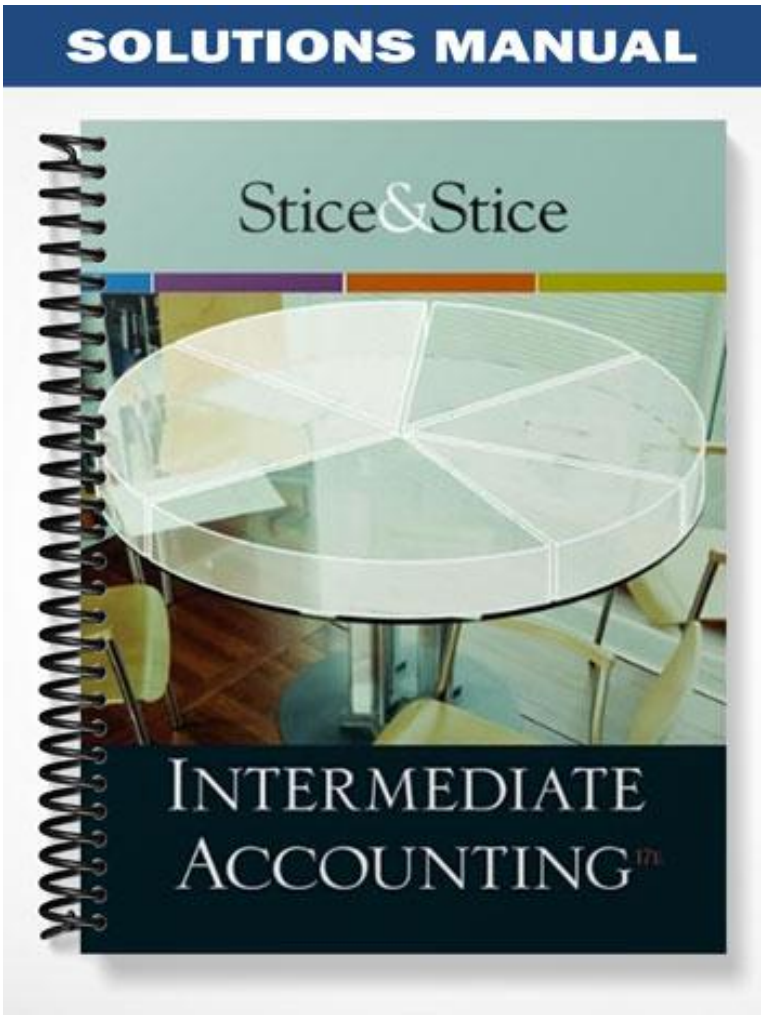
SOLUTIONS MANUAL
Stice&Stice
INTERMEDIATE ACCOUNTING

Fair Value Module

An Excel spreadsheet that contains the details of the calculations for the Fair Value Module solutions is available on the IRCD and instructor Web site.

EXERCISES

FV–1. **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 fair value of Building 3 = $2,400,000 = $2,000,000 + 0.8($2,500,000 – $2,000,000)**

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 fair value of Building 4 = $2,287,500 = $2,250,000 + 0.1($2,625,000 – $2,250,000)**

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 fair value of Building 5 = $1,980,000 = $1,800,000 + 0.6($2,100,000 – $1,800,000)**

FV–2. **Selling Price**

	Square Feet				
Capitalization Rate	**10,000**	**20,000**	**30,000**	**40,000**	**50,000**
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
9.3%	535,000	1,070,000	1,505,000	1,940,000	2,240,000

Building Z

- **Look at the 9.3% capitalization rate row which was created by interpolation between the 9% and 10% rows.**
- **Based on square footage, Building Z is 20% of the way from $1,505,000 to $1,940,000.**
- **Estimated fair value of Building Z = $1,592,000= $1,505,000 + 0.2($1,940,000 – $1,505,000)**

FV–3.

- **Look at the AA bond rating column.**
- **Based on the term of the bond, the bond is 30% of the way from 100 to 91.**
- **100 – (0.3 × 9) = 97.3**
- **Estimated fair value of the bond = 0.973 × $1,000 = $973**

FV–4. **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 bond price as a percent of par = 103.787 = 103.85 – 1/3(103.85 – 103.66)**
- **Estimated price of Bond 3 = 1.03787 × $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 bond price as a percent of par = 84.044 = 91.98 – 0.8(91.98 – 82.06)**
- **Estimated price of Bond 4 = 0.84044 × $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 bond price as a percent of par = 99.938 = 101.45 – 0.8(101.45 – 99.56)**
- **Estimated price of Bond 5 = 0.99938 × $1,000 = $999.38**

FV–5. **Customer List**

Outcome 1: PMT = $40,000; I = 8%; N = 5 years → $159,708
Outcome 2: PMT = 18,000; I = 8%; N = 4 years → 59,618
Outcome 3: PMT = 9,000; I = 8%; N = 3 years → 23,194

	Present Value	Probability	Probability-Weighted Present Value
Outcome 1.....	$159,708	0.20	$31,942
Outcome 2.....	59,618	0.30	17,885
Outcome 3.....	23,194	0.50	11,597
Total estimated fair value.....			$61,424

FV–5. (Concluded)

Franchise Agreement

Outcome 1: PMT =	$450,000;	I = 8%;	N = 10 years →	$3,019,537
Outcome 2: PMT =	12,000;	I = 8%;	N = 4 years →	39,746
Outcome 3: PMT =	500;	I = 8%;	N = 3 years →	1,289

	Present Value	Probability	Probability-Weighted Present Value
Outcome 1	$3,019,537	0.10	$301,954
Outcome 2	39,746	0.20	7,949
Outcome 3	1,289	0.70	902
Total estimated fair value			$310,805

FV–6. The fair value of the business license is $42,215, computed as follows:

Discount rate	15.0%
Royalty rate	2.0%
Initial annual cab revenue growth rate	10.0%
Terminal growth rate (after five years)	3.0%
Income tax rate	30%

	Growth 3%					
	Year 1	Year 2	Year 3	Year 4	Year 5	Years 5+
Total annual revenue	$300,000	$ 330,000	$ 363,000	$ 399,300	$439,230	
Pretax royalty (2%)	$ 6,000	$ 6,600	$ 7,260	$ 7,986	$ 8,785	
Income taxes (30%)	1,800	1,980	2,178	2,396	2,636	
After-tax royalty	$ 4,200	$ 4,620	$ 5,082	$ 5,590	$ 6,149	$51,242
Discounted cash flow	$ 3,652	$ 3,493	$ 3,341	$ 3,196	$ 3,057	

Sum of discounted cash flow	$ 16,739
Present value of "perpetuity"	25,476
Total present value of cash flows	$ 42,215

FV–7. We can estimate a "depreciated" replacement cost using a process exactly analogous to the computation of depreciated book value. The computations are as follows:

- **($800,000 – $40,000) ÷ 16 years = $47,500 "depreciation" per year**
- **7 years × $47,500 "depreciation" per year = $332,500 total "depreciation"**
- **$800,000 replacement cost new – $332,500 "depreciation" = $467,500 adjusted replacement cost**

This $467,500 adjusted replacement cost is a cost-based estimate of the fair value of the rock crushing system. If it is more reasonable to assume that the system loses value more quickly in the early years, then an accelerated depreciation method can be used.

FV–8. ***Note:*** **These securities are reported at fair value on a recurring basis.**

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

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

The unrealized decrease of $2,600 recognized in other comprehensive income this year is computed as follows:

	Beginning of Year		Ending of Year	
Securities	Cost	Market Value	Cost	Market Value
First purchase	$ 4,500	$ 5,400	$4,500	$3,600
Second purchase	0	0	3,200	2,400
Total	$ 4,500	$ 5,400	$7,700	$6,000

Cumulative unrealized gain or loss at the beginning of year ($5,400 – $4,500) **Unrealized gain $900**

Cumulative unrealized gain or loss at the end of Year 2 ($6,000 – $7,700) **Unrealized loss $1,700**

To get from a cumulative unrealized gain of $900 to a cumulative unrealized loss of $1,700 required an UNREALIZED LOSS of $2,600 for the year.

FV–9. ***Note:*** **These assets are reported at fair value on a nonrecurring basis.**

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

CASES

FV–10.

1. The key assumption that must be made is the average total estimated life for the asset group. This is given to be eight years for the network equipment, the primary asset in the group. The total estimated annual lease payment for the group of assets is $4,250, computed as follows:

	Estimated Annual Lease Payment
Land	$ 30
Network equipment	2,840
Buildings and improvements	299
Non-network software, office equipment	437
Construction in progress*	644
Total	$4,250

*60% of the lease payment for the completed assets.

The impairment test for a tangible asset group such as this involves comparing the book value of the assets of $22,882 to the undiscounted future cash flows expected to be generated by the group. The undiscounted cash flow amount is $34,000 = 8 years × $4,250 per year.

Because the undiscounted cash flow total of $34,000 exceeds the book value of $22,882, the Wireless segment's property, plant, and equipment is NOT impaired and no impairment write-down is necessary.

2. The first step in determining whether Sprint Nextel's goodwill is impaired is comparing the book value of the Wireless segment, to which all of the goodwill relates, to the fair value of the Wireless segment. As explained in the case, Sprint Nextel uses two different techniques for estimating the fair value of the Wireless segment: (1) indirect valuation by estimating the fair value of the Wireline segment, subtracting that from total Sprint Nextel market capitalization, and then adding a control premium and (2) directly estimating the fair value of the Wireless segment with discounted cash flow analysis.

Indirect Valuation of Wireless Segment

Using the Wireline industry data given in the case, price multiples based on revenue and EBITDA are as follows:

	Price-to-Revenue Multiple	Price-to-EBITDA Multiple
Qwest	0.60	1.80
Level 3	1.15	6.53
Embarq	1.07	2.54
Windstream	1.84	3.59
Centurytel	1.41	2.77
Average	1.21	3.45

FV–10. (Continued)

Using the averages for both multiples, the estimated price of Sprint Nextel's Wireline segment is as follows:

Price-to-revenue multiple: 1.21 × $6.46 = $7.8 billion
Price-to-EBITDA multiple: 3.45 × $1.07 = $3.7 billion

The average of these two estimates is $5.8 billion.

Making the (perhaps unreasonable estimate) that the fair value of the Wireline segment was constant throughout 2007, and also considering the "control premium" mentioned by Sprint Nextel, the quarter-by-quarter estimate of the fair value of the Wireless segment is as follows:

	Sprint Nextel Market Capitalization (in billions)	Wireless Segment Only	Plus 5% Control Premium	Plus 10% Control Premium
January 1, 2007	$54.2	$48.4	$50.8	$53.2
March 31, 2007	53.8	48.0	50.4	52.8
June 30, 2007	58.8	53.0	55.7	58.3
September 30, 2007	54.1	48.3	50.7	53.1
December 31, 2007	37.4	31.6	33.2	34.8

As seen in the case, the book value of the Wireless segment at December 31, 2007, was $52.8 billion. Accordingly, it appears that Sprint Nextel could justify a conclusion that goodwill was NOT impaired for the first three quarters of 2007, but the estimated fair value of the Wireless segment of about $34 billion on December 31, 2007, indicates that goodwill may be impaired on that date.

Direct Valuation of Wireless Segment

Given the data in the case, the weighted average cost of capital of 9.3% can be computed as follows:

Risk-free rate on 12/31/2007	4.0%	
Historical equity premium	7.0%	
Average industry Beta	1.55	
Equity cost of capital	14.9%	
	Amounts of Debt and Equity	
After-tax debt cost of capital	42.1	4.3%
Equity cost of capital	37.4	14.9%
	79.5	9.3%

The amount of liabilities ($42.1 billion) and the market value of equity ($37.4 billion) used here are for the entire company. These values are used to generate the relative weights used in computing the weighted-average cost of capital for the entire company.

Using this discount rate and the other parameters given in the case, a discounted cash flow analysis of the Wireless segment indicates a value of $33.6 billion, as shown below.

FV–10. (Continued)

Discount rate 9.3%

	HISTORICAL			FORECAST					
				OIBDA Growth	13.0%				Growth
				Capex Growth	10.0%				6.0%
	2005	2006	2007	2008	2009	2010	2011	2012	Terminal
Segment earnings	6,932	11,678	9,914	11,203	12,659	14,305	16,165	18,266	
Taxes (38%)	2,634	4,438	3,767	4,257	4,810	5,436	6,143	6,941	
OIBDA	4,298	7,240	6,147	6,946	7,849	8,869	10,022	11,325	
Capital expenditures	3,545	5,944	5,067	5,574	6,131	6,744	7,419	8,160	
Free cash flow	753	1,296	1,080	1,372	1,718	2,125	2,603	3,164	95,891
Discounted cash flow				1,255	1,438	1,627	1,824	2,029	61,472

Note: The numbers reported above include rounding effects from the underlying spreadsheet computations. Also, the 2005 and 2006 historical numbers are reported just for background information; they are not reflected explicitly in the computations.

Sum of discounted cash flow	8,173
PV of Terminal value	61,472
Total present value of cash flow	69,645
Less liabilities	36,046
Value of equity	33,599

FV–10. (Continued)

As with the indirect valuation, this direct valuation also confirms that there is a possible goodwill impairment as of December 31, 2007.

Because it has been established that goodwill may be impaired as of December 31, 2007, a more extensive valuation analysis of Sprint Nextel's assets is required in order to compute the correct amount of goodwill. The fair value of both the FCC licenses and the customer relationships must be estimated.

Valuation of FCC Licenses

The fair value of Sprint Nextel's FCC licenses can be estimated using the "relief-from-royalty" approach. This method uses market royalty rates charged for the use of licenses similar to those owned by Sprint Nextel. Using this approach, the fair value of the licenses is the present value of the after-tax royalties that Sprint Nextel is avoiding by owning the licenses. The structure of this valuation analysis is very similar to the direct valuation of the Wireless segment shown previously.

Using the parameters given in the case, along with the 9.3% discount rate computed earlier, the fair value of the FCC licenses is computed to be $29.1 billion as follows:

Discount rate 9.3%						Growth 6.0%
	2008	2009	2010	2011	2012	Terminal
Number of customers (millions)	46,049	52,035	58,799	66,443	75,081	
Monthly ARPU	$57	$57	$56	$56	$55	
Total annual revenue (millions)	31,729	35,496	39,709	44,422	49,695	
Pretax royalty (4.2%)	1,333	1,491	1,668	1,866	2,087	
Taxes (38%)	506	567	634	709	793	
After-tax royalty	826	924	1,034	1,157	1,294	1,294
Discounted cash flow	756	774	792	811	830	39,214

Note: The numbers reported above include rounding effects from the underlying spreadsheet computations.

Sum of discounted cash flow	3,962
PV of Terminal value	25,139
Total present value of cash flows	29,100

Valuation of Customer Relationships

The value of the existing customer relationships that Sprint Nextel has with its wireless customers is done using an excess cash flow analysis. As explained in the case, the value of these relationships is computed assuming that Sprint Nextel's other assets earn a normal return. Using the data in the case, with the discount rate of 9.3%, the fair value of the customer relationships is estimated to be $7.5 billion, as shown below.

Assets employed

Wireless reported assets (less $30,664 goodwill)	$58,190
Extra license value (above book value $21,123)	7,977
Fair value of non-goodwill assets employed	$66,167

	Average # of Customers	Monthly ARPU	Annual Contribution Margin	Capital Charge (Assets × 0.093)	After-Tax Excess	Present Value (on 12/31/07)
For the year 2008	35,144	$57.42	$13,997	$6,154	$4,863	$4,449
For the year 2009	26,582	56.85	10,481	6,154	2,683	2,246
For the year 2010	20,106	56.28	7,848	6,154	1,051	805
For the year 2011 (ignored because negative)	15,207	55.71	5,877	6,154	(172)	(120)
Fair value of customer relationships						$7,499

Note: The numbers reported above include rounding effects from the underlying spreadsheet computations.

FV–10. (Continued)

An assumption made here, and in the computation of goodwill, is that the book value of property, plant, and equipment of $22,882 approximates the fair value. Using the data given above, it is possible to get an estimate of the fair value of the PPE. With the annual lease payment of $4,250, estimated life of eight years, and discount rate of 9.3%, the present value of the future lease payments is $23,263 which exceeds the book value by $381 million. If this is taken as a reliable estimate, the value of the customer relationships is lower (because the capital charge is higher); the computation of goodwill would also be impacted.

Computation of Goodwill

Computation of the goodwill amount requires estimation of the fair value of ALL identifiable assets and liabilities, whether those items have been previously recognized or not. The computations above have yielded estimates of the fair value of the FCC licenses and the customer relationships. In addition, it was shown in the preceding section that the fair value of the property, plant, and equipment is closely approximated by the book value. In the computation of goodwill shown here, it will be assumed that the fair values of current assets, other intangibles, and liabilities are approximated by their book values. With that assumption, goodwill is computed to be $914 million indicating that Sprint Nextel's goodwill impairment loss is $29.75 billion.

Note: The amounts below do NOT represent a new balance sheet with an increased reported amount for licenses and with the inclusion of the previously unrecognized customer relationships. This fair value computation is used only in computing the new amount of goodwill.

Current assets	$ 7,414
PPE	22,882
Licenses	29,100
Customer relationships	7,499
Other intangibles	1,835
Less liabilities	(36,046)
Fair value of net identifiable assets	$ 32,685
Estimated equity value (direct valuation)	$ 33,599
Less fair value of identifiable assets	32,685
Implied goodwill value	$ 914
Recorded goodwill	$ 30,664
Revised goodwill	914
Goodwill impairment loss	$ 29,750

Subsequent questions will address the sensitivity of this computation to the assumptions made.

3. *Note:* The goodwill asset in question here is reported at fair value on a nonrecurring basis. This disclosure is different from what is required for assets reported at fair value on a recurring basis (such as investment securities).

		Fair Value Measurements at Reporting Date Using			
Description	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total Gains (Losses)
Goodwill	$914			$914	$(29,750)

FV–10. (Continued)

Note that property, plant, and equipment is not included here because it was determined that the PPE was NOT impaired, so it is not recorded at fair value. This is also true (by assumption) of the other asset categories as well as the liabilities. Finally, note that no amounts are reported for the FCC licenses and the customer relationships even though their fair values were computed and used in the computation of the fair value of goodwill. The recorded amounts of these intangibles are not changed even though they are computed and used as part of the goodwill impairment computation.

4. Because the undiscounted cash flow total of $34,000 from the PPE exceeds the book value of $22,882, the Wireless segment's property, plant, and equipment is NOT impaired, the fair value of the PPE is not estimated, and no impairment write-down is recognized. Because the PPE is not impaired and no fair value is computed, the discount rate assumption has no impact on the recorded amount of PPE in this case.

5. As seen in Question 2, the fair value of both the FCC license and the customer relationships depends on the discount rate. Because both of these fair values enter into the computation of goodwill, changing the discount rate used will change the computed amount of goodwill. The impacts of increasing the 9.3% discount rate to 9.8% and decreasing it to 8.8% are shown below.

Goodwill Sensitivity Analysis (assets only)

	8.8%	9.3%	9.8%
Current assets	$ 7,414	$ 7,414	$ 7,414
PPE	22,882	22,882	22,882
Licenses	34,332	29,100	25,245
Customer relationships	7,348	7,499	7,520
Other intangibles	1,835	1,835	1,835
Less liabilities	(36,046)	(36,046)	(36,046)
Fair value of net identifiable assets	$ 37,765	$ 32,685	$ 28,851
Estimated equity value (direct valuation)	$ 46,379	$ 33,599	$ 24,187
Less fair value of identifiable assets	37,765	32,685	28,851
Implied goodwill value	$ 8,614	$ 914	$ (4,664)
Recorded goodwill	$ 30,664	$ 30,664	$ 30,664
Revised goodwill	8,614	914	0
Goodwill impairment loss	$ 22,050	$ 29,750	$ 30,664

Note that the amount of the goodwill impairment loss drops by more than $7 billion with a decrease of just 50 basis points (0.5%) in the discount rate used. Looking more closely at the numbers in each scenario, you can see that the items that change the most are the estimated equity value and the estimated fair value of the FCC licenses. It is interesting to note that the customer relationship intangible is relatively unaffected by the discount rate assumption.

This sensitivity analysis has at least two limitations. First, the estimated value that is by far the most sensitive to the discount rate assumption is the estimated equity value of the Wireless segment. Recall that Sprint Nextel also uses a market multiple approach to estimate this equity value. Previous computations, in connection with Question 2, suggest a Wireless segment value of $34.0 billion. This is probably a more reasonable number to use in this sensitivity analysis, not least because the total market capitalization of Sprint Nextel was $37.4 billion as of December 31, 2007, indicating that the $46.4 billion estimate for the Wireless segment value using a discount rate of 8.8% is not feasible.

The second limitation is that we have ignored the impact of the discount rate on the fair value of the liabilities. To get a very rough idea of this impact, the $36,046 million liability amount is assumed to represent the present value of an annuity 10 years in length. With a discount rate of 9.3%, this implies that the annuity payment is $5,691 million. With this assumption, the size of the impact of the discount rate on the fair value of the liabilities can be estimated.

FV–10. (Concluded)

Both these limitations are addressed in the numbers shown below.

Goodwill Sensitivity Analysis (assets AND liabilities AND indirect valuation)

	8.8%	9.3%	9.8%
Current assets	$ 7,414	$ 7,414	$ 7,414
PPE	22,882	22,882	22,882
Licenses	34,332	29,100	25,245
Customer relationships	7,348	7,499	7,520
Other intangibles	1,835	1,835	1,835
Less liabilities	(36,847)	(36,046)	(35,271)
Fair value of net identifiable assets	$ 36,964	$ 32,685	$ 29,626
Estimated equity value (direct valuation)	$ 33,970	$ 33,970	$ 33,970
Less fair value of identifiable assets	36,964	32,685	29,626
Implied goodwill value	$ (2,994)	$ 1,285	$ 4,344
Recorded goodwill	$ 30,664	$ 30,664	$ 30,664
Revised goodwill	0	1,285	4,344
Goodwill impairment loss	$ 30,664	$ 29,379	$ 26,320

The sensitivity of the goodwill impairment loss amount to the assumption about the discount rate is much less pronounced in this expanded analysis. These two sensitivity calculations illustrate the importance of conducting a comprehensive valuation analysis wherever possible. Isolating the impact of variable factors such as interest rates on single items in a vacuum can yield extremely misleading results.

6. In the sensitivity analysis conducted in Question 5, it was seen that the Wireless segment valuation using discounted cash flow analysis was extremely sensitive to the assumption about the discount rate.

The FCC license valuation is sensitive not only to the discount rate assumption but also to the choice of royalty rate.

Tinkering with the customer relationship valuation spreadsheet shows that this valuation is less sensitive to changes in the value of the discount rate, the monthly churn rate, and the ARPU annual growth rate which are the key assumptions. Estimated values cluster in the $6.5 billion to $8.5 billion range for reasonable values of the valuation parameters.

The valuation of the Wireless segment indirectly using market multiples for the Wireline segment is impacted by the choice of which company or companies to use in generating the multiples. However, because the Wireline segment provides a relatively small portion of the overall market value of Sprint Nextel, the value of the Wireless segment is fairly close to the value of the entire company. And this company value is reliable because it comes from independently observed market data.

As explained in *SFAS No. 157*, observable inputs to valuation models are preferable to unobservable inputs. And the most reliable observable inputs are those from quoted market prices. In this circumstance, the most reliable valuation technique appears to be the Wireless segment valuation using market multiples for the Wireline segment.

FV–11.

1. Before the restructuring, the six companies were as follows:

- China Mobile—mobile phone service
- China Telecom—fixed-line service, 21 southern provinces
- China Unicom—mobile phone service
- China Netcom—fixed-line service, 10 northern provinces
- China Tietong—fixed-line telephone and Internet service
- China Satcom—satellite-related communications services

As part of the restructuring, three of the six companies will disappear, having been acquired by the others: China Netcom, China Tietong, and China Satcom.

The three remaining companies will have the following pieces.

- China Mobile—existing mobile service plus China Tietong and its fixed-line service
- China Telecom—existing fixed-line service plus CDMA mobile customers of China Unicom plus China Satcom
- China Unicom—existing mobile service (less CDMA customers) plus China Netcom and its fixed-line service

2. The most notable feature of the restructuring is that each of the three "mega-companies" will have both fixed-line and mobile service. Thus, each will be dealing with the strengths and weaknesses of both fixed-line and mobile service.

3.

	Price/ Sales	Price/ EBITDA	Price/ Earnings	Price/ Subscriber
China Mobile	7.1	13.0	29.0	6,833
China Telecom	2.6	5.2	19.7	1,823
China Unicom	2.2	6.8	23.7	1,355
China Netcom	1.7	3.4	11.7	1,086

The most striking feature of these numbers is the high multiples of China Mobile. These high multiples arise because of China Mobile's existing strong position, and because China Mobile continues to experience high subscriber growth. And this high expected growth is occurring in China which has both the largest existing mobile phone market in the world as well as the largest potential mobile phone market. This high expected growth is the primary driver of the high valuation multiples.

A comparison of the multiples of China Telecom and China Netcom, both fixed-line service providers, confirms the strong position of China Telecom as China's largest fixed-line service provider. These multiples indicate that the market expects much higher future growth from China Telecom than from China Netcom.

4. Because there are greater growth prospects in the mobile phone business than in the fixed-line business, valuation multiples are generally higher in the mobile phone industry. This can be seen by comparing the multiples of the stronger mobile phone (China Mobile) and the stronger fixed-line (China Telecom) providers and also by comparing the multiples of the weaker companies in these two segments (China Unicom and China Netcom). In both cases, the mobile phone multiples are higher, reflecting higher expected future growth.

The fact of differential growth prospects is confirmed in this excerpt from an article in *The Wall Street Journal*.

> "China Mobile … added 22.8 million subscribers [in the first quarter of 2008], up from 19.7 million new users in the fourth quarter of 2007. … Meanwhile, China Telecom said the number of users of its local-access lines fell for the eighth straight month in March as customers continued to migrate to more affordable mobile services."

SOURCE: Lorraine Luk, "Growth Boosts China Mobile's Net," *The Wall Street Journal*, April 22, 2008.

FV–11. (Continued)

5.

	Price/ Sales	Price/ EBITDA	Price/ Earnings	Price/ Subscriber
Existing multiples of China Telecom fixed-line operations	2.6	5.2	19.7	1,823
Multiples implied by 165 billion yuan price	2.0	4.0	13.6	1,263
Existing multiples of China Netcom fixed-line operations	1.7	3.4	11.7	1,086
Multiples implied by 165 billion yuan price	2.0	4.0	13.6	1,263
Existing multiples of China Unicom mobile operations	2.2	6.8	23.7	1,355

The top comparisons in the table above compare the valuation multiples implied by the 165 billion yuan acquisition price to the existing fixed-line valuation multiples for China Telecom and China Netcom. Because the 165 billion yuan price represents a small premium over the pre-acquisition price (total market capitalization of 142 billion yuan), the valuation multiples based on the acquisition price are higher than are the existing multiples of China Netcom. This indicates that the acquisition price includes some expectation that future growth and profitability will be stronger after the acquisition. This improved growth is possible as evidenced by the fact that the valuation multiples based on the acquisition price are still much lower than the existing valuation multiples of the fixed-line operations of China Telecom.

Part of the value to China Unicom of the acquisition of China Netcom is that China Unicom acquires the customer relationships of China Netcom. As seen in the lower comparison shown in the table above, the existing mobile phone operations of China Unicom have higher valuation multiples than those based on the acquisition price. To the extent that some of the China Netcom fixed-line users migrate to China Unicom mobile service, the acquisition valuation multiples can be justified as being reasonable.

6.

	Price/ Sales	Price/ EBITDA	Price/ Earnings	Price/ Subscriber
Existing multiples of China Mobile mobile operations	7.1	13.0	29.0	6,833
Multiples implied by 110 billion yuan price	4.0	n/a	137.5	2,619
Existing multiples of China Unicom mobile operations	2.2	6.8	23.7	1,355
Multiples implied by 110 billion yuan price	4.0	n/a	137.5	2,619
Existing multiples of China Telecom fixed-line operations	2.6	5.2	19.7	1,823

Note: EBITDA numbers for China Unicom's CDMA network are not available.

The 110 billion yuan purchase price indicates that increased growth must be experienced in the China Unicom CDMA network to justify the price. The valuation multiples implied by the 110 billion yuan price are higher than both the existing multiples of China Unicom's mobile operations as well as the multiples of China Telecom's existing fixed-line operations. In order to justify the price, the CDMA mobile network must experience faster growth and higher profitability (although not necessarily as high as the growth expected of China Mobile).

FV–11. (Continued)

7. The uncollectible accounts percentages, based on the aging data, would be generated by a combination of past experience, experience of other companies in the industry, and changes in economic circumstances. The first source of data is the experience of the same company in the past. These percentages would then need to be adjusted based on what is happening with other companies in the industry and with the general economic environment, especially as it impacts the company's customers.

	Amount	Uncollectible Estimate	
0–30 days	3,546	1.0%	35
31–60 days	1,639	3.0%	49
61–90 days	1,363	15.0%	204
91–150 days	1,763	40.0%	705
Over 150 days	1,545	80.0%	1,236
Total	9,856		
Allowance			(2,230)
Net carrying amount			7,626

8. The key assumption that must be made is the average total estimated life for fixed assets in each category. With the interest rate given at 10%, and with the estimated annual lease payments given for each category, computation of the present value of the lease payments requires only that the average total life be specified. This is not the only assumption that can be made, but it is one possibility.

The estimated fair values given in the table below are the present value of the estimated annual lease payments with an interest rate of 10% and with the length of the annuity being the midpoint of the useful life range given in China Netcom's note disclosure.

Discount rate 10.0%

(in millions of RMB)	Estimated Annual Lease Payment	Midpoint Useful Life Range	Estimated Fair Value
Buildings	2,670	19	22,334
Telecom networks and equipment	25,780	7.5	131,664
Furniture and other equipment	2,130	7.5	10,878
			164,877

As shown in the table below, the fair value estimate is relatively robust to rather large changes in the assumed interest rate. A reduction in the interest rate of 200 basis points (from 10.0% to 8.0%) increases the total fair value by just 8.3%. A similar increase in the interest rate decreases the total fair value by just 7.3%.

Interest Rate Sensitivity Analysis

	8.0%	10.0%	12.0%
Buildings	25,642	22,334	19,667
Telecom networks and equipment	141,318	131,664	123,007
Furniture and other equipment	11,676	10,878	10,163
Total	178,636	164,877	152,837

The fair value estimate also depends on the assumption about average useful life. The table below shows the variation in the total fair value based on whether the useful lives are at the low point, mid-point, or high point of the disclosed range of lives. However, because it is unlikely that the average economic life of the assets in a class would be anywhere near the low point or high point, it is also reasonable to conclude that the computed total fair value of ¥164,877 is accurate to within plus or minus 10%.

FV–11. (Continued)

Useful Life Sensitivity Analysis

	Low Point	Midpoint	High Point
Buildings	14,244	22,334	25,170
Telecom networks and equipment	97,726	131,664	158,407
Furniture and other equipment	8,074	10,878	13,088
Total	120,045	164,877	196,665

9. The fair value of China Netcom's operating licenses is estimated using the "relief-from-royalty" approach. This method uses market royalty rates charged for the use of licenses similar to those held by China Netcom. Using this approach, the fair value of the licenses is the present value of the after-tax royalties that China Netcom is avoiding by holding the licenses. This is one way to estimate how much China Netcom would receive for selling its operating licenses if it had the freedom to do so.

The valuation parameters given in the case result in a license valuation of 26.3 billion yuan. The computations are summarized in the table below.

	2008	2009	2010	2011	2012	Growth 0.0% Terminal
Number of customers	132.8	135.1	137.4	139.7	142.1	
Monthly ARPU	52.6	51.7	50.8	49.8	48.9	
Total annual revenue	83,892.2	83,782.7	83,673.2	83,564.0	83,454.8	
Pretax royalty (4.2%)	3,523.5	3,518.9	3,514.3	3,509.7	3,505.1	
Taxes (25%)	880.9	879.7	878.6	877.4	876.3	
After-tax royalty	2,642.6	2,639.2	2,635.7	2,632.3	2,628.8	2,628.8
Discounted cash flow	2,402.4	2,181.1	1,980.2	1,797.9	1,632.3	26,288.3

Sum of discounted cash flow	9,993.9	
PV of Terminal value	16,322.9	
Total present value of cash flows	26,316.8	in millions of RMB

To understand the numbers in the table, let's focus on the numbers for the first year, 2008. The number of customers (132.8 million) multiplied by the monthly ARPU (average revenue per user) and 12 months in a year yields revenue for the year of 83,892.2 million yuan. (*Note:* The numbers displayed above are rounded; thus, the reported calculations include some rounding differences.) With a royalty rate of 4.2%, the estimated royalty payment is 3,523.5 million yuan and, after subtracting 25% for income taxes, 2,642.6 million yuan after tax. Making the simplifying assumption that this royalty payment occurs at the end of the year, the present value of the estimated after-tax royalty payment, assuming a discount rate of 10%, is 2,402.4 million yuan.

The same calculations are performed for the next four years. Note that the after-tax royalty payment is almost the same in each year. This is because the expected annual 1.7% increase in the number of customers is offset by the expected annual 1.8% decrease in the monthly ARPU.

It is standard in valuation models to specify a terminal year after which all growth will occur, in perpetuity, at some constant rate. In this case, that terminal year follows Year 5 (2012), and the expected constant growth rate is given to be 0.0%. The expected cash flow of 2,628.8 million yuan each year from Year 6 (2013) continuing on forever has a present value (as of the end of Year 5) of 26,288.3 million yuan. Discounted back to time 0, the present value of the terminal amount is 16,322.9 million yuan.

FV–11. (Continued)

A key assumption here is the post-terminal-year growth rate assumption. If a more pessimistic assumption of post-terminal-year growth of –5.0% is assumed, the estimated fair value of the licenses is 20.9 billion yuan. A less pessimistic assumption, of –2.0% growth, yields a fair value estimate of 23.6 billion yuan.

It is important that students learn to understand that all fair value estimates are indeed estimates and are not exact numbers. Accounting students in particular are sometimes disturbed that there may be a reasonable range of plus or minus 10% in the estimates of fair values, especially for long-lived assets. The reality is that fair value estimates are required for accounting purposes in many contexts such as the purchase price allocation context of this case.

10. Assuming no new customers and normal attrition among China Netcom's 110.8 million existing fixed-line customers as these customers continue to migrate from fixed-line to mobile phones, the discounted present value of these after-tax cash flows, after removing a reasonable return on other assets employed, represents an estimate of the fair value of the customer relationships as of December 31, 2007. The calculation of the estimated fair value of 24,632 million yuan is shown in the table below.

Assets	
Reported assets	186,428
Less accounts receivable reduction	(832)
Fixed assets above book value	7,929
Unrecognized license value	26,317
Value of assets employed	219,842

	Customers (in millions)	Monthly ARPU	Annual Contribution Margin	Return on Capital Employed	After-Tax Excess over Capital Cost	Present Value
2008	107.7	52.6	36,773	21,984	11,062	10,056
2009	104.7	51.7	35,062	21,984	9,808	8,106
2010	101.8	50.8	33,467	21,984	8,612	6,470
Economic life ends after 3 years						
Estimated customer relationship value						24,632

The annual contribution margin is computed as the number of customers (which decreases 2.8% each year) multiplied by the monthly ARPU (which decreases 1.8% each year) multiplied by 12 months and then by the contribution margin percentage (1 – the 46.0% variable cost ratio). An amount representing a 10% return on the fair value of assets employed is then subtracted. The computation of the fair value of assets employed requires using fair value estimates generated in earlier analyses. Finally, the present value of the after-tax amount is computed.

A key assumption here is the annual rate of attrition in the existing customers. If a more pessimistic assumption of –5.0% is assumed, the estimated fair value of the customer relationships is 21.8 billion yuan.

FV–11. (Concluded)

11. Goodwill is measured as a residual amount, the remaining amount of the acquisition price of 165 billion yuan after removing the fair value of all identifiable assets and liabilities. As seen in the table below, the computed amount of goodwill is 24,902 million yuan.

Goodwill computation

Cash	5,395
Accounts receivable	7,626
Inventories	287
Prepayments	1,021
Due from holding companies	347
Fixed assets	164,877
Construction in progress	3,990
Lease prepayments	2,494
Recorded intangible assets	1,552
Unrecorded intangible assets	50,949
Deferred tax assets	2,693
Other noncurrent assets	3,243
Total identifiable assets	244,474
Total liabilities	104,376
Net identifiable assets	140,098
Acquisition price	165,000
Less net identifiable assets	140,098
Goodwill	24,902

Note that the goodwill amount is computed using the fair value, rather than the book value of the identifiable assets and liabilities. The following simplifying assumption is given in the text of the case:

> For simplicity, assume that the fair value of all recorded assets and liabilities of China Netcom is equal to their December 31, 2007, balance sheet value EXCEPT for the following:
> - Accounts receivable
> - Fixed assets
> - Intangible assets

The information used in answering Questions 7, 8, 9, and 10 determines the fair value of the identifiable assets in the list above.

Care must be exercised in quantifying the sensitivity of this goodwill computation to the assumption about a discount rate (10% in this case). In this simplified case, only the fair value of assets is impacted by the discount rate assumption. A higher discount rate will result in a lower computed fair value of the identifiable assets and thus higher goodwill. In a more complete case, the fair value of the liabilities would also depend on the discount rate assumption. A higher discount rate would result in a lower fair value for the assets but also for a lower fair value for the liabilities. As a result, there would be an offsetting impact on the computation of goodwill.