Present Value Analysis

Effective management decision making means making the best possible choices from the available investment alternatives consistent with the amount of funds available for reinvestment. To make the best choices consistently, however, a basis for analysis must exist that can provide a common denominator for various investment alternatives. Each alternative will have a different contract rate, maturity, minimum amount requirement, and method of payback.

One idea that both management and regulators use in the thrift industry is "present value analysis," based on the time value of money. In this Section we specifically provide information about present value analysis. Through a detailed set of problems, the Section provides assistance in performing present value analysis computations to arrive at conclusions regarding sound institutional investments.

LINKS

Appendix A

Appendix B

A word of caution is in order. Many business transactions involve considerations other than those governed by present value theory and its applications. Consequently, there will be instances where other considerations will temper management's and regulators' positions.

The primary objectives of this Section are:

- To understand and apply the concept of present value analysis in management decision making within the framework of the regulatory process.
- To evaluate the true effect of actual business transactions and decisions on the overall financial condition of a thrift institution.
- To ensure that savings associations adjust financial statements to reflect present value where necessary.

Examination Considerations

Financial intermediaries, including thrift institutions, attempt to channel funds effectively and efficiently from depositors to worthwhile borrowers. Institutions buy and sell financial claims. Financial assets and financial liabilities, however, have a time value. Customers present deposits in return for a promise of future deposit withdrawal plus interest. The ability to acquire and retain savings deposits from surplus sources is a function of the interest rate, the interest-compounding interval, and the deposit maturity.

Conversely, institutions lend present funds to borrowers in exchange for a promise of future interest and principal repayment. Savings associations evaluate such financial transactions based on present value analysis. Institutions sell interests in previously originated mortgages; you must be able to understand the underlying valuation mechanics. In addition, real estate owned financing requires present value application knowledge. The following guidelines show the user how to compute the future value, present value, and prospective rate of return of various investment opportunities. Simply stated, the worth of one dollar tomorrow is different from the worth of one dollar today.

COMPOUND ACCUMULATION

Compounding an Initial Deposit

Simple interest is the receipt or payment of interest upon principal; compound interest also includes interest upon interest. General compound accumulation involves determining some future value based upon an initial deposit. Calculation of a future value sum derives from the stated annual interest rate (r), the time period funds are deposited (n), the compounding interval (m), and the amount of the initial deposit (PV). The future value increases as the deposit, interest rate, number of compounding intervals, and time period increase. Equation 1 represents the proper notational relation of these elements.

Computation of future sums becomes unwieldy in Equation 1 whenever n or m becomes large. Normally, the compounding interval, m, is annual (m=1), semiannual (m=2), quarterly (m=4) or monthly (m=12). Compound value tables simplify the task, as the amount, $[1 + (r \div m)]^{nm}$, is known as "future value of $1." You may solve a compound accumulation problem whenever four of the five elements of Equation 1 are known. The present value tables in Appendix A assume a deposit is made at the beginning of each period.

Equation 1

$$\text{Sum} = \text{PV}\left[1 + \left(\frac{r}{m}\right)\right]^{nm}$$

Appendix B to this section provides Hewlett-Packard HP-12C calculator keystroke sequences and solutions for each of the following problems. The solutions presented throughout this Section incorporate the tables found in Appendix A to facilitate the reader's comprehension of present value concepts. Once the principles of cash flow, timing, and interest compounding are assimilated, use of the calculator will become easy. For a detailed discussion of the calculator's basic financial functions, refer to pages 36 through 78 of the HP-12C *Owner's Handbook and Problem Solving Guide*. Examples follow:

Problem 1

If a depositor places $2,000 in an account, how much will the deposit grow in 20 years assuming a 6% interest rate, compounded annually?

Answer: $Sum = PV(1.06)^{20}$. Future value of $1, compounded annually at 6% for 20 years, is 3.2071. *Sum* = $2,000(3.2071) = $6,414.20. The initial deposit would grow to $6,414.20, assuming the depositor maintains all interest in the account.

Problem 2

A depositor wishes to accumulate $5,000 within 10 years. Assume a 4% rate of return, compounded annually. How much must the depositor place in the account to attain the savings goal?

Answer: $Sum = PV(1.04)^{10}$. Here, the present deposit, *PV*, equals the desired *sum* divided by the interest factor. *PV* = $5,000 ÷ (1.4802) = $3,377.92. Thus a deposit of $3,377.92, earning 4%, compounded annually for 10 years, will generate the desired $5,000.

Problem 3

A depositor places funds in an 8% annually compounded account and wishes to determine the necessary length of time to double the deposit.

Answer: $Sum = PV(1.08)^n$. Solve for the future value factor, which equals the desired *sum* divided by the initial deposit, *PV*. $(1.08)^n = Sum \div PV = 2 \div 1 = 2.000$. The 8% annually compounded interest factor that approximates 2.00 is found at nine years. Thus, a deposit doubles in nine years when compounded annually at 8%.

The first three examples all assume annual compounding (i.e., $m = 1$). Some tables include an appropriate future value factor for shorter compounding periods, which facilitate numerical computations. When multiple compounding interval tables are not available, determine the appropriate factor by using an interest rate that equals the annual interest rate divided by the compounding interval factor (r/m), and using an annual period that equals the maturity times the compounding interval factor (n x m). For example, the future value factor of $1 compounded quarterly at 16% for five years is equal to the annual factor of 4% (16% ÷ 4) for a period of 20 years (5 x 4). Note that the quarterly compounded factor of 2.1911 exceeds that of 2.1003 for annual compounding applicable to 16% over five years. The quarterly compounding provides more interest on interest.

Problem 4

How much extra interest would a depositor receive on a 7%, four-year $1,000 certificate of deposit if the institution compounded interest semiannually rather than annually?

Answer: $Sum = PV(1.07)^4$. The future value factor for a 7%, four-year note compounded annually equals 1.3108. $Sum = PV[1 + (.07 \div 2)]^{2x4}$. $Sum = PV(1.035)^8$. The future factor for the semiannual compounding equals 1.3168 (found directly from a semiannual table or from an annual table using 3.5% and eight years.) For each $1,000 deposit, the semiannual compounding increases future value by $6 at the end of four years [$1,000(1.3168-1.3108)].

The user should be able to determine various unknowns within a compounding framework. The illustrations relate primarily to computation of the receipt or payment of interest upon an initial deposit.

Compounding a Constant Deposit Each Period

Another compound accumulation process involves a constant amount invested each period for a number of years. For example, what sum will result if $1,000 is deposited each year for three years at 6% interest? Of course, it is possible to solve the problem by parts. Determine the future value of $1,000 deposited each year for three years at 6% ($1,000 x 1.1910), plus $1,000 deposited for two years at 6% ($1,000 x 1.1236) plus $1,000 deposited one year at 6% ($1,000 x 1.06). The total of the three parts equals $3,374.60 at the end of three years. Fortunately, some tables include a factor for a "future value of $1 each period." For example, the problem above may be solved directly by multiplying the $1,000 annual deposit by a factor of 3.3746, located in the annually compounded, 6% Future Value of $1 Each Period Table found in Appendix A. Obviously, the inclusion of such factors greatly simplifies future value calculation when a constant amount is deposited each period.

PRESENT VALUE ANALYSIS

Discounting a Future Amount

Present value analysis provides a common denominator for the evaluation of various income and expense streams. Simply, all dollar flows and sums are based at one point in time. That time is generally today; hence, the name of present value. A dollar received or paid one year hence is worth something different from a dollar received or paid 10 years hence. At a minimum, a dollar may be invested in an institution and earn some rate of return. In fact, present value analysis is the inverse of compounding. Remember, compounding determines what a dollar deposited today will be worth in the future. Present value determines the current value of a future dollar transaction. Because of this inverse relation, the mathematical representation of present value in Equation 2 is quickly found by dividing Equation 1 by the interest factor.

Equation 2

$$PV = \frac{Sum}{\left[1 + \frac{r}{m}\right]^{nm}}$$

Because of normal presentation of present value tables and the cumbersome interest factor of Equation 2, a notational convention has been adopted: *Sn/m/r*. The S represents a present value or discounting procedure, *n* represents the period in which the transaction is effected, *m* represents the compounding time intervals involved, and *r* is the interest rate of discount. As in compounding, the discount factor is multiplied by the dollars involved. For example, the present value notation of $1 to be received five years hence at an 8% annual discount rate is *S*5/1/8% and equals .6806. The present value of $1 received five years hence discounted at 8% is $.68. A dollar received in the future is worth less today. Alternatively, $.68 deposited for five years at an 8% annually compounded rate grows to $1 at period termination. ($.68 x 1.4693 = $1). Compounding and discounting are inverse processes.

Problem 5

A service corporation anticipates a tract of land will be worth $250,000 four years hence. If the corporation requires a 12% annual rate of return on investment, what is the maximum price that the service corporation should pay for the land?

Answer: *PV* = *Sum*(*S*4/1/12%). The present value factor of $1 four years hence discounted at 12% is .6355 and the *sum* to be received is $250,000. Thus, the maximum price for the land is $158,875 ($250,000 x .6355). Conversely, $158,875 invested today at 12% interest compounded annually will equal $250,000 at the end of four years ($158,875 x 1.5735).

Problem 6

In January 1983, an investor purchased the stock of an institution for $30 per share. In January 1998, the investor sold the institution stock for $70 per share. The institution paid no dividends. What was the annual compound rate of return on investment?

Answer: *PV* = *Sum*(*S*15/l/*r*/). In this case, all variables are known except *r*. What *r* will generate an interest factor that equates the *PV* of $30/share to the sum of $70/share? *PV*/*Sum* = (*S*15/l/*r*) $30 ÷ $70 = .4286 = (*S*15/l/*r*). An interest rate between 5.75% and 6.00% generates a present value factor for a 15-year annual compounding approximately equal to .4286. Thus, the return is between 5.75% and 6.00%.

Discounting a Constant Amount Per Each Period

A common time value technique applicable to institution investment is discounting a stream of equal future payments. Most residential mortgage contracts amortize a loan completely from equal monthly repayments. Payments include both interest and principal. Tables are available to account for discounting a stream of equal cash flows, known as *PAY*, which are assumed to occur at the end of each period. *PV* = *PAY* (*An*/*m*/*r*). For example, what is the present value of $1 to be paid at the end of each year for three years discounted annually at 9%? Note the three $1 payments. Because these three payments occur in the future, the present value should be less than a simple summation. The discount annuity factor for (*A*3/1/9%) from the Present Value of an Annuity of $1 Per Period Table of three years and 9% equals 2.5313. Because the annual cash flow, *PAY*, equals $1, the present value of the stream is $2.53 ($1 x 2.5313). Alternatively, the problem could be solved by parts, one period at a time. The present value of $1 discounted annually at 9% equals .7722 from the third year, .8417 from the second year, and .9174 from the first year. The addition of each of the three present values equals 2.5313. As you can see, when equal payments are involved, use of present value of an annuity of $1 per period considerably facilitates computation.

Problem 7

An institution may purchase a mortgage that will be fully paid in equal annual payments of $700 for the next nine years (that is, there are nine payments remaining.) If the institution requires a 10% return on investment, what is the highest price the institution should pay?

Answer: *PV* = *PAY* (*A*9/1/10%). The appropriate present value factor of $1 for each year for nine annual payments at 10% is 5.7590. The institution will receive not $1, but $700 each year, so the maximum price the institution should pay is $4,031.30 ($700 x 5.7590). Alternatively, an individual depositing $4,031.30 today could withdraw $700 per year for nine years if the account earned 10% on each year's remaining deposit.

Problem 8

A bank offers you terms of 9 1/2% and 20 years for a residential mortgage. If you must borrow $40,000, what will be the equal monthly payments?

Answer: *PV* = PAY (*A*20/12/9.5%). The appropriate present value factor that accounts for the 240 monthly payments is 107.2810. The loan amount is $40,000. Therefore, PAY equals *PV* divided by the interest factor. PAY = $40,000/107.2810 = $372.85. Monthly payments of $372.85 will amortize the $40,000 loan over 20 years.

Alternatively, you can compute the monthly payments directly by multiplying the initial loan times the appropriate factor within the Present Value of an Annuity of $1 Per Month for *n* Years Table. Tables that include this factor ease payment calculations. For example, the installment factor equals .00932131 for the given problem. In this case, the monthly payment equals $372.85 ($40,000 x .00932131).

The problems identified above provide the core for mortgage investment analysis.

Discounting Mixed Types of Cash Flows

Some investment opportunities have a stream of equal payments plus a single large payment at the conclusion. The coupon bond form of contract is an example. The standard bond has a face value (par) of $1,000, a stated maturity and a stated coupon rate. For a bond with a 10-year term to maturity and a coupon rate of 6%, the annual return would be $60 (6% of $1,000) for 10 years, at which time the face amount of $1,000 would be repaid. The coupon interest payments constitute the annuity portion, and the principal repayment is the large single payment. Bond price evaluation follows in a present value formula. *PV* = PAY (*An/m/r*) + *Sum* (*Sn/m/r*).

Problem 9

An institution has the opportunity to purchase a $1,000 bond with a 6% coupon rate and 10 years remaining to maturity. Because of a cyclical increase in interest rates, bonds such as this one are selling at a price to yield 9% to maturity. At what price should the bond sell?

Answer: Discount the promised future payments to the present at a 9% rate.

PV = PAY (*A*10/1/9%) + *Sum* (*S*10/1/9%)

PV = $60 (6.4177) + $1,000 (.4224)

PV = $385.06 + $422.40 = $807.46

A current price of $807.46 will generate a 9% return to an investor over a 10-year period.

Whenever the rate of return (discount rate) is equal to the bond coupon rate, the present value is the face value of the bond. Whenever the rate of return is higher than the bond coupon rate, the present value is less than face and trades at a discount (as in Problem 9). Conversely, whenever the rate of return is lower than the bond coupon rate, the present value is more than face and trades at a premium.

MORTGAGE INVESTMENT ANALYSIS

Many present value applications exist within mortgage investment analysis. Institutions lend present funds in exchange for future interest and principal repayment. Effective investment yields may be increased by numerous mechanics including points, prepayment penalties, buying and selling of whole loans and wraparound loans. The following examples illustrate the numerical mechanics of these various mortgage investments.

The Basic Mortgage Loan

The basic mortgage loan is a primary financial asset of thrift institutions. A mortgage instrument normally involves disbursement of a lump sum that is subsequently paid off in level, equal payments. Obviously, heavy use is made of present value annuity tables within the heading “Present Value of an Annuity of $1 per Month.” Knowledge of the previously presented material is hereafter assumed.

Problem 10

An institution offers terms of 10% for a 30-year- maturity mortgage of $50,000. What monthly payment will amortize the loan?

Answer: *PV* = PAY (*An/m/r*)

$50,000 = PAY (*A*30/12/10%)

$50,000 = PAY (113.9508)

$50,000 ÷ 113.9508 = PAY

$438.79 = PAY

Thus, monthly payments of $438.79 for 30 years will completely amortize the loan and provide the lender with a 10% return on the outstanding balance.

Selling and Purchasing Whole Loans

Thrift institutions use the secondary market to buy and sell previously originated mortgage loans. In these transactions, the monthly payment and maturity do not vary as a result of a change in mortgage ownership. The market value and the effective investment return may differ from the book value and stated contract rate.

Problem 11

Assume five years have elapsed for the hypothetical loan stated in Problem 10. The loan represents a monthly stream of level $438.79 payments for 5 years. Thus, 300 payments remain (25 years x 12 months/year.) At what price should the institution sell the loan so that a buyer receives an 8.75% return? Compare the selling price with the book value of the loan (that is, the value obtained with a 10.0% return).

Answer: First, compute the loan value at the market yield, 8.75%.

PV = PAY x (*An/m/r*)

PV = $438.79 x (*A*25/12/8.75%)

PV = $438.79 x 121.6332

PV = $53,371.43

Second, compute the loan book value at the contractual yield, 10.0%.

PV = $438.79 x (*A*25/12/10.0%)

PV = $438.79 x 110.0472

PV = $48,287.61

Thus, the loan principal has been repaid by $1,712 with the previous five years of monthly payments ($50,000 - $48,288 = $1,712). As a result of an interest decline, however, the institution may sell the loan for $53,371, which represents a profit of $5,083.82 over book value ($53,371.43 - $48,287.61).

The decision to buy or sell loans is not solely a function of being able to sell at a profit. For example, in the problem above, the institution books a "profit" at the expense of reinvesting funds at a lower interest rate than is applicable to the initial loan. Buying and selling mortgages enable institutions to coordinate the assets portfolio with funds flow.

Discount Points

The effective investment yield of a mortgage may be increased by the imposition of discount points from the face value of the mortgage loan at the time of disbursement. For example, a $50,000 mortgage loan bearing four points and an interest rate of 7% results in a disbursement of $48,000, which is 4% less than anticipated. The monthly payment and loan pay-off, however, are based on the full face amount of the loan. Because of the influence of points, the yield on such a loan will be higher than the contractual rate. Indeed, the earlier a mortgage loan bearing points is paid off, the greater the effect of points on the yield.

Problem 12

What is the effective investment yield of a $50,000 mortgage loan at a 7% rate with the imposition of four points? Assume the loan is not paid off until the final maturity of 30 years.

Answer: First determine the monthly payments on the basis of the full face amount of the loan.

PV = PAY x (A30/12/7%)

$50,000 = PAY x 150.3076

$332.65 = PAY

However, the payments are received for a disbursement of $48,000, not $50,000. Thus, determine that rate that equates the present value of the level payment to the actual disbursement.

$48,000 = $332.65 x (*A*30/12/*r*)

144.2958 = A30/12/r

A yield of 7.4% approximates that interest factor necessary to equate the monthly payment stream of \$332.65 with the actual loan disbursement of \$48,000.

Problem 13

Recompute the investment yield from Problem 12 by assuming the loan is repaid at par in five years, and not at maturity.

Answer: The loan payments of \$332.65 per month and the initial loan disbursement of \$48,000, remain constant. In this case, however, you must calculate the loan value at the end of five years. Twenty-five years of monthly payments remain.

PV = \$332.65 x (*A*25/12/7%)

PV = \$332.65 x 141.4869

PV = \$47,065.62

Now compute the investment yield. Note that the problem includes a mixed type of cash – both an annuity for five years and a lump sum at the end of the fifth year.

PV = PAY (*A*5/12/*r*) + *Sum*(*S*5/12/*r*)

\$48,000 = \$332.65 (*A*5/12/*r*) + \$47,065.62(*S*5/12/*r*)

The problem may not be solved through the usual division and factor location within a discount of discount annuity table. Rather, you must locate, via trial and error, the interest rate that equates the loan disbursement to the present valued annuity and lump sum. At a minimum, the appropriate rate should exceed the 7.4% of Problem 12 because the institution's advantage of points is realized much sooner. Therefore, try a higher rate; say 7.5%.

\$48,000 = \$332.65(49.9053) + \$47,065.62 (.6881)

\$48,000 = \$16,601.00 + \$32,385.85

\$48,000 = \$48,986.85

Because the loan disbursement is considerably less than the present valued payments at a discount rate of 7.5%, try a higher rate; say 8.0%.

\$48,000 = \$332.65 (49.3184) + \$47,065.62 (.6712)

\$48,000 = \$16,405.77 + \$31,590.44

\$48,000 = \$47,996.21

A discount rate of 8% approximately equates the funds flow. Thus, the effective yield is slightly less then 8% as the problem indicates.

Points increase a yield, which is further increased with a loan repayment before maturity.

Prepayments and Penalties

Prepayments represent early payments on loans; they usually occur at the discretion of the borrower. The timing and amount of prepayments are of concern to the liquidity management of institutions. Prepayments tend to move inversely to the interest rate level. When interest rates are low, borrowers benefit by refinancing a mortgage (that is, prepaying the loan). Conversely, when rates are high, housing sales slow and individuals selling houses are not motivated to prepay; rather, they allow the buyers to assume the loan to facilitate the sale. Prepayments run counter to the pro table investment of funds.

Some mortgage loan contracts contain a prepayment penalty. For example, a mortgage loan contract may specify a penalty of six months' interest on the amount of the loan principal outstanding at the time the loan is prepaid. The effect the prepayment penalty has on the effective yield of a mortgage loan depends upon the period of time until the loan is prepaid.

Similar to points, the effective yield from penalties increases as a loan is prepaid more quickly.

Problem 14

Determine the effective yield from a $50,000, 30-year mortgage with a 10% rate that is prepaid at the end of five years. The prepayment penalty is six months' interest.

Answer: Problems 10 and 11 solved portions of the problem. First, the monthly payments are $438.79. Second, the book value of the loan after five years is $48,287.61. The prepayment penalty of 6 months' interest (1/2 year) is $2,414.38 ($48,287.61 x 1/2 x 10%). The effective yield is determined by a process similar to that used in points. Discount the cash inflow by the rate that equates the inflow to the original loan disbursement.

PV = PAY (*A*5/12/*r*) + *Sum*(S5/12/*r*)

Note that the sum includes both the loan repayment and prepayment penalty ($48,287.61 + $2,414.38). $50,000 = $438.79 (*A*5/12/*r*) + $50,701.99 (*S*5/12/*r*).

Try a discount rate of 10.75%. (Remember, this is by trial and error.)

$50,000 = $438.79 (46.2578) + $50,701.99 (.5856)

$50,000 = $20,297.46 + $29,691.09

$50,000 = $49,988.55

A discount rate of 10.75% approximately equates the inflow with the loan disbursement. The penalty increases the effective yield to 10.75% from the original 10% loan. The penalty partly compensates the institution for the need to reinvest funds, which will probably be at a lower current rate. Institutions may substantially increase yields by the imposition of both points and a prepayment penalty in addition to simply charging a higher rate. To a large extent, market forces maintain a competitive rate.

Wraparound Loans

A wraparound loan enables an institution to lend an existing borrower an additional amount over and above the unpaid balance on an old loan. Even at higher rates, some customers may be interested in the opportunity to refinance old loans into new loans with larger balances or longer maturities. A portion of the payments on the wraparound loan continues to amortize the initial loan, while the residual portion pays off the new principal. The effective investment yield of a wraparound is calculated by the interest rate that equates the present valued incremental payment stream to the additional funds disbursed. Generally, the yield to the institution declines as the amount of new dollars lent increases and as the maturity of the loan is lengthened.

Problem 15

Fifteen years ago, a borrower received a $30,000 mortgage at a 5% rate and a 20-year maturity. Therefore, monthly payments of $197.99 remain for five years. An institution offers a wraparound loan for $1,000 more than the unpaid mortgage at a rate of 8% with a five-year maturity. What is the effective investment yield for the institution on the loan?

Answer: First, determine the unpaid loan balance.

PV = PAY x (*A*5/12/5%)

PV = $197.99 x 52.9907

PV = $10,491.63

The institution offers to lend $1,000 over and above the loan at a rate of 8% for five years. Determine the new payments that will amortize the wraparound loan.

$11,491.63 = PAY x (*A*5/12/8%)

$11,491.63 = PAY x 49.3184

$233.01 = PAY

The institution receives $233.01 per month, of which $197.99 per month covers the initial loan. Thus, $35.02 per month is available for the amortization of the incremental $1,000 lent. Determine the yield that equates the loan with the payments.

PV = PAY x ($A$5/12/r)

$1,000 = $35.02 x $A$5/12/r

28.56 = $A$5/12/r

The annuity factor represents an interest rate of about 34%. Note that the wraparound payments include a higher rate on both the incremental and the existing loan. The institution receives interest on funds not additionally disbursed. As you can see, when a small amount of money is lent, the resulting return can be astronomical. The institution must ensure that appropriate consumer safeguards and disclosure are properly met.

Examination Problems

This section builds upon the present value and mortgage investment analysis foundation of the previous sections. Specifically, this section presents the numerical mechanics necessary for various phases of the examination process.

Real Estate Owned Financing

To facilitate the sale of real estate owned (REO), an institution may lend funds to a purchaser at submarket interest rates. Such a financing procedure induces a purchaser to pay a higher price for the REO. However, the actual monthly cash disbursement by the purchaser remains constant, more for the property and less for the financing. The purchaser, except for tax benefits, is indifferent as long as the payment remains unchanged.

It is an unsound practice for an institution to fail to recognize losses based on the market value of consideration received when that price is inflated due to favorable lending terms. Failure to recognize such losses results in overstatement of an institution's net worth and net income. Though there is no legal objection to facilitating the sale of REO by favorable terms, the financial records should properly reflect the present value of consideration received. In addition, the institution should factor in the impact of points since points effectively raise the interest rate. The institution must evaluate the cash flows it receives at a market discount rate and compare the results with the book value of property.

Problem 16

Assume the book value of REO for an institution is $20,000. The institution may sell the REO for $22,000 with no money down and monthly payments sufficient to amortize a 6% loan over 10 years. The market rate for such a loan approximates 9%. The institution plans to credit $2,000 to the account "unearned profit on real estate owned." Obviously, the institution cannot directly credit the profit because it has not received a down payment. However, does the institution actually stand to profit by $2,000, the difference between book value and selling price?

Answer: Determine monthly payments necessary to amortize the $22,000 loan at the contract rate.

PV = PAY x (*A*10/12/6%)

PAY = $22,000 ÷ 90.073453

PAY = $244.25

Discount the monthly payments at the market rate.

PV = $244.25 x (*A*10/12/9%)

PV = $244.25 x 78.941693

PV = $19,281.51

Thus, the present value of the promised payments discounted at a market rate is $19,281.51. The more favorable interest rate offered the purchaser results in a $2,718 present value loss from the $22,000 "selling" price. The actual loss from book value is $718 ($20,000 - $19,282), not a $2,000 gain.

The $2,000 differential price gain reflects the benefit of receiving lower financing charges. You may determine the gain or loss by the following alternative but analogous method:

Determine monthly payments necessary to amortize the $22,000 loan at a market rate.

PV = PAY x (*A*10/12/9%)

PAY = $22,000 ÷ 78.941693

PAY = $278.69

The institution should receive $278.69 per month. To facilitate the sale of REO, however, the institution accepted $244.25 per month. The financing benefit amounts to $34.44 per month ($278.69 - $244.25). Evaluate the present value of that cash flow stream lost.

PV = PAY x (*A*10/12/9%)

PV = $34.44 x 78.941693

PV = $2,718.75

The loss on the REO financing may be seen more clearly when viewed from the cash flow per month not received. By either analytical method, the loss to book remains the same. In this case, the $2,718.75

represents the present value of the interest lost that the institution would have received had it made a loan at the current market interest rate.

The institution should record the transaction on its books as follows:

Account	Debit	Credit
Mortgage loans	$22,000	
Real estate owned		$20,000
Loss on sale of REO	718	
Unamortized discount on loans to facilitate		2,718

The discount (or imputed interest) should be accredited to interest income. Importantly, the institution must consider any financing benefit offered to sell REO so as to maintain the financial record's integrity.

Problem 17

In some cases, the interest rate charged for a loan facilitates changes over the period of the loan. For example, assume the institution in Problem 16 requests a 6% rate for four years and an 8% rate for the remaining six years. Because a portion of the new loan has an interest cost closer to the market rate of 9%, the computed adjustment to book value is bound to be less. The present value of consideration received may be solved by a recursive process.

Answer: First, determine the monthly payments necessary to amortize the entire loan of $22,000 at the interest rate initially applicable, 6%. We completed this step in Problem 16. Payments necessary to amortize the loan on a monthly basis for 10 years at 6% are $244.25.

Second, determine the loan's outstanding balance at expiration of the first interest rate charged. In this case, monthly payments of $244.25 remain for six years.

PV = PAY x (*A*6/12/6%)

PV = $244.25 x 60.339514

PV = $14,737.93

The loan balance of $14,737.93 must be paid over the remaining years of the loan. Determine the monthly payments necessary to amortize the existing loan balance at an 8% basis for six years. Because the interest rate is higher, the monthly payments should increase.

PV = PAY x (*A*6/12/8%)

PV = $14,737.93 x .017533

PV = $258.40

Instead of receiving the monthly amount of $278.69 applicable to the market rate of interest as determined in Problem 16, the institution should receive monthly payments of $244.25 for four years and $258.40 for six years. The monthly financing concession amounts to $34.44 for four years ($278.69 - $244.25) and $20.29 for six years ($278.69 - $258.40). Next, discount the payments not received at the market rate. Note the mechanics necessary to evaluate the last six years of payments.

PV = $34.44 (*A*4/12/9%) + $20.29

[(*A*10/12/9%) - (*A*4/12/9%)]

PV = $34.44 (40.184782) + $20.29

[78.941693 - 40.184782]

PV = $1,383.96 + $20.29 (38.756911)

PV = $1,383.96 + $786.38

PV = $2,170.34

As expected, the present value of consideration not received is less when a portion of the loan to facilitate carries a higher interest rate. Again, though the process is not simple, you may compute the present value by stages.

Renegotiation of Existing Loans

Sometimes institutions offer attractive financing terms to current or prospective borrowers on existing loans. That is, an institution may renegotiate a loan such that the underlying property is not foreclosed into REO. Regardless of the financing advantage (that is, no interest, low interest, longer maturity, payment forbearance), determination of the appropriate accounting treatment is necessary as indicated by Statement of Financial Accounting Standards Nos. 15, 114, 118, and 121. For a more detailed discussion of this topic, turn to Handbook Section 240, Troubled Debt Restructurings.

Unsold Real Estate Owned

There are a number of instances in which real estate owned is not sold immediately after acquisition. Often, an institution acquires a land development project before completion, and it must invest additional funds before the property can be sold. Apartments and office rental units may be held until the occupancy ratio has increased sufficiently to reduce the income risk. Finally, the market may not be capable of absorbing the property, and the institution may have to wait until it improves. No matter what the reason, the important point is that the institution should consider a holding period in analyzing the property.

Prudent REO management practices and applicable regulations require that the institution have all pieces of REO appraised at the time of acquisition to determine whether or not the institution should establish reserves for potential losses. An appropriate method for estimating the value of income-producing property, and one that the institution should consider in the appraisal process, is to discount the forecasted cash flows at an appropriate rate. This rate should earn an internal rate of return comparable with projects with similar risk.

Partly Developed Real Estate Owned (Requiring Capital Additions)

Problem 18

Assume that the institution foreclosed on a piece of property with a current loan balance of $7,000,000. The property is not completely developed, and cost estimates for completion are as follows:

Year 1: $45,000 per month, or $540,000 per year

Year 2: $30,000 per month, or $360,000 per year

Year 3: $16,000 per month, or $192,000 per year

At the end of three years, the completed project can be sold for $10,000,000.

Should the institution establish a valuation allowance, and if so, how much?

For this example, assume that the required internal rate of return for projects with similar risk is 10%.

<u>Step 1</u> - Determine discount cash inflows.

Sales Price = $10,000,000

PV = *Sum* x (*Sn*/*m*/*r*)

PV = $10,000,000 x (*S*3/12/10%)

PV = $10,000,000 x .741740

PV = $7,417,400

Step 2 - Determine discount cash outflows.

PV = Pay x (*An/m/r*) x (*Sn/m/r*)

Year 1 *PV* = $45,000 x (*A*1/12/10%)

PV = $45,000 x 11.374508 *PV* = $511,853

Year 2 *PV* = 30,000 x (*A*1/12/10%) x (*S*1/12/10%)

PV = 30,000 x 11.374508 x .905212

PV = $308,890

Year 3 *PV* = 16,000 x (*A*1/12/10%) x (*S* 2/12/10%)

PV = 16,000 x 11.374508 x .819410

PV = $149,126

Total Discounted Cash Outflow =

$511,853 + $308,890 +$149,126 = $969,869

Step 3 - Determine net present value of property.

NPV = *PV* Inflows - *PV* Outflows

NPV = $7,417,400 - $969,869

NPV = $6,447,531 say $6,447,500

Step 4 - Compare net present value of property with the outstanding balance of the loan.

Loan Balance	$7,000,000
NPV	6,447,500
	$ 552,500

Because the property's estimated value is only $6,447,500, the institution should establish a valuation allowance of $552,500. The institution should reevaluate the project periodically and make adjustments to the valuation allowance account.

Fully Developed Real Estate Owned (Holding Until the Market Improves)

Problem 19

A second type of project an institution may acquire is one in which the occupancy ratio is increasing and that will not be sold until the ratio levels out at the expected ratio.

Institution XYZ acquired a completed apartment building with a book value of $6,750,000. The occupancy ratio is not sufficiently high to attract a buyer. The building has 400 units available for rental at $250 per month. Projected occupancy ratios and operating expense/gross operating income ratios are as follows:

Year	Occupancy Ratio	Operating Expense Ratio
1	50%	45%
2	85%	40%
Thereafter	95%	35%

The effective remaining life of the property is 50 years, giving a straight-line recapture rate of 2%. The institution expects a return on the investment of 10% and will sell the property after the second year.

Step 1 - Determine cash flows.

Year 1 Gross Income = No. Units x Monthly Rental x Occupancy Ratio = 400 x $250 x .50 = $50,000 per month

Net Operating Income = Gross Income x (1 - Operating Expense Ratio) = $50,000 x (1 - .45) = $27,500 per month

Year 2 Gross Income = $400 x 250 x .85 = $85,000 per month

Net Operating Income = $85,000 x (1 - .40) = $51,000 per month

After Year 2 GI = $400 x 250 x .95 = $95,000 per month

Net Operating Income = $95,000 x (1 - .35) = $61,750 per month

Capitalization Rate = .12

Annualized Net Operating Income = $61,750 x 12 = $741,000

Sales Price = (AN. NOI) ÷ (CAP. RATE) = $741,000/.12 = $6,175,000

Step 2 - Determine discount cash flows.

Again, the discount rate was determined to be 10%.

Year 1 *PV* = 27,500 x (*An/m/r*) = 27,500 x (*A*1/12/10%) = 27,500 x 11.374508 = 312,799

Year 2 *PV* = 51,000 x (*A*1/12/10%) x (*S*1/12/10%) = 51,000 x 11.374508 x. 905212 = 525,113

PV = $6,175,000 x (*S* 2/12/10%)

PV = $6,175,000 x .819410

PV = $5,059,857

Total *PV* = $312,799 + $525,113 + $5,059,857 = $5,897,769 say $5,898,000

Step 3 - Compare book value with the present value.

Book Value	$6,750,000
PV	5,898,000
Loss	852,000

Because the present value is less than the book value, the institution should establish an $852,000 valuation allowance.

In appraising real estate owned, the method of discounting forecasted cash flows should be considered. It identifies the cash inflows to be received and the outflows to be paid and accounts for the holding period before a project can or will be sold.

Portfolio Valuation

According to the Accounting Principles Board (APB) No. 16 Business Combinations as amended, an acquiring corporation using the purchase accounting method should allocate the cost of an acquired company to the identifiable individual assets acquired and liabilities assumed based on their relative fair values.

APB No. 16 also provides general guidelines for assigning amounts to individual assets acquired. These guidelines include the valuation of receivables “at present values of amounts to be received determined at appropriate current interest rates, less allowances for uncollectibility and collection costs, if necessary.” Given the high proportion of receivables for thrift institutions, accurate valuation is important. Generally, the loan portfolio of an acquired institution is revalued when the portfolio’s average yield is different from the current required yield.

Problem 20

Assume the institution is acquiring a loan portfolio with a $1,000,000 book value. The average yield of the portfolio is 7.5%, and the current market yield is 9.0%. The average remaining contractual life of the portfolio is 25 years.

Because of prepayments, however, the projected average life of the portfolio is only 10 years. What is the current market value of the loan portfolio?

Based upon these assumptions, sufficient data exist for the proper evaluation of the loan portfolio. In effect, determine what price an investor would pay so that the investor earns a current market yield on the investment.

As indicated by APB No. 16, first determine the cash flow "amounts to be received." A loan portfolio represents an equal monthly stream of payments that include both interest and principal amortization for the life of the contract. Prepayment assumptions, however, shorten the contract life and are recognized as a large lump sum payment in a future period.

<u>Step 1</u> - Determine cash flows.

Monthly payments

PV = PAY(*An*/*m*/*r*)

PAY = *PV* ÷ (*A*25/12/7.5%)

PAY = $1,000,000 ÷ 135.319613

PAY = $7,389.91

Monthly payments of $7,389.91 would amortize a $1,000,000 loan over 25 years and return a 7.5% yield to the lender.

Payoff balance

PV = PAY (*An*/*m*/*r*)

PV = $7,389.91 x (*A*15/12/7.5%)

PV = $7,389.91 x 107.873427

PV = $797,174.92

The book value of the loan as of the tenth year is $797,174.92. As indicated, the book value is simply the discount of the remaining 15 years of payments at the portfolio rate of interest, 7.5%. Because the repayment occurs in the future, the amount is known as a sum in the following market valuation.

<u>Step 2</u> -Discount cash flows at current market rate.

$PV = \text{PAY}\ (An/m/r) + Sum\ (Sn/m/r)$

$PV = \$7{,}389.91(A10/12/9.0\%) + \$797{,}174.92(S10/12/9\%)$

$PV = \$7{,}389.91(78.941693) + \$797{,}174.92(0.407937)$

$PV = \$908{,}569.15$

The market value of the loan portfolio is $908,569.15. This figure is the present value of the 10 years of monthly loan payments plus the present value of the loan repayment, all discounted at the desired current yield of 9%.

When revaluation is warranted, the discounted cash flow method embodies the intended thrust of APB No. 16. However, the institution must exercise care in the use of qualifying assumptions. Rarely is a loan portfolio homogeneous in yield, maturity, and risk. Obviously, changes in the assumed portfolio yield, average remaining life, average remaining projected life, and current required market yield affect the current market value. Within this framework, however, the discounted cash flow method generates an accurate fair value.

SALE/LEASEBACK EVALUATION

The Theory

A sale/leaseback is a variation of a financial lease. Financial leases provide a lessee with many values otherwise associated with outright ownership. The period of the lease generally approximates the remaining economic life of the asset. The lessee contractually commits to the lessor payment of funds that cumulatively exceed the current market price of the property. Although the lessee may terminate an operating lease, such as telephone service, upon proper notice, the lessee many not cancel a financial lease. In effect, a financial lease provides a financing vehicle for the lessee and is so regarded by accounting theorists.

In a sale/leaseback, the prospective lessee receives current funds in exchange for the asset. Simultaneously, the lessee receives the continued use of the asset in consideration for future lease payments. The sale/leaseback is a contrast between current funds inflow and anticipated funds outflow. A decision model must capture the timing of the after-tax funds flow. Next year's dollar is worth something less than today's. In simplest terms, the "cost" of a sale/leaseback is the rate of interest that equates future payments to the current sales receipt. As lease payments increase relative to a given sale price, the cost of the lease increases. That is, only a higher rate of discount forces the equation between inflow and higher outflows. For a sale/leaseback to be considered advantageous, the cost of the lease should be less than an appropriate benchmark criterion. The benchmark depends on the use of the sale price: after-tax cost of funds for a contracting institution, and after-tax investment return for an expanding institution.

Cost of Leasing

Before-Tax

Equation 3

$$\text{Sales Price} = \sum_{1}^{n} \frac{\text{n Lease Pay t}}{(1+r)^t}$$

The before-tax cost of leasing is the rate, *r*, that forces equation of the sale price to the annual lease payments paid until year *n*. The advantages of leasing, however, are heavily dependent upon avoidance of taxes.

After-Tax

Equation 4

$$\text{Sales Price} = \sum_{1}^{n} \frac{\text{n Lease Pay t}}{(1+r)^t}$$

$$+ \sum \frac{\text{n(Lease Pay t} - \text{Depr t)tax rate}}{(1+r)^t}$$

Estimate cash flows on an after-tax basis by determining the legitimate expenses incurred by leasing and those expenses missed as a result of not owning. Lease payments provide an effective tax shield because annual taxes are reduced by lease payments times the tax rate. On the other hand, the right to depreciate property that is not owned is lost. To the extent that lease payments exceed depreciation charges, an effective tax shield is generated. The tax shield reduces the after-tax cash payments and accordingly lowers the after-tax cost of the sale/leaseback.

Problem 21

Assume an institution currently owns an office building and land carried at respective book values of $800,000 and $200,000. Management considers the value of such property will be negligible after 20 years if demolition costs equal the land's residual value. A prospective lessor approaches the institution and offers $1 million cash in exchange for 20 annual payments of $117,454.

Equation 5

$$\$1{,}000{,}000 = \sum_{1}^{20} \frac{\$117{,}454}{(1+r)^t}$$

PV = PAY (*An*/*m*/*r*)

$1,000,000 = $117,454 (*A*20/1/*r*)

8.514 = (*A*20/1/*r*)

r = 10%, the before-tax cost of leasing

After-Tax

Assume a tax rate of 25% and "lost" depreciation charges of $40,000 per year ($800,000 ÷ 20 years.) The depreciation base is limited to $800,000 since land is excluded from consideration.

Equation 6

$$\$1{,}000{,}000 = \sum_{1}^{20} \frac{\$117{,}454}{(1+r)^t} + \sum_{1}^{20} \frac{(\$117{,}454 - \$40{,}000).25}{(1+r)^t}$$

PV = PAY (An/m/r)

$1,000,000 = ($117,454 - $19,364)(A20/1/r)

$1,000,000 = $98,090 (A20/1/r)

10.195 = A20/1/r

r = 7.49%, the after-tax cost of leasing

The after-tax cost of leasing, r, increases as the sales price declines, the tax rate declines, the missed depreciation charges increase, or the lease payments increase. Is the sale/leaseback a good deal for the institution? That depends. If the institution uses the sales price to retire debt with an after-tax cost of less than 7.49%, the answer is no. If the institution uses the funds to expand investments earning greater than 7.49% after taxes, the answer may be yes.

Why the qualified answer? To this point, the example contains simplifying and, to a certain extent, unrealistic assumptions. Most institutions would use an accelerated depreciation. The reduction of early-term avoidance of taxes and higher time value of money increases the cost of leasing. Many properties have an expected residual value that affects depreciation schedules. Also, any residual values belong to the lessor, not the lessee, and increase the cost of leasing. Alternatively, the sales price in the sale/leaseback may be less than actually stated. For example, if an institution provides the lessor with purchase money at less than market rates, the lessor must similarly reduce the effective sale price. The institution must consider the effects of such refinements to either the right side or the left side of the equation.

Sale/Partial Leaseback After Taxes

In some instances, an institution owns a building far larger than internal requirements dictate. Consequently, the institution may prudently lease part of the office space to other tenants. If the institution subsequently decides to sell its building and leases back only a portion of the office space, the effective cost of the sale/partial leaseback may still be calculated. The sales price reflects the sum of the seller's partial leaseback and the lease payments of the other tenants. Computation of the cost of the sale/partial leaseback is analogous to the previously discussed sale/leaseback. The cost is the rate of discount that equates the sales price to a discounted sum of the seller's annual partial lease payments, plus the other tenant's annual lease payments, minus the annual tax shield. Again, as a result of not owning, the prospective lessee loses the opportunity to depreciate. On the other hand, taxable expenses are increased by the lease charges, and taxable income is reduced by not including the other tenants' lease payments.

In fact, the cost of a sale/partial leaseback should be similar to that of a sale/leaseback if other tenants are paying the market price for leasing. Continuing the previous example, assume other tenants were leasing office space at $90,000 per year and will continue to lease regardless of the building's owner. Further, the institution contract calls for annual lease payments of $27,454.

Equation 7

$$\$1{,}000{,}000 = \sum_{1}^{20} \frac{\$27{,}454}{(1+r)^t} + \sum_{1}^{20} \frac{\$90{,}000}{(1+r)^t} + \sum_{1}^{20} \frac{[(\$27{,}454 - \$40{,}000 + \$90{,}000).25]}{(1+r)^t}$$

PV = PAY ($An/m/r$)

\$1,000,000 = (\$117,454 - 19,364)($A20/1/r$)

\$1,000,000 = \$98,090 ($A20/1/r$)

10.195 = ($A20/1/r$)

r = 7.49%, the after-tax cost of the sale/partial leaseback

In some cases, the other tenants do not lease at a current market rate. As a result, the purchaser either pays a lower sales price or requires higher lease payments from the seller. Of course, either action increases the effective cost of the sale/ partial leaseback. The higher costs may indicate the economic reality of the present value of the tenants' lease payment, as opposed to a poor managerial decision by institution management.

Statement of Financial Accounting Standards No. 13, as amended, discusses the accounting implications for sale/leaseback transactions.

REFERENCES

Financial Accounting Standards Board, Statement of Financial Accounting Standards

No. 13	Accounting for Leases
No. 15	Accounting by Debtors and Creditors for Troubled Debt Restructurings
No. 114	Accounting by Creditors for Impairment of a Loan
No. 118	Accounting by Creditors for Impairment of a Loan – Income Recognition and Disclosure
No. 121	Accounting for the Impairment of Long-Lived Assets and Long-Lived Assets to be Disposed of

Accounting Principles Board (APB) Opinions

No. 16	Business Combinations