Valuation**

Both business valuation and impairment-related asset valuation can and should be covered in intermediate financial accounting courses. Extensive material on these two topics is given in other modules of this CPE course.

## **Cash Flow Projection Models**

The cash flow projection spreadsheet exercise given on the following pages is useful in two ways in helping students learn about valuation. First, spreadsheet modeling itself is a useful exercise, and this spreadsheet illustrates how a fairly involved spreadsheet model can be built up systematically from basic building blocks. Second, this cash flow projection spreadsheet model is similar to the types of cash flow projection models that provide input into discounted cash flow valuation models.

- a. The financial statements below are simplified financial statements for Home Depot for fiscal 1985.

<b>Home Depot, Inc.</b>	
<b><u>Simplified Financial Statements</u></b>	
<b>For Fiscal 1985 (in millions)</b>	
Cash	10
Receivables	27
Inventory	<u>153</u>
Total Current Assets	190
Gross Property, Plant, and Equipment (PPE)	199
Accumulated Depreciation	<u>-9</u>
<b>TOTAL ASSETS</b>	<b><u>380</u></b>
Accounts Payable	74
Short-term Loans Payable	<u>10</u>
Total Current Liabilities	84
Long-term Debt	<u>207</u>
<b>TOTAL LIABILITIES</b>	<b>291</b>
Paid-in Capital	50
Retained Earnings	<u>39</u>
<b>TOTAL LIABILITIES AND EQUITY</b>	<b><u>380</u></b>
Beginning Retained Earnings	31
+ Net Income	8
- Dividends	<u>0</u>
Ending Retained Earnings	<u>39</u>
Sales	700
Cost of Goods Sold	<u>-519</u>
Gross Profit	181
Depreciation Expense	-5
Other Operating Expenses	<u>-155</u>
Operating Profit	21
Interest Expense	<u>-9</u>
Income before Taxes	12
Income Tax Expense	<u>-4</u>
Net Income	<u>8</u>
<b><u>Cash Flow From Operations</u></b>	
Net Income	8
Depreciation	5
Increase in Receivables	-15
Increase in Inventories	-68
Increase in Accounts Payable	<u>23</u>
<b>Net Cash from Operations</b>	<b>-47</b>
<b><u>Cash Used in Investing Activities</u></b>	
Cash paid for PPE purchases	-92
<b><u>Cash from Financing Activities</u></b>	
New Short-term Borrowing	10
New Long-term Borrowing	82
New Paid-in Capital	1
Cash dividends paid	<u>0</u>
Net Cash from Financing	<u>93</u>
Net Increase or Decrease in Cash	<u>-46</u>

Your assignment is to prepare projected financial statements for the five years 1986 through 1990. Make the following assumptions:

1. Sales are expected to grow at 40% per year. For example, sales in 1986 are expected to be \$980 (\$700 x 1.40). Sales in 1987 are expected to be \$1,372 (\$980 x 1.40).
2. No cash dividends are to be paid.
3. **Round all amounts to the nearest dollar.**
4. Cash is expected to increase at the same rate as sales.
  
5. The following anticipated ratio values should be used in forecasting the levels of receivables, inventory, gross PPE, accounts payable, cost of goods sold, and other operating expenses. For simplicity in your spreadsheet formulas, use ending balances in all ratio formulas that sometimes use the average balance in a balance sheet amount. For example, use ending Accounts Receivable instead of average Accounts Receivable in the average collection period formula.
  - Average collection period 14.08 days  

$$\frac{\text{Accounts Receivable}}{\text{Sales}/365}$$
  - Number of Days' Sales in Inventory 107.6 days  

$$\frac{\text{Inventory}}{\text{Cost of Goods Sold}/365}$$
  - Fixed Asset Turnover 3.518 times  

$$\frac{\text{Sales}}{\text{Gross PPE}}$$
  - Gross Profit Percentage 25.86%  

$$\frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Sales}}$$
  - Other Operating Expenses / Sales 22.14%
  - Average Payable Period 48.34 days  

$$\frac{\text{Accounts Payable}}{\text{Purchases} / 365}$$
  
 Note:  $\text{Purchases} = \text{Cost of Goods Sold} + \text{Ending Inventory} - \text{Beginning Inventory}$
  
6. Depreciation Expense. Assume a 30-year useful life with no salvage value. Gross PPE acquired during the year is only depreciated for half the year. For example, depreciation expense in 1986 should be \$8  $[(\$199/30) + 1/2(\$80/30)]$ .
7. Interest Expense. Assume an interest rate on short-term debt of **6.0%** and on long-term debt of **8.0%**. Only a half year's interest is charged on loans taken out during the year. For example, if short-term loans payable at the end of 1986 is \$15, total short-term interest expense for 1986 would be \$0.75  $[(\$10 \times .06) + (\$5 \times .03)]$ .
  
8. Income Tax Expense. Assume the same tax rate that was in effect in 1985.
9. Assume that loan covenants dictate that Home Depot must maintain a **current ratio** (current assets/current liabilities) of 2.0 or greater, and a **debt ratio** (total liabilities/total assets) of less than 80%. **Further assume that these covenant restrictions are met exactly.**
  
- b. Home Depot is wondering what its financial statements would look like if the ratio values were changed as follows:
  - Average collection period 9.06 days
  - Number of Days' Sales in Inventory 66.23 days
  - Fixed Asset Turnover 3.989 times
  - Gross Profit Percentage 27.55%
  - Other Operating Expenses / Sales 19.86%
  - Average Payable Period 50.37 days

**Make your spreadsheet flexible enough to enable to you to evaluate the impact of these ratio changes.**

---

**Use the spreadsheet to answer the questions on the following two pages.**

***The Home Depot, Inc.***  
**Spreadsheet Assignment**  
**Questions for Class Discussion**

**The correct numerical answers are given in the accompanying spreadsheet solution “Home Depot Cash Flow Projection Solutions.”**

1. Using the original ratios in part (a), what is projected **Cash Flow From Operations** for the 5 years 1986 through 1990?
  
2. Change the sales growth rate to 10%. Now, what is projected **Cash Flow From Operations** for the 5 years 1986 through 1990? Are the values higher or lower than those in #1? Why? Are Home Depot’s problems solved?
  
3. Change the sales growth rate back to 40%. Change the value of the Number of Days’ Sales in Inventory ratio from 107.6 to 66.2. What is projected **Cash Flow From Operations** for the 5 years 1986 through 1990? Are the values higher or lower than those in #1? Why? Why is the effect so dramatic in the first year? Does this change fix Home Depot’s problems?
  
4. Reset Number of Days’ Sales in Inventory to 107.6. Change the value of Fixed Asset Turnover from 3.518 to 6.000. What is projected **Cash Flow From Operations** for the 5 years 1986 through 1990? Are the values higher or lower than those in #1? It is easy to see how a change in Fixed Asset Turnover impacts cash for investing activities; how exactly does the change impact cash from operating activities?
  
5. Reset Fixed Asset Turnover to 3.518. Change the value of Gross Profit Percentage from 25.86% to 30.00%. What is projected **Cash Flow From Operations** for the 5 years 1986 through 1990? Are the values higher or lower than those in #1? Why? Does this change fix Home Depot’s problems? Why are the cash flow effects of this change more constant, especially relative to the effects of the inventory change in (3)?

***The Home Depot, Inc.***  
**Spreadsheet Assignment**  
**Questions for Class Discussion**  
**(continued)**

6. Reset Gross Profit Percentage to 25.86%. Now, change all the ratio values listed in part (a) of the spreadsheet assignment to the values listed in part (b) of the assignment sheet.
- a. What is projected **Cash Flow From Operations** for the 5 years 1986 through 1990? Are the values higher or lower than those in #1? Why?
  
  - b. What is the projected current ratio at the end of each year for the 5 years 1986 through 1990? Recall that a lender would impose a current ratio constraint in order to ensure that the borrowing company maintains its liquidity. In this case, what would the lender do if Home Depot could not meet the current ratio constraint?
7. As of the beginning of fiscal 1986, would you loan Home Depot \$75 million? (Note: All numbers in the spreadsheet are in millions). The loan would replace existing long-term debt. Assume:
- a. That the ratios in part (a) of the spreadsheet assignment are expected to prevail.
  - b. That the ratios in part (b) of the spreadsheet assignment are expected to prevail.

For both situations, (a) and (b), briefly justify your loan decision using your projected financial statement data.

## **Introduction to Derivatives**

**Objective #1: Understand what a derivative is and how derivatives can be used to help manage risk.**

Let's be honest – many of us are not exactly sure what a derivative is. Here is a basic definition.

**A derivative is a financial instrument or other contract that derives its value from the movement of prices, interest rates, or exchange rates associated with an underlying item.**

For example, an option to buy a piece of land is a derivative. The option itself increases in value as the piece of land increases in value. Conversely, the value of the option decreases as the value of the underlying item (the land in this case) decreases. [Note: The fluctuations in the value of a land-related option would be exactly the opposite if it were an option to SELL the land.]

### Illustration: Faculty Salary Swap

Let's say that Faculty Member A's total compensation from all sources averages \$500,000 per year. However, there is lots of variance.

Question: What can Faculty Member A do to reduce her salary risk?

Answer: Enter into a Faculty Salary Swap.

Pay variable, receive fixed

### **Questions (answers are in blue)**

1. What are the qualifications of the person who could successfully enter into the other side of the Faculty Salary Swap arrangement?

**Sufficient capital**

**Not terribly risk averse**

**Good understanding of the faculty salary market**

2. What would happen to the **value of the Faculty Salary Swap** if it were announced that all faculty members would get a large salary bonus for the year?

**From the standpoint of the faculty member, the Faculty Salary Swap would decrease in value, perhaps becoming a liability to make a net payment under the contract.**

**From the standpoint of the speculator, the Faculty Salary Swap would increase in value, perhaps becoming an asset to receive a net payment under the contract.**

3. The Faculty Salary Swap would typically be settled with a net cash payment. Who would pay cash to whom in the following circumstances? Assume that the fixed amount in the swap contract is \$500,000.
  - a. Faculty salary of \$400,000  
**speculator → faculty \$100,000**
  - b. Faculty salary of \$750,000  
**faculty → speculator \$250,000**
  - c. Faculty salary of \$500,000  
**no cash flow in either direction**

---

---

**Are derivatives just another way to gamble?**

(Discussion Case 19-55) Laurie Seals and Julie Winn are roommates at Upland State College. Laurie majors in political science and Julie is a finance major. Recently, one of Laurie's political science classes has been discussing the impact of derivative trading losses on the finances of several public institutions in the U.S., including city governments and public colleges. The political science class has decided that derivatives are nothing more than a sophisticated form of gambling and that the trading of derivatives in the United States should be banned.

What should Julie say to Laurie in explaining how derivatives serve a vital business purpose?

---

---

- **Some derivative trading is merely a sophisticated form of gambling.**
- **These high-profile, gambling-type losses are the only ones that make their way to the public's attention.**
- **It is sometimes the case that derivatives are purchased not as part of a hedging strategy to eliminate avoidable risk, but instead are purchased as a speculation.**

**HOWEVER,**

**Derivatives can be an important business tool in managing risk.**

- **For example, for a company with a variable rate loan, an interest rate swap serves a valid business purpose by eliminating uncertainty about the amount of future interest payments.**
- **However, for a company without a variable-rate loan, the same interest rate swap is just a speculation on which way future interest rates will move.**

**Objective #2: Identify the different types of risk faced by a business.**

Because the use of derivatives helps companies to manage their risks, an important element in understanding derivatives is understanding the risks they help to manage. Four important risks faced by businesses are

- price risk (uncertainty about the future price of an asset),
- credit risk (uncertainty over whether other parties will do what they have agreed to do),
- interest rate risk (uncertainty about future interest rates), and
- exchange risk (uncertainty about future exchange rates).

Price Risk

**Price risk** is the uncertainty about the future price of an asset. Firms can be exposed to price risk with existing assets, such as financial securities or inventory, or with assets to be acquired in the future such as equipment to be purchased next month.

Credit Risk

**Credit risk** is the uncertainty that the party on the other side of an agreement will abide by the terms of the agreement. The most common example of credit risk is the uncertainty over whether a credit customer will ultimately pay his or her account.

Interest Rate Risk

**Interest rate risk** is the uncertainty about future interest rates and their impact on future cash flows as well as on the fair value of existing assets and liabilities.

**Which kind of loan eliminates interest rate risk – a fixed-rate loan or a variable-rate loan?**

**Fixed rate loan – eliminates cash flow risk but doesn't eliminate fair value risk. If interest rates go down, then the present value of future loan payments is greater than the face value of the loan.**

**Variable rate loan – eliminates fair value risk but doesn't eliminate cash flow risk.**

**One way to eliminate interest rate risk is to have a fixed-rate mortgage that can be refinanced if interest rates go down. In essence, you have an option. You pay for this option through higher interest rates on the fixed rate loan.**

Exchange Rate Risk

**Exchange rate risk** is the uncertainty about fair values and future cash flows arising when assets and liabilities are denominated in a foreign currency.

Some risk is an unwanted side-effect of doing business.

- The variation in the cost of jet fuel is a nuisance and a worry to the major airlines.

On the other hand, managing risk is the very reason for the existence of some businesses.

- Banks
- Insurance companies

---

---

**What risks do we face?**

(Discussion Case 19-53) Palmer Equipment Company is a multinational firm that sells exercise equipment to fitness clubs and to individuals. When customers buy Palmer's equipment, they typically pay 20% down and pay the balance within one year. Palmer's primary market is the United States where it makes 60% of its sales. Palmer makes 10% of its sales in Japan and 30% in Europe. All foreign sales are denominated in the local currencies. All the equipment that Palmer sells is manufactured in southern China. The factories are not owned by Palmer; instead, Palmer contracts with various factory owners for the manufacture and delivery of equipment. All of Palmer's equipment purchase contracts are denominated in Hong Kong dollars.

Palmer has obtained its long-term debt financing from a mixture of U.S., Japanese, and German banks. About half of the loans from U.S. banks are variable-rate loans; the remainder of Palmer's bank loans are fixed rate.

Recently, Palmer has seen its earnings fluctuate wildly from one year to the next. As the recently-appointed head of the corporate risk management committee, you have been asked by Jefferson Todd Palmer, CEO of Palmer Equipment, to briefly summarize the different types of risk faced by Palmer.

---

**Palmer faces each of the four types of risk outlined above.**

- **Price Risk. Palmer faces price risk on both the sales side and the purchases side.**
  - **The demand for exercise equipment can vary greatly depending on the general health of the economy—when people are fearful of unemployment, they don't usually run out and buy an expensive piece of exercise equipment or sign up for a fitness club membership.**
  - **This price risk caused by demand is even a bit more complicated because Palmer is operating in three different major markets—the United States, Europe, and Japan.**
  - **Palmer also faces price risk in terms of uncertainty about the purchase price of its equipment from the Chinese manufacturers.**
  - **Palmer is particularly exposed to price risk because there is no natural hedging relationship between movements of prices for Chinese manufacturers and movements of prices for consumers in the United States, Europe, and Japan.**
  
- **Credit Risk.**
  - **Palmer faces credit risk because most sales are credit sales. We all know how easy it is for customers to lose interest in a new piece of exercise equipment; if they lose interest, they are much less likely to pay off their bill.**
  - **Palmer also faces credit risk of a different sort in that Palmer must rely on the Chinese manufacturers to deliver equipment on time. Palmer has no other source for its products.**
  
- **Interest Rate Risk.**
  - **About one-half of Palmer's U.S. loans are variable-rate loans, so Palmer faces some uncertainty about the amount of future interest payments required for these loans.**
  - **With its fixed-rate loans, Palmer is exposed to the risk that market interest rates could decrease and Palmer would be stuck paying above-market rates for its fixed-rate loans.**
  
- **Exchange Rate Risk. Obviously, Palmer faces all kinds of exchange rate risk:**
  - **receivables denominated in Japanese yen and various European currencies (mainly euros),**
  - **payables denominated in Hong Kong dollars,**
  - **loans denominated in Japanese yen and in euros.**

**The particularly worrisome aspect of Palmer's exchange rate risk is that the Hong Kong dollar payables are not naturally hedged by any of Palmer's other cash flows.**

**Objective #3: Describe the characteristics of the following types of derivatives: swaps, forwards, futures, and options.**

- A **swap** is an agreement to exchange payments in the future, usually a fixed payment for a variable payment, or vice versa.
- A **forward** is an agreement to exchange an item at a set date in the future at a price that is set now.
- A **future** is quite similar to a forward except that the terms of futures contracts are standardized and these contracts are traded in markets.
- An **option** is the right, but not the obligation, to buy or sell an asset at a specified price in the future.

A derivative does not require a firm to take delivery or make delivery of the underlying asset or financial instrument. For example, you may have heard about the buying and selling of pork belly futures. These contracts (futures contracts are explained below) can qualify as derivatives because, fortunately, they do not require the holder to either deliver or take delivery of a truckload of pork bellies. Instead, these contracts are settled by cash payments.

**Objective #4: Define hedging, and outline the difference between a fair value hedge and a cash flow hedge.**

Hedging is the structuring of transactions to reduce risk. Derivatives are often used as hedges. A business can carefully structure its transactions to hedge, or partially offset, many of its risks. Derivatives can be used as fair value hedges (where the change in the fair value of the derivative offsets changes in fair values of assets or liabilities) and cash flow hedges (where cash flows from the derivative offset variability in the cash flows from forecasted transactions).

Examples of Hedging

- In the retail sale of gasoline, one risk to the gasoline retailer is that movement in worldwide oil prices will cause variation in the cost to purchase gasoline. This cost of goods sold risk is partially offset by the fact that the retail selling price of gasoline also goes up when oil prices rise. So, the increase in the cost is offset by the increase in the selling price.
- Banks are vulnerable to interest rate increases because this increases the amount they must pay to get the use of depositors' money. However, this risk is hedged because an interest rate increase also allows a bank to raise the rates it charges on its loans.
- Multinational companies can be impacted by changes in exchange rates. If a U.S. multinational has a subsidiary in France, then a decline in the value of the euro will cause the dollar value of the subsidiary's euro-denominated assets to decline. But, this loss is partially offset because the dollar value of the subsidiary's euro-denominated liabilities will also decline.

**Objective #5: Understand the basics of accounting for derivatives**

	<b>Historical Cost</b>	<b>Subsequent Changes in Value</b>
<b>Traditional assets and liabilities</b>	Focus	Frequently Ignored
<b>Derivatives</b>	Small or zero	Everything

Accounting for derivatives is based on two simple notions.

1. Derivatives should be reported in the balance sheet at their fair value as of the balance sheet date. No other measure of value is relevant for derivatives.
2. When a derivative is used to hedge risk, the gains and losses on the derivative should be reported in the same income statement in which the income effects on the hedged item are reported. This sometimes requires unrealized gains and losses being temporarily deferred, or stored, in an accumulated other comprehensive income account that is reported as part of equity.

### Hedging, Partial Hedging, and Overhedging

The company is a golf course developer that constructs approximately 10 courses per year. Next year the company will buy 10,000 trees to install in the courses it builds. In recent years, the price of trees has fluctuated wildly. In order to eliminate this uncertainty, the company has found a reputable financial institution that will enter into a forward contract for 10,000 trees. On January 1 of Year 1, the company agrees to buy 10,000 trees on January 1 of Year 2 from the financial institution. The price is set at \$500 per tree. Of course, the financial institution doesn't own any trees. As with most derivative contracts, this agreement will be settled by an exchange of cash on January 1 of Year 2 based on the price of trees on that date.

- a. Compute the total cash flows of the golf course developer under each of the following three scenarios.

	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 10,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
\$300 per tree			
\$850 per tree			
\$500 per tree			

<b>Market Price of Trees</b>	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 10,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
\$300 per tree	$10,000 \times \$300 =$ $(\$3,000,000)$	$10,000 \times (\$300 - \$500) =$ $(\$2,000,000)$	$(\$5,000,000)$
\$850 per tree	$10,000 \times \$850 =$ $(\$8,500,000)$	$10,000 \times (\$850 - \$500) =$ $\$3,500,000$	$(\$5,000,000)$
\$500 per tree	$10,000 \times \$500 =$ $(\$5,000,000)$	$10,000 \times (\$500 - \$500) =$ $\$0$	$(\$5,000,000)$

- b. When the financial institution entered into the tree forward contract on January 1 of Year 1, which direction did the financial institution think that tree prices were going to go – up or down? Explain.

**The financial institution thought that the price of trees was going down.**

- c. What if the golf course developer had entered into a forward contract for just 3,000 trees rather than for the full 10,000 trees expected to be purchased in Year 2? In other words, what would be the golf course developer's total cash payment in Year 2 if 10,000 trees are purchased but the forward contract is for 3,000 trees? Compute the total cash flows under each of the following three scenarios.

	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 3,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
\$300 per tree			
\$850 per tree			
\$500 per tree			

	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 3,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
<b>Market Price of Trees</b>			
\$300 per tree	$10,000 \times \$300 =$ <b>(\$3,000,000)</b>	$3,000 \times (\$300 - \$500) =$ <b>(\$600,000)</b>	<b>(\$3,600,000)</b>
\$850 per tree	$10,000 \times \$850 =$ <b>(\$8,500,000)</b>	$3,000 \times (\$850 - \$500) =$ <b>\$1,050,000</b>	<b>(\$7,450,000)</b>
\$500 per tree	$10,000 \times \$500 =$ <b>(\$5,000,000)</b>	$3,000 \times (\$500 - \$500) =$ <b>\$0</b>	<b>(\$5,000,000)</b>

- d. What if the golf course developer had entered into a forward contract for 25,000 trees rather than for the 10,000 trees expected to be purchased in Year 2? In other words, what would be the golf course developer's total cash payment in Year 2 if 10,000 trees are purchased but the forward contract is for 25,000 trees? Compute the total cash flows under each of the following three scenarios.

	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 25,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
\$300 per tree			
\$850 per tree			
\$500 per tree			

	<b>(Cost) to Purchase 10,000 Trees</b>	<b>Receipt or (Payment) under 25,000-tree Forward Contract</b>	<b>Net (Cost) of Trees</b>
<b>Market Price of Trees</b>			
\$300 per tree	$10,000 \times \$300 =$ <b>(\$3,000,000)</b>	$25,000 \times (\$300 - \$500) =$ <b>(\$5,000,000)</b>	<b>(\$8,000,000)</b>
\$850 per tree	$10,000 \times \$850 =$ <b>(\$8,500,000)</b>	$25,000 \times (\$850 - \$500) =$ <b>\$8,750,000</b>	<b>\$250,000</b>
\$500 per tree	$10,000 \times \$500 =$ <b>(\$5,000,000)</b>	$25,000 \times (\$500 - \$500) =$ <b>\$0</b>	<b>(\$5,000,000)</b>

---

---

**How many bushels shall we hedge?**

(Discussion Case 19-54) King Follett Foods produces premium tofu for the U.S. market. Sales are growing rapidly in the health-conscious U.S.A., and King Follett expects sales in 2007 to be up 30% over sales in 2006.

A key ingredient in the making of tofu is soybeans. During 2006, King Follett has used approximately 10,000 bushels of soybeans per month. The cost of a bushel of soybeans has varied from a high of \$9.00 to a low of \$7.00.

In order to stabilize its production cost, in 2006 King Follett initiated a program of using forward contracts to lock in the cost of soybean purchases in advance. The three employees in the finance department who oversee this program are starting to get a pretty good feel for the way prices move in the soybean market. As of the end of 2006, these employees have purchased the following forward contracts for the first three months of 2007.

	<u>Quantity</u>	<u>Forward Price</u>
January 2007	20,000 bushels	\$8.00 per bushel
February 2007	30,000 bushels	\$8.50 per bushel
March 2007	30,000 bushels	\$8.60 per bushel

In each case, if the market price on the first day of the month is greater than the forward price, King Follett collects the difference (multiplied by the number of bushels in the contract). In 2006, the forward contract purchase program netted a profit of \$12,000 over and above the offsetting cost of goods sold increase from the effect of price increases on the cost of soybeans.

Comment on whether the three employees in the finance department have structured the forward contracts to properly hedge the risk of fluctuations in soybean prices.

---

---

**King Follett's soybean price-hedging program is a disaster waiting to happen. Consider the following three facts.**

- 1. The three employees in the finance department who oversee this program *think* they are starting to get a pretty good feel for the way prices move in the soybean market. --- Those who think they can predict price movements are speculators, and this program wasn't intended as a speculation.**
- 2. In 2006, the forward contract purchase program netted a profit of \$12,000 over and above the offsetting cost of goods sold increase from the effect of price increases on the cost of soybeans. A proper hedging program won't net any profit or loss at all. In 2007, King Follett could just as easily lose \$12,000, or more, from this speculative forward contract program.**
- 3. With sales expected to be up 30% in 2007, soybean purchases should be around 13,000 bushels per month. However, the finance department employees have purchased forward contracts for 20,000 to 30,000 bushels per month. These extra contracts are speculations, not hedges. If soybean prices go down, King Follett stands to lose a lot of money on these contracts, far more than will be saved through the lower cost of soybean purchases of 13,000 bushels per month.**

### Southwest Airlines

During 2006, 2005, and 2004, the Company recognized pretax gains in Fuel and oil expense of \$634 million, \$892 million, and \$455 million, respectively, from hedging activities. At December 31, 2006 and 2005, approximately \$42 million and \$83 million due from third parties from settled derivative contracts is included in Accounts and other receivables in the accompanying Consolidated Balance Sheet. The fair value of the Company's financial derivative instruments at December 31, 2006, was a net asset of approximately \$999 million. The current portion of these financial derivative instruments, \$369 million, is classified as Fuel derivative contracts and the long-term portion, \$630 million, is classified as Other assets in the Consolidated Balance Sheet. The fair value of the derivative instruments, depending on the type of instrument, was determined by the use of present value methods or standard option value models with assumptions about commodity prices based on those observed in underlying markets.

#### SOUTHWEST AIRLINES CO. CONSOLIDATED STATEMENT OF INCOME

(In millions)	Years Ended December 31,		
	<u>2006</u>	<u>2005</u>	<u>2004</u>
<b>OPERATING REVENUES:</b>			
Passenger	\$ 8,750	\$ 7,279	\$ 6,280
Freight	134	133	117
Other	<u>202</u>	<u>172</u>	<u>133</u>
<b>Total operating revenues</b>	<b>9,086</b>	<b>7,584</b>	<b>6,530</b>
<b>OPERATING EXPENSES:</b>			
Salaries, wages, and benefits	3,052	2,782	2,578
Fuel and oil	2,138	1,341	1,000
Maintenance materials and repairs	468	446	472
Aircraft rentals	158	163	179
Landing fees and other rentals	495	454	408
Depreciation and amortization	515	469	431
Other operating expenses	<u>1,326</u>	<u>1,204</u>	<u>1,058</u>
<b>Total operating expenses</b>	<b>8,152</b>	<b>6,859</b>	<b>6,126</b>
<b>OPERATING INCOME</b>	<b>934</b>	<b>725</b>	<b>404</b>

#### Questions

1. During this period, fuel and oil prices were generally increasing. Did Southwest enter into derivative contracts to BUY or to SELL fuel and oil? **BUY**
2. Recompute Southwest's Fuel and Oil Expense for each year (2004, 2005, and 2006) assuming that Southwest had not entered into its fuel and oil hedging activities.

<b>Fuel and oil expense</b>	<b>2,138</b>	<b>1,341</b>	<b>1,000</b>
<b>Effect of hedging</b>	<b><u>634</u></b>	<b><u>892</u></b>	<b><u>455</u></b>
<b>Fuel and oil expense without hedging</b>	<b>2,772</b>	<b>2,233</b>	<b>1,455</b>
<b>Percentage decrease</b>	<b>23%</b>	<b>40%</b>	<b>31%</b>

3. Recompute Southwest's Operating Income for each year (2004, 2005, and 2006) assuming that Southwest had not entered into its fuel and oil hedging activities. By what percentage was Southwest's Operating Income increased in each year by its hedging activities?

<b>OPERATING INCOME</b>	<b>934</b>	<b>725</b>	<b>404</b>
<b>Effect of hedging</b>	<b><u>634</u></b>	<b><u>892</u></b>	<b><u>455</u></b>
<b>Operating income without hedging</b>	<b>300</b>	<b>(167)</b>	<b>(51)</b>
<b>Percentage increase</b>	<b>211%</b>	<b>can't compute</b>	<b>can't compute</b>

## **The Fair Value Option**

In 2007, with *SFAS No. 159*, the FASB took a bold step toward increased use of fair value by allowing companies a fair value option for the reporting of financial assets and liabilities. Under the provisions of *SFAS No. 159*, a company has the option to report, at each balance sheet date, any or all of its financial assets and liabilities at their fair values on the balance sheet date. This is a very interesting accounting rule because a company can choose to report some financial assets and liabilities of a certain type at fair value while at the same time continuing to use another basis, such as historical cost, for other financial assets and liabilities of exactly the same type.

You should be asking yourself: Why did the FASB give companies this financial reporting flexibility? The FASB stated its reason as follows: “The objective is to improve financial reporting by providing entities with the opportunity to mitigate volatility in reported earnings caused by measuring related assets and liabilities differently without having to apply complex hedge accounting provisions.” The best way to understand this rationale is through a simple example as given below.

Lily Kay Company has a very simple structure – the company has one asset, a Lusvardi Company bond that it purchased (on the day it was issued) as an investment, and one liability, one of its own bonds that Lily Kay issued to finance the purchase of the Lusvardi bond investment. Both bonds have the same terms: \$1,000 face value, 20-year life, 10% coupon rate, and single interest payments made at the end of each year. Given the general level of interest rates in the economy and the riskiness of both Lily Kay Company and Lusvardi Company, both bonds were associated with a market interest rate of 10% when they were issued. Accordingly, both bonds were issued at par of \$1,000. Lily Kay Company’s balance sheet on the day it purchased the Lusvardi bond with the \$1,000 cash raised by issuing its own bond is as follows.

<b><u>Assets</u></b>		<b><u>Liabilities and Equity</u></b>	
Lusvardi Bond	\$1,000	Bonds Payable	\$1,000
		Equity	\$0

As seen earlier, a risk associated with bonds is that their value fluctuates when market interest rates fluctuate. If, for example, the market interest rate associated with the Lusvardi bond asset were to increase to 12%, the value of the bond would decrease by \$149 to \$851. [ $N = 20$ ,  $I = 12\%$ ,  $PMT = \$100$ ,  $FV = \$1,000 \rightarrow PV = \$851$ ] This would represent an economic loss to Lily Kay Company. However, in the same way that the fair value of the bond asset is impacted by market interest rates, the fair value of the bond liability is also impacted by market interest rates. If the market interest rate associated with the Lily Company bond were to also increase to 12%, the fair value of the bond would decrease to \$851. This \$149 decrease represents an economic gain because Lily Company could pay a third party just \$851 to take over its bond obligation which is currently reported in its balance sheet at \$1,000. The \$149 loss on the bond asset is exactly offset by the \$149 gain on the bond liability. Lily Company’s balance sheet would then appear as follows.

<u>Assets</u>		<u>Liabilities and Equity</u>	
Lusvardi Bond	\$851	Bonds Payable	\$851
		Equity	\$0

Under the FASB's fair value option, both the \$149 loss and the \$149 gain from the fair value fluctuations would be reported in Lily Kay Company's income statement. The net impact on income is \$0, so retained earnings (and total equity in this case because there was no initial shareholder investment) stays at its initial balance of \$0.

In this case, the bond liability serves as a **hedge** for fluctuations in the value of the bond asset. A hedge is an action taken to reduce the risk associated with a related investment or action. For example, if an airline company is worried about future fluctuations in the price of aviation fuel, the airline can enter into hedging arrangements whereby it enters into contracts to buy its fuel in the future at a price that is set now.

Now, assume that Lily Kay Company were required to report the Lusvardi bond asset at its fair value of \$851 but were also required to report the bond liability at its historical issuance amount of \$1,000. The resulting balance sheet would appear as follows.

<u>Assets</u>		<u>Liabilities and Equity</u>	
Lusvardi Bond	\$851	Bonds Payable	\$1,000
		Equity	(\$149)

The negative equity of \$149 represents the recognized loss associated with the decline in fair value of the bond asset. And because the accounting requirement is that the bond liability be reported at its historical issuance amount of \$1,000, the corresponding, and offsetting, economic gain is not recognized. Requiring one side of the balance sheet to include fair values but the other side to report historical amounts results in misleading reporting because the hedging effect of the related asset and liability is not reflected in the financial statements.

Accounting rules and procedures exist which allow for the impact of hedging activities to be reflected in the financial statements. These accounting rules are found in *SFAS No. 133*. However, as of March 19, 2008, the FASB had issued 189 pieces of implementation guidance on how to apply *SFAS No. 133*. To put it mildly, the bookkeeping requirements underlying *SFAS No. 133* have proved to be extremely onerous. As shown in the simple Lily Kay example, for some cases the economic effect of hedging can be reflected quite nicely and simply in the financial statements by allowing companies the option of fair value reporting for both financial assets and financial liabilities. Thus, the intent of the fair value option in *SFAS No. 159* is to simplify the accounting for economic hedges.

Please note that hedging reduces risk, it doesn't guarantee profits. In the example given above when the market interest rate increased to 12% for both the Lusvardi bond asset and the Lily Kay bond liability, the economic loss on the asset was offset by an economic gain on the liability. However, it could just as easily have been the case that the market interest rate decreased for both the bond asset and the bond liability. For example, assume that the market interest rate on both the Lusvardi bond asset and the Lily Kay bond liability decreased to 8%. The fair value of both the asset and the liability would then be \$1,196. [N = 20, I = 8%, PMT = \$100, FV = \$1,000 → PV = \$1,196] In this case, an economic gain of \$196 on the bond asset would be offset by an economic loss of \$196 because of an increase in the fair value of the bond liability. The resulting balance sheet would appear as follows.

**Assets**

Lusvardi Bond \$1,196

**Liabilities and Equity**Bonds Payable \$1,196  
Equity \$0

In retrospect, from a reporting standpoint, Lily Kay might wish it had not elected the fair value option for the bonds payable. Then the economic gain of \$196 from the increase in the value of the asset would have been reported but the offsetting loss would not have been reported. To prevent companies from using hindsight to selectively enhance reported results using the fair value option, *SFAS No. 159* requires a company to designate whether it is using the fair value option with respect to a financial asset or financial liability when the initial transaction to create the item occurs. A company can't wait to see which way interest rates go and then cherry pick the economic gains while ignoring the economic losses.

In the examples given in this section, the gains and losses on the Lusvardi and Lily Kay bonds were exactly offsetting meaning that the market interest rates for the two bonds moved together. This might be the case if the change in interest rates were caused by general economic factors that affected both companies equally. However, if the change in market interest rates is caused by firm-specific factors, there is no reason to think that they would move together. For example, assume that the financial condition of Lusvardi Company weakened, resulting in an increase in the market interest rate associated with the company's bonds from 10% to 12%. At the same time, assume that the financial condition of Lily Kay Company strengthened, resulting in a decrease in the market interest rate from 10% to 8%. The resulting balance sheet would appear as follows.

**Assets**

Lusvardi Bond \$851

**Liabilities and Equity**Bonds Payable \$1,196  
Equity (\$345)

The \$345 economic loss is a combination of the \$149 loss from the weakening of Lusvardi Company and a \$196 economic loss from the strengthening of Lily Kay Company as evidenced by the drop in the market interest rate from 10% to 8%. The \$149 loss is easy to understand, but the \$196 loss requires further explanation. How can an improvement in a company's economic circumstances result in a loss? Remember that losses and gains are reported from the standpoint of the shareholders. In this example, the shareholders of Lily Kay are now obligated to make 10% interest payments on the Lily Kay bonds for the next 20 years when in fact the circumstances of the company suggest that it need pay only 8%. In other words, Lily Kay Company is obligated to make above-market interest payments for the next 20 years. This represents a transfer of wealth from the shareholders, who are paying too much interest, to the bondholders, who are collecting too much interest. --- From an accounting standpoint, the important thing to note here is that use of the fair value option results in all of these interesting and relevant economic facts being reflected immediately in the financial statements.

### Example A

The company has one asset, a bond (called Bond B) that it purchased (on the day it was issued) as an investment, and one liability, one of its own bonds (called Bond X) that the company issued to finance the purchase of the Bond B investment. The company had no initial shareholder investment. Both bonds have the same terms: \$1,000 face value, 30-year life, 8% coupon rate, and single interest payments made at the end of each year. On their issuance dates, both bonds were associated with a market interest rate of 8%. The company has determined to account for both the bond asset and the bond liability using the fair value option. (1) Prepare a balance sheet for the company as of the issuance date of investment Bond B and the company's own Bond Payable X. (2) On the very next day, the market interest rate with respect to Bond B had risen to 13% and the market interest rate with respect to Bond Payable X had risen to 11%. Prepare the company's balance sheet.

### Solution A

1.

Both bonds were issued when the market interest rate of 8% was equal to the coupon rate, so the bonds were issued at par of \$1,000.

<u>Assets</u>		<u>Liabilities and Equity</u>	
Bond B	\$1,000	Bond X Payable	\$1,000
		Equity	\$0

2.

Asset:  $N = 30, I = 13\%, PMT = \$80, FV = \$1,000 \rightarrow PV = \$625$

Liability:  $N = 30, I = 11\%, PMT = \$80, FV = \$1,000 \rightarrow PV = \$739$

<u>Assets</u>		<u>Liabilities and Equity</u>	
Bond B	\$625	Bond X Payable	\$739
		Equity	(\$114)

### Example B

Ryan Marie Company has one asset, a bond issued by Miles Company that Ryan Marie purchased (on the day it was issued) as an investment. Ryan Marie also has only one liability, one of its own bonds that was to finance the purchase of the Miles Bond investment. The company had no initial shareholder investment. Both bonds have the same terms: \$1,000 face value, 10-year life, 11% coupon rate, and single interest payments made at the end of each year. On their issuance dates, both bonds were associated with a market interest rate of 8%. The company has determined to account for both the bond asset and the bond liability using the fair value option.

1. Prepare a balance sheet for Ryan Marie Company as of the date it both purchased the Miles bond investment and issued its own bonds payable.
2. On the very next day, the market interest rate with respect to the Miles bond investment had risen to 13%, and the market interest rate with respect to Ryan Marie's bond had risen to 11%. Prepare the company's balance sheet.
3. Repeat (2) but this time assume that the market interest rate for the Miles bond had gone down to 6%, and the market interest rate of Ryan Marie bond had increased to 14%.
4. Repeat (2) but this time assume that the market interest rate for the Miles bond had increased to 14%, and the market interest rate of Ryan Marie bond had gone down to 6%.

Solution B

1.

Asset:  $N = 10, I = 8\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$1,201$

Liability:  $N = 10, I = 8\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$1,201$

**Assets**

**Liabilities and Equity**

Miles Bond	\$1,201	Bond Payable	\$1,201
		Equity	\$0

2.

Asset:  $N = 10, I = 13\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$891$

Liability:  $N = 10, I = 11\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$1,000$

**Assets**

**Liabilities and Equity**

Miles Bond	\$891	Bond Payable	\$1,000
		Equity	(\$109)

3.

Asset:  $N = 10, I = 6\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$1,368$

Liability:  $N = 10, I = 14\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$844$

**Assets**

**Liabilities and Equity**

Miles Bond	\$1,368	Bond Payable	\$844
		Equity	\$524

4.

Asset:  $N = 10, I = 14\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$844$

Liability:  $N = 10, I = 6\%, PMT = \$110, FV = \$1,000 \rightarrow PV = \$1,368$

**Assets**

**Liabilities and Equity**

Miles Bond	\$844	Bond Payable	\$1,368
		Equity	(\$524)

## **Fair value disclosures**

Accounting measurement has always been a balancing act between relevance and reliability. Reliable measurements are verifiable and avoid estimates and forecasts that introduce uncertainty. Relevant measurements are timely and are more likely to include forecasts, estimates, and judgments.

The historical-cost accounting model leans more toward reliability and less toward relevance. Historical transactions prices are extremely reliable because they can be independently verified with invoices and receipts from third parties.

The FASB has concluded that in many settings the relevance of fair value data justifies a departure from the reliable foundation of historical cost. However, the FASB continues to recognize that even with fair value measurements, preference should be given to reliable data whenever possible.

In *SFAS No. 157* (par. 21), the FASB comments that fair value measurements are generated with a combination of observable and unobservable inputs. Consider the example of Company A computing the fair value of its investment in the common stock of Company B. Examples of observable inputs are the quoted price of Company B stock and market multiples (such as price-to-sales ratio, price-earnings ratio, and price-to-book ratio) for Company B and other companies in its industry. Examples of unobservable inputs are Company A's own estimate of the future cash flows to be generated by its investment in Company B and its estimate of the appropriate rate of return to use in valuing those cash flows. In using valuation techniques to generate fair values, the FASB requires companies to maximize the use of observable inputs and minimize the use of unobservable inputs.

The FASB has refined this observable/unobservable dichotomy into a three-way "fair value hierarchy," as follows.

- Level 1 inputs – quoted prices in active markets for identical assets (or liabilities).
- Level 2 inputs – observable inputs other than quotes prices in active markets for identical assets.
- Level 3 inputs – unobservable inputs.

In generating fair values, Level 1 inputs are preferable to Level 2 inputs which in turn are preferable to Level 3 inputs. Back to the Company A valuation of its investment in Company B mentioned above, Company A should use the quoted price of Company B stock if such a price exists. In the absence of such a price, Company A should maximize its use of market multiples and other market data for similar companies. Finally, if no market-corroborated data exist relative to the fair value of Company B, then Company A should use its own internally generated cash flow and required rate of return estimates.

Clearly, a fair value generated with Level 1 inputs is more reliable and involves less uncertainty than a fair value generated with Level 3 inputs. Accordingly, under *SFAS No.*

157, companies are required to provide quantitative disclosure about the source of the inputs into its fair value computations.

These fair value disclosures fall into two categories. The first category is for assets (and liabilities) that are measured at fair value on a recurring basis. Examples are trading securities, available-for-sale securities, and derivatives. These items are reported at their fair values on every reporting date.

For items measured at fair value on a recurring basis, the first required valuation input disclosure is a simple table with the assets as the rows and the three input levels as the columns. The example below is copied from *SFAS No. 157*, par. A34.

Description	12/31/XX	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Trading securities	\$115	\$105	\$10	
Available-for-sale securities	75	75		
Derivatives	60	25	15	\$20
Venture capital investments	10			10
Total	<u>\$260</u>	<u>\$205</u>	<u>\$25</u>	<u>\$30</u>

To illustrate what additional information this disclosure provides beyond the summary fair value measurements, consider the values reported for the available-for-sale securities (\$75) and the venture capital investments (\$10). The data in this table tell the financial statement user that there is a larger difference in the reliability of these two numbers even though both are reported as “fair value” numbers in the balance sheet. The \$75 number is extremely reliable because, as noted in the table heading, it comes from “quoted prices in active markets for identical assets.” In contrast, the \$10 number is not as reliable because it stems from internal judgments and estimates that have not been corroborated by independent market observations.

The preceding paragraph highlights that the greatest concern regarding fair value numbers is with the numbers generated using Level 3 inputs. As a result, further disclosure is required for these fair values. An example is given in the table below.

(\$ in 000s)	Fair Value Measurements Using Significant Unobservable Inputs (Level 3)		
	Derivatives	Venture Capital Investments	Total
Beginning balance	\$14	\$11	\$25
Total gains or losses (realized/unrealized)			
Included in earnings (or changes in net assets)	11	(3)	8
Included in other comprehensive income	4		4
Purchases, issuances, and settlements	(7)	2	(5)
Transfers in and/or out of Level 3	(2)	0	(2)
Ending balance	<u>\$20</u>	<u>\$10</u>	<u>\$30</u>

This table presents a beginning and ending balance reconciliation, or rollforward, for the fair values generated using Level 3 inputs. In summary, for items measured at fair value on a recurring basis, an overall table is presented showing the relative magnitudes of fair values computed using Level 1, Level 2, and Level 3 inputs. In addition, a more detailed table is provided for the values generated using Level 3 inputs showing an explanation of the change in the fair value amounts from the beginning of the period to the end of the period.

Most balance sheet items are NOT reported at fair value on a recurring basis but are occasionally reported at fair value. A common example is impaired assets. The required disclosure for assets reported at fair value on a nonrecurring basis is given below. This table is copied from *SFAS No. 157*, par. A36.

(\$ in millions)	Year Ended 12/31/XX	Fair Value Measurements Using			Total Gains (Losses)
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
Long-lived assets held and used	\$75		\$75		\$(25)
Goodwill	30			\$30	(35)
Long-lived assets held for sale	26		26		(15)
					<u>\$(75)</u>

You should first notice that will items reported at fair value on a nonrecurring basis, it is unlikely that Level 1 inputs will be available. Also, note that the final column, containing the gains and the losses, is a very condensed version of the second table, the rollforward table, required for the items that are reported at fair value on a recurring basis.

Example A – Disclosures for Items Reported at Fair Value on a Recurring Basis

Didericksen Company has an investment portfolio containing three securities. Details about each of the securities are given below.

- **Security 1:** 1,000 shares purchased last year for \$20 per share. At the beginning of this year, the shares were trading at \$25 per share. At the end of this year, the shares were trading at \$27 per share. The shares of Security 1 trade actively on the New York Stock Exchange. Didericksen holds these securities with the intent to make money through short-term fluctuations in price; they are classified as trading securities.
- **Security 2:** 30 bonds (\$1,000 face value) purchased last year at 98.5. At the beginning of this year, the bonds were trading at 101.4. The bonds are thinly traded, so no quoted price is available near the end of this year. However, use of matrix pricing based on the trading prices of similar bonds indicates that the estimated price of the bonds is 97.8 at the end of this year. Didericksen classifies these securities as available for sale.
- **Security 3:** 500 shares in a real estate investment trust. Didericksen purchased 300 shares last year for \$15 per share. At the beginning of this year, the estimated fair value of these shares was \$18. During the year, Didericksen purchased another 200 shares at \$16 per share. Didericksen classifies this as an available-for-sale investment. The shares in this real estate investment trust are privately held and transactions are infrequent. As of the end of the year, Didericksen has used its own analysis to estimate the price per share to be \$12.

**Required: Prepare the Level 1, Level 2, and Level 3 disclosures required under SFAS No. 157.**

Solution A

Note: These securities are reported as fair value on a recurring basis.

<u>Description</u>	<u>Total</u>	<u>Fair Value Measurements at Reporting Date Using</u>		
		<u>Quoted Prices</u> in Active Markets for Identical Assets (Level 1)	<u>Significant</u> Other Observable Inputs (Level 2)	<u>Significant</u> Unobservable Inputs (Level 3)
Trading securities	\$27,000	\$27,000		
Available-for-sale securities	35,340		\$29,340	\$6,000
	-----	-----	-----	-----
Total	<u>\$62,340</u>	<u>\$27,000</u>	<u>\$29,340</u>	<u>\$6,000</u>

<u>Fair Value Measurements Using</u> <u>Significant Unobservable Inputs</u> <u>(Level 3)</u>	
-----	
	<u>Real Estate</u> <u>Investment Trust</u> <u>Security 3</u>
Beginning balance	\$5,400
Total gains or losses (realized/unrealized)	
Included in earnings	
Included in other comprehensive income	(2,600)
Purchases	3,200
Transfers in or out of Level 3	0
	-----
Ending balance	<u>\$6,000</u>

Example B – Disclosures for Items Reported at Fair Value on a NONRecurring Basis  
 During the year, Nelson Company conducted an impairment analysis for three assets: a building, an operating license, and goodwill. The carrying values of the assets as of the beginning of the year were as follows: building, \$20,000; operating license, \$38,000; goodwill, \$120,000. It was found that each one of the assets was impaired. Impairment losses were recognized as follows: building, \$4,000; operating license, \$23,000; goodwill, \$94,000. The year-end fair values of all three of these assets were determined using internally-generated data.

**Required:** Prepare the Level 1, Level 2, and Level 3 disclosures required under *SFAS No. 157*.

Solution B

Note: These assets are reported at fair value on a nonrecurring basis.

<u>Description</u>	<u>Total</u>	<u>Fair Value Measurements at Reporting Date Using</u> <u>Quoted Prices</u>			<u>Total</u>
		in Active Markets for Identical Assets <u>(Level 1)</u>	Significant Other Observable Inputs <u>(Level 2)</u>	Significant Unobservable Inputs <u>(Level 3)</u>	<u>Gains</u> <u>(Losses)</u>
Building	\$16,000			\$16,000	(\$4,000)
Operating license	15,000			15,000	(23,000)
Goodwill	26,000			26,000	(94,000)
	-----			-----	-----
	<u>\$57,000</u>			<u>\$57,000</u>	<u>(\$121,000)</u>