Chapter 6

Mortgages: Additional Concepts, Analysis, and Applications

In previous chapters, we have considered the analytics of various types of mortgages used in real estate finance. This chapter extends those concepts to various questions related to the analysis of mortgage financing. Questions raised include how to compare two loans with different loan terms (e.g., amount of loan, interest rate), how to decide whether to refinance or prepay a loan, and whether a loan assumption is desirable. We will also evaluate the effect of below-market financing on the sale price of a property. This is important because one must often pay a higher price for a property that appears to have favorable financing.

Incremental Borrowing Cost

We begin by considering how to evaluate two loan alternatives, where one alternative involves borrowing additional funds relative to the other. For example, assume a borrower is purchasing a property for $100,000 and faces two possible loan alternatives. A lender is willing to make an 80 percent first mortgage loan, or $80,000, for 25 years at 12 percent interest. The same lender is also willing to lend 90 percent, or $90,000, for 25 years at 13 percent. Both loans will have fixed interest rates and constant payment mortgages. How should the borrower compare these alternatives?

To analyze this problem, emphasis should be placed on a basic concept called the **marginal,** or **incremental, cost of borrowing.** Based on the material presented in earlier chapters, we know how to compute the effective cost of borrowing for one specific loan. However, it is equally important in real estate finance to be able to compare financing alternatives, whereby the borrower can finance the purchase of real estate in more than one way or under different lending terms.

In the problem at hand, we are considering differences in the amount of the loan and the interest rate. A loan can be made for $80,000 for 25 years at 12 percent, or $90,000 can be borrowed for 25 years at 13 percent interest. Because there are no origination fees, we know from Chapter 4 that the effective interest cost for the two loans will be 12 percent and 13 percent, respectively. However, an important cost that the borrower should compute is the cost to acquire the incremental or additional $10,000, should he choose to take the $90,000 loan over the $80,000 loan. At first glance, you may think that because the interest rate on the $90,000 loan is 13 percent, the cost of acquiring the additional $10,000 is also

13 percent. This is *not* so. Careful analysis of the two loans reveals that if the borrower wants to borrow the additional \$10,000 available with the \$90,000 loan at 13 percent, he also must pay an *additional* 1 percent interest on the first \$80,000 borrowed. This increases the cost of obtaining the additional \$10,000 considerably. The \$90,000 loan has a larger payment due not only to the additional \$10,000 being borrowed but also to the higher interest rate being charged on the entire amount. To determine the cost of the additional \$10,000, we must consider how much the additional payment will be on the \$90,000 loan compared with the \$80,000 loan.[1] This difference should then be compared with the additional \$10,000 borrowed. This can be done as follows:[2]

	Loan Amount		Loan Constant		Monthly Payments
Alt. II at 13%	\$90,000	×	.0112784	=	\$1,015.05
Alt. I at 12%	80,000	×	.0105322	=	842.58
Difference	\$10,000		Difference		\$ 172.47

We want to find the annual rate of interest, compounded monthly, that makes the present value of the difference in mortgage payments, or \$172.47, equal to \$10,000, or the incremental amount of loan proceeds received. Solving for i, we find

Solution:	Function:
$n = 25 \times 12 = 300$	$i\,(n, PV, FV, PMT)$
$PV = -\$10{,}000$	
$PMT = \$172.47$	
$FV = 0$	
Solve for i = 20.57% (annual)	

A financial calculator indicates that the answer is 20.57 percent. Hence, if our borrower desires to borrow the additional \$10,000 with the \$90,000 loan, the cost of doing so will be more than 20 percent, a rate considerably higher than 13 percent. This cost is referred to as the marginal, or incremental, cost of borrowing. The 13 percent rate on the \$90,000 loan can be thought of as a weighted average of the 12 percent rate on the \$80,000 loan and the 20.57 percent rate on the additional \$10,000. That is,

$$\left[\frac{80{,}000}{90{,}000} \times 12\%\right] + \left[\frac{10{,}000}{90{,}000} \times 20.57\%\right] = 12.95\% \text{ or } 13\% \text{ (rounded)}$$

The borrower must consider this cost when evaluating whether the additional \$10,000 should be borrowed. If the borrower has sufficient funds so that the \$10,000 would not have to be borrowed, it tells the borrower what rate of interest must be earned on funds *not* invested in a property because of the larger amount borrowed. In other

[1] Although we use an \$80,000 and a \$90,000 loan in our example, the calculation can be generalized to other loans that are the same percentage of the property value.

[2] For single family residential properties, when loan amounts exceed 80 percent of the property value, private mortgage insurance is usually required by lenders. The cost of this insurance will affect the incremental borrowing costs and must be considered in the calculations. More will be said about private mortgage insurance in Chapter 8.

words, by obtaining a larger loan ($90,000 vs $80,000), the borrower's down payment will be $10,000 less than it would have been on the $80,000 loan. Hence, unless the borrower can earn 20.57 percent interest or more on a $10,000 investment of equal risk on funds not invested in the property, he or she would be better off with the smaller loan of $80,000.

If the borrower does not have enough funds for a down payment to combine with the $80,000 loan and must borrow $90,000, the incremental borrowing cost is the cost of obtaining the extra $10,000. There may be alternative ways of obtaining the extra $10,000. For example, if the borrower could obtain a second mortgage for $10,000 at a rate *less* than 20.57 percent, this may be a better alternative than a $90,000 loan.[3] Therefore, the marginal cost concept is also an *opportunity cost* concept in that it tells the borrower the minimum rate of interest that must be earned, or the maximum amount that should be paid, on any additional amounts borrowed.

It should be noted that the 20.57 percent figure we calculated also represents the *return* that the lender earns on the additional $10,000 loaned to the borrower; that is, the *cost* of a loan to the borrower will reflect the *return* on the loan to the lender. Of course, keep in mind that the figures we are calculating do not take federal income tax considerations into account, which are also important in determining returns and costs (see the appendix to this chapter). For example, if the borrower is in a higher tax bracket than the lender, the after-tax cost to the borrower will be less than the after-tax return to the lender.

Early Repayment

We should also note that in this example, the incremental cost of borrowing will depend on when the loan is repaid. For example, if the loan is repaid after five years instead of being held for the entire loan term, the incremental borrowing cost increases from 20.57 percent to 20.83 percent. To see this, we modify the above analysis to consider that if the loan is repaid after five years, the amount that would be repaid on the $80,000 loan will differ from the amount that would be repaid on the $90,000 loan. Thus, in addition to considering the difference in payments between the two loans, we must also consider the difference in the loan balances at the time the loan is repaid. We can find the incremental borrowing cost as follows:

	Loan Amount		Loan Constant		Monthly Payments	Loan Balance after Five Years
Alt. II at 13%	$90,000	×	.0112784	=	$1,015.05	$86,639.88
Alt. I at 12%	80,000	×	.0105322	=	842.58	76,522.56
Difference	$10,000		Difference		$ 172.47	$10,117.32

To find the answer, we must find the interest rate that makes the present value of the monthly annuity of $172.47 and the differences in loan balances equal to $10,000. We can verify that the incremental borrowing cost is now 20.83 percent, the result of early repayment. As we will see in the next section, the impact of early payment may be greater when points are also involved on one or both of the loans.

[3] A lower effective cost for a second mortgage means that the borrower pays less interest each month. However, if the second mortgage has a term less than 25 years, the total monthly payments will be higher with the $80,000 first mortgage and a $10,000 second mortgage than with a $90,000 first mortgage. Thus, some borrowers may prefer to choose a higher effective borrowing cost to have lower monthly payments.

Solution:

$n = 5 \times 12 = 60$
$PV = -\$10{,}000$
$PMT = \$172.47$
$FV = 10{,}117.32$
Solve for i = 1.7360 (monthly)
Solve for i = 1.7360 × 12 = 20.83% (annual)

Function:
$i\,(n, PV, PMT, FV)$

Origination Fees

It should be apparent that the concept of incremental borrowing cost is extremely important when deciding how much should be borrowed to finance a given transaction. In the preceding section, the two alternatives considered were fairly straightforward; the only differences between them were the interest rate and the amount borrowed. In most cases, financing alternatives under consideration will have *different* interest rates as the amount borrowed increases and, possibly, *different* loan maturities. Also, loan **origination fees** will usually be charged on the loan alternatives. This section considers differences in loan fees on two loan alternatives. We will consider differences in loan maturities later.

The first case is the incremental cost of borrowing when loan origination fees are charged on two 25-year loan alternatives. For example, if a $1,600 origination fee (2 points) is charged on the $80,000 loan and a $2,700 fee (3 points) is charged on the $90,000 loan, how does this affect the incremental cost of borrowing? These differences can be easily included in the cost computation as follows.

Differences in amounts borrowed and payments:

	Loan	–	Fees	=	Net Amount Disbursed	Loan		Loan Constant	=	Monthly Payments
Alt. II at 13%	$90,000	–	$2,700	=	$87,300	$90,000	×	.0112784	=	$1,015.05
Alt. I at 12%	80,000	–	1,600	=	78,400	80,000	×	.0105322	=	842.58
			Difference	=	$ 8,900			Difference	=	$ 172.47

We want to find an annual rate of interest, compounded monthly, that makes the present value of the difference in mortgage payments, or $172.47, equal to $8,900, or the incremental amount of loan proceeds received. Using a financial calculator, we find that the exact answer is 23.18 percent. Hence, the marginal cost increases to about 23.2 percent when the effects of an additional $1,100 in origination fees charged on the $90,000 loan are included in the analysis. Thus, the borrower only benefits from an additional $8,900 instead of $10,000.

Solution:

$n = 25 \times 12 = 300$
$PV = -\$8{,}900$
$PMT = \$172.47$
$FV = 0$
Solve for i = 1.9316 × 12 = 23.18% (annually)

Function:
$i\,(n, PV, FV, PMT)$

As before, the marginal or incremental cost of borrowing increases if the loan is repaid before maturity. For example, if the loan in the above problem were repaid after five years, the incremental cost would increase to about 24.67 percent.

Incremental Borrowing Cost versus a Second Mortgage

The incremental borrowing cost obviously depends on how much the interest rate increases with the loan-to-value ratio. In the examples considered previously, the interest rate increased from 12 percent to 13 percent (a differential of 1%) when the loan-to-value ratio increased from 80 percent to 90 percent. When no points were charged and the loan was held until maturity, the incremental borrowing cost was 20.57 percent. The incremental borrowing cost would increase if the differential between the rate on the 80 percent loan and the 90 percent loan were greater than 1 percent. Conversely, the incremental borrowing cost would decrease if the differential were less than 1 percent.

Because borrowers have a choice between obtaining a 90 percent loan or an 80 percent loan plus a second mortgage for the remaining 10 percent, we would expect the incremental borrowing cost to be competitive with the rate on a second mortgage with the same maturity. In the example, if a second mortgage with a maturity of 25 years can be obtained with an effective borrowing cost that is much less than 20.57 percent, then the 90 percent loan is not competitive; it implies that the 1 percent yield differential between the 90 percent loan and the 80 percent loan is too great. Lenders would have to adjust the differential (or the second mortgage rate) so that the incremental borrowing cost is about the same as the effective cost of a second mortgage.

In Exhibit 6–1, we calculate the incremental borrowing cost for the alternatives discussed earlier, which assume that the loan is prepaid after five years. The exhibit shows how the incremental borrowing cost is affected by the interest rate differential on the 90 percent loan and the 80 percent loan. A 0 percent interest rate differential means that the contract interest rate, which is 12 percent, is the same for both loans. A 1 percent differential means the contract rate is 1 percent higher (e.g., 13% for the 90% loan).

When the interest rate differential is zero, the incremental cost is the same as the effective cost of the loan. For example, with no points the incremental cost is exactly 12 percent, the same as the interest rate for the 80 percent loan. As the interest rate differential increases, the incremental borrowing cost increases. The incremental cost increases by about the same rate for each loan.

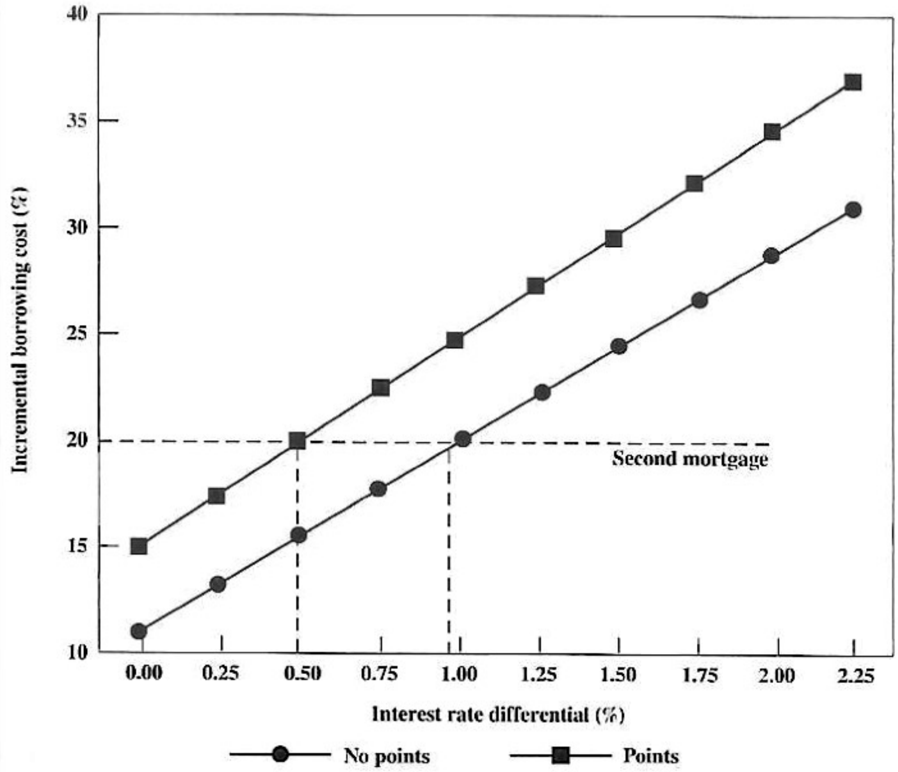
Suppose that a second mortgage for 10 percent of the purchase price (on top of an 80% first mortgage) can be obtained with an effective cost of 20 percent with a 25-year maturity. This is added to Exhibit 6–1.[4] This implies that, to be competitive, the 90 percent loan should be priced so that its incremental cost over an 80 percent loan is 20 percent. Suppose that lenders expect the loan to be prepaid on average after five years and that they want to charge 2 points on an 80 percent loan and 3 points on a 90 percent loan as we have assumed in the previous examples. This implies that the interest rate differential should be about .50 percent or 50 basis points (see Exhibit 6–1). Alternatively, if lenders do not want to charge any points on either loan, the interest rate differential would have to be about 90 basis points.

Relationship between the Incremental Cost and the Loan-to-Value Ratio

In the previous section, we illustrated the calculation of the incremental borrowing cost for a 90 percent loan ($90,000) with a 13 percent interest rate versus an 80 percent loan

[4] To compare this rate with the incremental borrowing cost, this must be the effective cost of the loan, considering any points and the effect of prepayment.

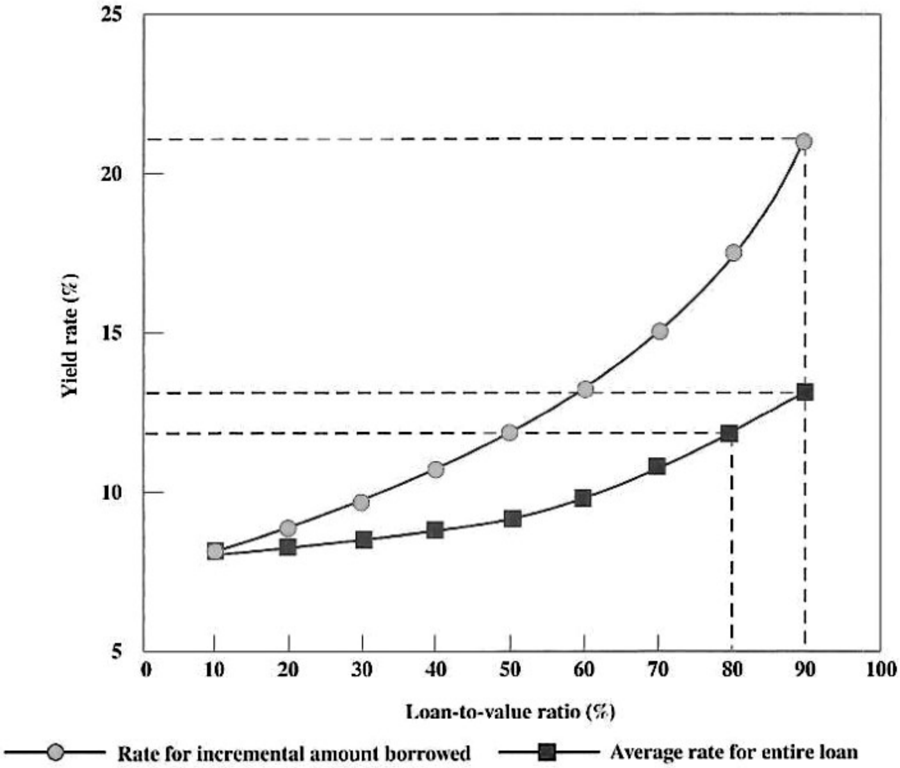
EXHIBIT 6–1
Incremental Borrowing Cost versus Interest Rate Differential



($80,000) with a 12 percent interest rate. Where there were no points and the loan was held until maturity, the incremental cost was 20.57 percent. The incremental borrowing cost is the amount that lenders require on the amount added to the loan that increases the loan-to-value ratio from 80 percent to 90 percent. As discussed previously, this incremental return should be competitive with the return required for a second mortgage for 10 percent of value. The incremental borrowing cost represents the return that lenders require at the margin for lending additional funds, that is, increasing the loan-to-value ratio, whether this is done with a larger first mortgage or a second mortgage.

In the previous examples, we used the difference in interest rates for the entire loan amount (e.g., the rate on an 80% loan vs. the rate on a 90% loan) to calculate the implied cost of the incremental 10 percent loan. In theory, however, it is the incremental cost of the extra amount loaned that must reflect the equilibrium required rate of return for the level of default risk associated with the additional amount loaned. As the loan-to-value ratio increases, the level of default risk also increases. Thus, we would expect the incremental borrowing cost to rise with the loan-to-value ratio. This, in turn, pulls up the average cost of the entire loan. Exhibit 6–2 shows the relationship between the rate for the incremental amount borrowed (incremental borrowing cost) and the average rate for the entire loan (effective rate for a loan with a particular loan-to-value ratio). To compare the results with the previous examples, the calculations in the exhibit are based on a loan term of 25 years, the assumption that the loan is held until maturity, and no points. Loans are assumed to be made in increments of 10 percent of value. The average and incremental rates are the same for a loan-to-value ratio of 10 percent because this is the first incremental loan amount. The incremental rate then increases as the loan-to-value ratio increases. The incremental rate rises faster than the average rate for the entire loan because the average rate for the entire loan is a weighted average of the incremental cost of each of the previous

EXHIBIT 6–2
Effect of Loan-to-Value Ratio on Loan Cost



incremental costs. This is the familiar relationship between marginal and average costs; that is, the marginal cost pulls up the average cost as long as the marginal cost is greater than the average cost.

The exhibit indicates, for example, that the average cost for an 80 percent loan is 12 percent. The marginal cost of a 90 percent loan is about 21 percent. This implies that the average cost of a 90 percent loan can be approximated as a weighted average as follows:

$$\text{Average cost of } 90\% \text{ loan} = (80/90 \times 12\%) + (10/90 \times 21\%)$$
$$\text{Average cost of } 90\% \text{ loan} = 13\%$$

Note that these are the same numbers (rounded) as calculated in the previous section for the same loan when the loan had no points and was held until maturity.[5]

Because the incremental borrowing cost must be competitive with the rate for a second mortgage, the rate for the incremental amount borrowed shown in Exhibit 6–2 should also approximate the market rate for a second mortgage. Because it is inefficient for lenders to make loans with low loan-to-value ratios,[6] however, we may not actually observe quotes for loans at the lower end of the loan-to-value range; that is, a borrower may have to pay the same rate for any loan that is less than 60 percent of value. This means that the incremental cost and average cost might not actually begin to rise until the loan-to-value ratio exceeds 60 percent.

[5] This formula is an approximation because the relative weight of each loan actually changes slightly over time as the loans are amortized. Because each loan is amortized over 25 years, the loan-to-value ratio of the 80 percent loan must drop much faster than that of the 10 percent loan because both loan-to-value ratios must be zero at loan maturity.

[6] The transactions cost would be the same as loans with a higher loan-to-value ratio.

Web App

Private mortgage insurance is a way of getting a loan that is greater than an 80 percent loan-to-value ratio. Companies like Mortgage Guarantee Insurance Corporation (**www.mgic.com**) offer such loans. Paying for the insurance to get the additional loan (more than 80%) is analogous to paying a higher interest rate to get a higher loan-to-value ratio as discussed in the chapter. Go to the MGIC website and find out more about how private mortgage insurance works and the typical cost. How would you determine the incremental cost of a loan with private mortgage insurance versus one that did not require insurance?

Differences in Maturities

In the previous examples, the loan alternatives considered had the same maturities (25 years). How does one determine the incremental cost of alternatives that have different maturities as well as different interest rates? Do differences in maturities materially change results? We examine these questions by changing our previous example and assuming that the $90,000 alternative has a 30-year maturity and a higher interest rate. How would the analysis be changed? We first must compute the following information:

	Loan	Payments Years 1–25	Payments Years 26–30
Alt. III at 13%, 30 years	$90,000	$995.58	$995.58
Alt. I at 12%, 25 years	80,000	842.58	–0–
Difference	$10,000	$153.00	$995.58

In this case, we compute the monthly payment for a $90,000, 30-year loan at 13 percent interest, which is $995.58. However, there are two differences in the series of monthly payments relevant to our example. For the first 25 years, the borrower will pay an additional $153.00 per month for alternative III. For the final five-year period, years 26 through 30, the difference between payments will be the full $995.58 payment on alternative III because the $80,000 loan would be repaid after 25 years. In the above formulation, the second annuity of $995.58 runs for five years, but it is not received until the end of year 25 and therefore must also be discounted for 25 years. We cannot solve directly for the solution because there are two unknowns. Thus, we must use the procedures outlined in Concept Box 3.2 in Chapter 3 to calculate the yield (cost).

Solution:
Requires cash flow analysis:

$CF_0 = -\$10{,}000$
$CF_j = \$153.00$
$n_j = 300$ (years 1–25)
$CF_j = \$995.58$
$n_j = 60$ (years 26–30)

Function:
$IRR\ (CF_1, CF_2, \ldots CF_n)$

Solve for *IRR*: (monthly) = 1.5719% (annualized) = 18.86%

Because the desired present value is $10,000, the answer must be slightly less than 19 percent. Using a calculator[7] that can solve for an *IRR* with uneven, or grouped, cash flows, we find the solution is 18.86 percent. Hence, the marginal or incremental cost of borrowing the additional $10,000 given that (1) the interest rate increases from 12 percent to 13 percent and (2) the loan term increases from 25 years to 30 years will be about 18.86 percent. Compare this with the incremental cost of 20.57 percent in the first example, where no fees were charged but both maturities were 25 years. The reason the marginal cost is lower in this case is that although a higher rate must be paid on the $90,000 loan, it will be repaid over a longer maturity period, 30 years. Even though the borrower pays a higher rate for the $90,000 loan, there is a benefit to having a longer amortization period (and thus lower monthly payments) on the $90,000 loan.

Note that if the borrower expects to repay the loan before maturity, both the differences in monthly payments and loan balances in the year of repayment must be taken into account when computing the marginal borrowing cost. Also, should any origination fees be charged, the incremental funds disbursed by the lender should be reduced accordingly.

Loan Refinancing

On occasion, an opportunity may arise for an individual to refinance a mortgage loan at a reduced rate of interest. The fundamental relationships to know in any **loan refinancing** decision include at least three ingredients: (1) terms on the present outstanding loan, (2) new loan terms being considered, and (3) any fees associated with paying off the existing loan or acquiring the new loan (e.g., prepayment penalties on the existing loan or origination and closing fees on the new loan). To illustrate, assume a borrower made a mortgage loan five years ago for $80,000 at 15 percent interest for 30 years (monthly payment). After five years, interest rates fall, and a new mortgage loan is available at 14 percent for 25 years. The loan balance on the existing loan is $78,976.50. Suppose that the prepayment penalty of 2 percent must be paid on the existing loan, and the lender who is making the new loan available also requires an origination fee of $2,500 plus $25 for incidental closing costs if the new loan is made. Should the borrower refinance?

In answering this question, we must analyze the costs associated with refinancing and the benefits or savings that accrue because of the reduction in interest charges, should the borrower choose to refinance. The costs associated with refinancing are as follows:

Cost to refinance:	
Prepayment penalty: (2% × $78,976.50)	$1,580
Origination fees and discount points, new loan	2,500
Recording, etc., new loan	25
	$4,105

Benefits from refinancing are obviously the interest savings that result from a lower interest rate. Hence, if refinancing occurs, the monthly mortgage payment under the new loan terms will be lower than payments under the existing mortgage. Monthly benefits would be $60.87 as shown:

[7] Unlike the problems involving constant payments, this calculation requires a calculator that can accommodate inputs of various cash flows over time.

Monthly savings due to refinancing:	
Monthly payments, existing loan, $80,000, 15%, 30 years	$1,011.56
Less: Monthly payments, new loan, $78,976.50, 14%, 25 years	−950.69
Difference in monthly payments	$ 60.87

It is useful to know that total cash savings for the 25-year (300-month) period would be $60.87 × 300 or $18,261, which is greater than the $4,105 in refinancing costs. However, the $18,261 in savings will not be received immediately, so we must ask whether it is worth "investing," or paying out, $4,105 (charges for refinancing) to save $60.87 per month *over the term of the loan*. Perhaps, the $4,105 could be invested in a more profitable alternative? What rate of interest, compounded monthly, would an alternative investment have to earn in order to be equivalent to spending $4,105 to refinance? To analyze this question, we should determine what rate of return is earned on the investment of $4,105 for 25 years, given that $60.87 per month represents a savings. Using a financial calculator, we find that the yield on our $4,105 investment, with savings of $60.87 per month over 25 years, is equivalent to earning an annual rate of 17.57 percent compounded monthly. If another alternative equal in risk, which provides a 17.57 percent annual return, cannot be found, the refinancing should be undertaken. This return appears to be attractive because it is higher than the market rate of 14 percent that must be paid on the new loan. Thus, refinancing is probably desirable.

Solution:	Function:
PV = $4,105	i (PV, n, FV, PMT)
n = 300	
FV = 0	
PMT = $60.87	
Solve for i = 17.57%	

Early Repayment: Loan Refinancing

If the property is not held for the full 25 years, the monthly savings of $60.87 do not occur for the entire 25-year term, and therefore the refinancing is not as attractive. If we assume that the borrower plans to hold the property for only 10 more years after refinancing, is refinancing still worthwhile? To analyze this alternative, note that the $4,105 cost will not change, should the refinancing be undertaken; however, the benefits (savings) will change. The $60.87 monthly benefits will be realized for only 10 years. In addition, since the borrower expects to repay the refinanced loan after 10 years, there will be a difference between loan balances on the existing loan and the new loan due to different amortization rates. We assume that there will be no prepayment penalty on either loan if they are prepaid 10 years from now.

Loan balance, 15th year—existing loan*	$72,275
Loan balance, 10th year—new loan†	71,386
Difference	$ 889

*Based on $80,000, 15 percent, 30 years prepaid after 15 years.

†Based on $78,976, 14 percent, 25 years, prepaid after 10 years.

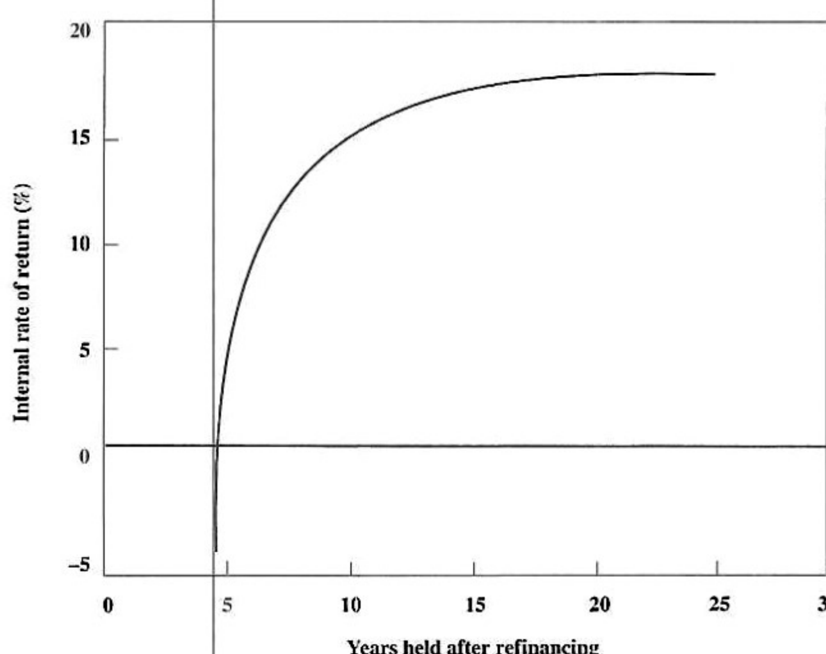
The new calculation comparing loan balances under the existing loan and the new loan terms, should the new loan be made, shows that if refinancing occurs the amount saved with the lower loan balance will be $889. Hence, total savings with refinancing will be $60.87 per month for 10 years, plus $889 at the end of 10 years. Do these savings justify an outlay of $4,105 in refinancing costs? To answer this question, we compute the return on the $4,105 outlay as follows:

Solution:	Function:
$n = 10 \times 12 = 120$	$i\,(n, PV, FV, PMT)$
$PV = -\$4{,}105$	
$PMT = \$60.87$	
$FV = \$889$	
Solve for $i = 14.21\%$	

Because the loan is repaid early and the monthly savings of $60.87 will not be received over the full 25-year period, the yield is below the 17.57 percent yield computed in the previous example. The yield earned due to refinancing will be 14.21 percent per year for the 10-year period.

Obviously, this return is lower than the 17.57 percent computed under the assumption that the loan will be repaid after 25 years. This is true because the refinancing cost of $4,105 remained the same, while the savings stream of $60.87 was shortened from 25 years to 10 years. Although an additional $889 was saved because of differences in loan balances, it did not offset the reduction in monthly savings that would have occurred from year 10 through year 25. The relationship between the *IRR* and the number of years the loan is held after refinancing is illustrated in Exhibit 6–3. Note that the returns from

EXHIBIT 6–3
***IRR* from Savings When Refinancing**



refinancing are negative if the loan is held for only five years after prepayment. The return rises sharply for each additional year the loan is held after prepayment until it is held for about 15 additional years. In analyzing refinancing decisions, then, we must compare not only costs and benefits (savings), but also the time period one expects to hold a property.[8]

Effective Cost of Refinancing

The refinancing problem can also be analyzed by using an extension of the effective cost concept discussed earlier. We know that points increase the effective cost of a loan. In our problem, the borrower would be making a new loan for $78,976.50 but must pay $4,105 in "fees" to do so. Although these fees include the prepayment penalty on the old loan, this can be thought of as a cost of making a new loan by refinancing, or the **effective cost of refinancing.** Thus, the borrower in effect receives $78,976.50 less $4,105, or $74,871.50. Payments on the new loan when made at 14 percent for 25 years would be $950.69. To find the effective cost where the loan is held to maturity, or 25 years, we proceed as follows:

Solution:	Function:
$n = 25 \times 12 = 300$	$i\,(n, PV, PMT, FV)$
$PV = -\$74{,}871.50$	
$PMT = \$950.69$	
$FV = 0$	
Solve for i = 14.86%	

Using a financial calculator, we obtain an interest rate of 14.86 percent. This can be interpreted as the effective cost of obtaining the new loan by refinancing. Since this cost is *less* than the rate on the old loan (15%), refinancing would seem to be desirable.[9] Thus, we arrive at the same conclusion we got when calculating the return on investing in refinancing.

Borrowing the Refinancing Costs

In the above analysis, we assumed that the borrower had to pay (as a cash outlay) the refinancing costs of $4,105. However, it is likely that if the borrower is going to the trouble of refinancing, he or she may also be able to borrow the refinancing costs.[10] How does this affect our analysis?

The borrower now gets a loan for the loan balance of $78,976.50 plus the fees of $4,105.00 for a total of $83,081.50. Payments at the 14 percent rate (assuming the interest rate is still the same) would be $1,000.10.[11] What do we compare this to now that the

[8] Obviously, the shorter the time period is that the borrower expects to hold the property after refinancing, the lower the return will be on "investing" in refinancing. In fact if the period of time is relatively short, the return could be negative. Hence, if a borrower expects to sell a property within a short time after refinancing, it will be difficult to justify refinancing.

[9] Any points that had been paid on the old loan would not be relevant since they are a "sunk cost"; that is, they have already been paid and are not affected by refinancing. Thus, only the current interest rate on the old loan should be compared with the effective cost of the new loan.

[10] The borrower will probably have sufficient equity in the property to do so since, if the old loan was held for several years, the borrower has reduced the balance on the old loan and the property may have increased in value.

[11] If this approach were used to analyze the case where the loan was to be repaid early, the additional loan balance on the refinanced loan would have to be considered. This would reduce the benefit of the lower payments.

borrower has no cash outlay when refinancing? The answer is simple. These payments are still less than those on the old loan ($1,011.56). Given that the borrower has lower payments ($11.46) for 300 months without any cash outlay, it is desirable to refinance.[12]

We could, of course, also compute the effective cost of refinancing as we did in the previous section. In this case, the total amount of the loan is $83,081.50; however, the borrower, in effect, only benefits from $78,976.50 (the loan amount less the refinancing costs). Using the payment of $1,000.10 and assuming the new loan is held for the full loan term, we can calculate the effective cost as follows:

Solution:	Function:
$n = 25 \times 12 = 300$	$i\,(n, PV, PMT, FV)$
$PV = -\$78{,}976.50$	
$PMT = \$1000.10$	
$FV = 0$	
Solve for $i = 14.81\%$	

Solving for the effective interest rate, we obtain an answer of 14.81 percent, which is virtually the same as we obtained in the previous section. The only reason the answer is slightly lower is that the origination fee on the new loan was assumed to remain at $2,500 even though the amount of the loan was increased to cover the refinancing costs.

Note that whether we calculate a return on investing in refinancing or the effective cost of refinancing, we arrive at the same conclusion. Often there are many ways of considering a problem that lead to similar conclusions. It is informative to look at a problem in several ways to gain skill in handling the wide variety of financial alternatives one may encounter. Knowing alternative ways of analyzing a problem also reduces the chance of applying an incorrect technique to solve it.

Other Considerations

Biweekly Payment Patterns—Interest Savings and Early Payoff

Generally speaking, when repaying mortgage loans, most borrowers prefer to make monthly payments. However, some borrowers consider **biweekly payments** which may (1) lower the amount of interest over the life of the loan and (2) repay the loan sooner. For example, if a borrower makes a fully amortizing $80,000 loan at 6 percent for 30 years and is considering a monthly versus a biweekly payment pattern, a comparison of payments would be as follows:

Solution:

Monthly Payments (360)	Biweekly Payments (26 *per year*)
$PV = -\$80{,}000$	$\$479.60 \div 2$
$i = 6\%$	
$n = 360$	$PMT = \$239.80$
$FV = 0$	
Solve for $PMT = \$479.60$	

[12] If the interest rate was higher, then we would also want to consider the incremental cost of the additional $4,105, as considered earlier in the chapter.

The following table shows (1) the number of payments needed to repay the biweekly loan, (2) the approximate number of years to maturity, and (3) approximate total interest savings over the life of the loan.

Solution:

Biweekly Mortgage Loan Payoff Period:

PV = −\$80,000
PMT = \$239.80
i = 6%/26*
FV = 0
Solve for n = 637 payments (rounded)
(approx. 24.5 years)

*Annual rate of 6% compounded biweekly.

Total Interest Savings:

Total monthly payments	\$172,656
Total biweekly payments	−152,752
Total interest savings	\$ 19,904

These calculations show that by choosing the biweekly payment pattern, the maturity period would be shortened from 30 years to about 24.5 years and *total interest saved* would be about \$19,904. While it is clear that the borrower would definitely save by making biweekly payments, this does not always mean this would be the best choice.

One way to think about this choice is to consider whether an alternative investment is available that is of equal risk and that will provide the borrower a return in excess of a 6 percent rate of interest, *compounded biweekly* ($i \div 26$). However, if such an alternative investment is unavailable, the borrower/investor would be better off "saving interest" by reducing interest costs and making the biweekly payments of \$239.80. It should also be stressed that this analysis assumes that the borrower has sufficient cash flow to make *either* choice, that is, the biweekly or monthly loan payments. Unless enough cash flow is available to the borrower every two weeks, the biweekly payment pattern may not be a viable option to begin with.

Early Loan Payoffs

Another question that many borrowers ask is whether loans should be paid off early, or prior to maturity. For example, we assume that a borrower makes a fully amortizing loan for \$80,000 at 6 percent interest for 30 years. He makes monthly payments for five years and suddenly receives a large amount of cash (e.g., inheritance) such that he may be able to repay the entire loan balance early. The question is should he do so? This question may be considered as follows:

Solution:

Loan Balance EOY 5:

PMT = \$479.64
i = 6%
n = 360 months
FV = 0
Solve for PV = \$74,443

Function:

$PV(PMT, i, n, FV)$

Assuming that $74,443 becomes available to the borrower with which to repay this loan early, the question is should it be repaid? One issue to consider is the interest savings. This would be

1. Total payments equal $479.64 × 300 =	$143,892
2. Less loan balance EOY 5	−74,443
3. Interest saved by early repayment	$ 69,449

However, related questions would be whether or not the $74,443 available to repay the loan at the end of year 5 may be reinvested elsewhere and, if so, at what rate of interest. By paying off a loan early that has a 6 percent interest rate, the borrower is in effect "earning" a 6 percent return on the funds used to repay the loan.

1. *Reinvesting at a rate greater than 6 percent.* If this is possible, the borrower would be better off *not* paying off the loan. If the $74,443 available for early payment could be invested elsewhere, say at 7%, the borrower should not pay off the loan early. This way, a spread of 7 percent minus 6 percent, or 1 percent, could be earned on the $74,443.
2. *Reinvesting at a rate below 6 percent.* If this is the case, the borrower would obviously be better off repaying the loan at the end of year 5. For example, if interest rates have fallen to 5 percent, the borrower may repay the loan thereby saving 6 percent. Alternatively, he may choose to refinance the loan at 5 percent. This would provide *savings* based on a spread of 6 percent minus 5 percent, or 1 percent. However, even this choice would be preferable only if alternative investments are available to invest the $74,443 at rates in excess of 5 percent.

Early Loan Repayment: Lender Inducements

After a period of *rising interest rates,* borrowers may have a loan that has an interest rate below the market rate. Earlier, we considered the situation where interest rates have fallen. In such cases, the borrower may find it beneficial to refinance at a lower interest rate even if additional fees and penalties have to be paid to the lender. Where interest rates have risen considerably, the situation may be the opposite. Lenders and other entities that have issued debt in earlier periods may be willing to "pay" borrowers to induce them to repay the loan early. That is, a lender may offer a borrower a discount to pay off the balance of a below-market-interest-rate loan.[13] How much of a discount should be offered?

Suppose a borrower has a loan that was made 10 years ago. The original loan amount was $75,000 to be amortized over 15 years at 8 percent interest. The balance of the loan is now $35,348, and the payments are $716.74 per month. If the current market interest rate has *increased* to 12 percent, then the lender would like to have the loan paid off early so that funds could be loaned to someone else at the market rate. However, the borrower has no incentive to prepay the loan even if he or she has $35,348 available to do so. In this case, the bank may be willing to offer the borrower a discount to prepay the loan. Suppose the lender discounts the loan by $2,000, so that only $33,348 must be paid to the lender. Is this attractive to the borrower?

By accepting the discount, the borrower, in effect, earns a return on the funds used to repay the loan; that is, by making a payment of $33,348 to the lender, the borrower saves $716.74 per month. To calculate the return earned by prepaying the loan, we have

[13] An analogy in corporate finance would include a corporation buying back its debt or "calling it" at market value.

Solution:	Function:
$n = 5 \times 12 = 60$	$i\ (n, PV, FV, PMT)$
$PV = -\$33,348$	
$PMT = \$716.74$	
$FV = 0$	
Solve for $i = 10.50\%$	

Using a financial calculator, we find the return to be about 10.5 percent. Thus, the interest savings represent a 10.5 percent return on the "investment" made to repay the loan.[14] Whether this represents an attractive proposition for the borrower depends on what alternatives he or she has for investing the $33,348.

In the preceding example, we assumed that the borrower had the funds ($33,348) to prepay the below-market-rate loan. Several other possibilities could be considered. One is that the borrower could refinance some or all of the loan at the market rate. Another is that the borrower wants to increase the loan balance by refinancing. In either case, the lender may still be willing to provide an inducement for the borrower to refinance since the existing loan is at a below-market rate. However, the approach taken to analyze the problem depends on whether, on balance, the borrower gives funds to the lender to reduce the loan balance in exchange for the lower payments or the borrower receives additional funds in exchange for an additional loan payment.

Market Value of a Loan

We have considered several problems in which the balance of a loan was determined after payments had been made for a number of years. The balance of the loan represents the amount that the borrower must repay the lender to satisfy the loan contract. (Any prepayment penalties must be added to the loan balance.) The loan balance may be interpreted as the "contract" or "book value" of the loan. However, if interest rates have changed since the origination of the loan, the loan balance will probably not represent the "market" value of the loan.

The **market value of a loan** is the amount that a new lender or investor would pay to receive the remaining payments on the loan. It can be thought of as the amount that could be loaned so that the remaining payments on the loan would give the lender a return equal to the current market rate of interest.

To find the market value of a loan, you simply calculate the present value of the remaining payments at the market rate of interest. For example, suppose that a loan was made five years ago for $80,000 with an interest rate of 10 percent and monthly payments over a 20-year loan term. Payments on the loan are $772.02 per month. To calculate the market value of the loan, we must find the present value of the remaining monthly payments of

[14] The above analysis does not consider the impact of federal income taxes. The IRS has ruled that when a lender discounts a loan such that the borrower does not have to repay the contract loan balance, the discount represents "loan forgiveness" and as such is considered taxable income. Thus, the borrower would have to pay taxes on the $2,000 discount. For an investor in the 40 percent tax bracket, the taxes would be $800. Thus, the net result is as if the borrower only received a discount of $2,000 − $800 = $1,200. This clearly reduces the benefit to the borrower to repay the loan. This forgiveness rule may also apply in cases where lenders accept a deed in lieu of foreclosure or take title to a property from a borrower when the loan balance outstanding exceeds the value of the property.

$772.02 by discounting at the *market rate of interest,* which we assume to be 15 percent. We do this in two steps:

STEP 1: Calculate present value of the remaining payments.

Solution: Function: $PV(i, FV, PMT, n)$

i = 15%
n = 180
PMT = $772.02
FV = 0
Solve for PV = $55.161

STEP 2: Calculate loan balance to determine % discount.

Solution: Function: $FV(i, PV, PMT, n)$

PMT = $772.02
i = 10%
PV = $80.000
n = 60
Solve for FV = $71.842

Thus, the market value of the loan is $55,161, compared to a loan balance of $71,842. The $55,161 is the amount that the lender would receive if the loan were sold to another lender, investor, or the secondary market.[15] We could say that the above loan is selling at a "discount." The amount of the difference in this case would be $71,842 – $55,161 = $16.681. We could also say that the mortgage is selling at a discount of 23 percent of its "face" value.

The market value of the loan is lower than the contract loan balance in this example because interest rates have risen relative to the interest rate (10%) at which the loan was originated 10 years ago. However, the borrower is required to make payments based on 10 percent even though market rates have risen to 15 percent. This is one reason why adjustable rate mortgages have become more attractive to lenders (see Chapter 5). With an adjustable rate mortgage, the market value of the outstanding loan will not differ as much as a new loan originated at market rates of interest. Indeed, if the interest rate on the outstanding loan could be adjusted at each payment interval and there were no limitations (caps) on the amount of the adjustment, the contract rate on the loan would always equal the market rate. In this event, the loan balance and market value for such a loan would always be equal because future payments would be based on current rates of interest.

Effective Cost of Two or More Loans

Many situations exist when an investor may be considering a combination of two or more loans (e.g., a first and a second mortgage). One situation is the assumption of a loan that has a favorable rate of interest.[16] However, the amount of cash necessary for the

[15] It is informative to look at an alternative approach that yields the same answer. Suppose that we were to make a loan for $71,842 at the market rate of 15 percent for the remaining loan term of 15 years. The payment would be $1,005.49. This is $233.47 higher than the contract payment. If we discount this *difference* in payments for the 15-year period at the market rate, we get a present value of $16,681. Subtracting this difference from the loan balance results in the market value of the loan.

[16] Depending on negotiations between borrowers and lenders, it may be possible for properties to be sold on assumption. However, the right to sell on assumption may be precluded explicitly in the mortgage or by the lender not approving the new buyer. Lending practices vary widely, depending on the tradition and the economic conditions in a given area.

buyer to assume a mortgage may be prohibitive. This can occur when the seller has already paid down the balance of the loan and when the property has appreciated in value since it was originally financed by the seller. Thus, the buyer must use a second mortgage to bridge the gap between the amount available from the loan assumption and the desired total loan amount.

Suppose that an individual bought a $100,000 property and made a mortgage loan five years ago for $80,000 at 10 percent interest for a term of 25 years. Due to price appreciation, the market value of the property has risen in value over the past five years to $115,000. The amount of cash equity required by the buyer to assume the seller's loan would be $39,669, determined as follows:

Purchase price	$115,000
Seller's mortgage balance ($80,000, 10%, 25 years after 5 years)	75,331
Cash equity required to assume seller's loan	$ 39,669

If the buyer does not have $39,669 in cash, even though he or she desires an assumption, the transaction may not be completed. One alternative open to the buyer unable to make the large cash outlay may be to obtain a second mortgage. However, using a second mortgage will be justified in this case only if the terms of the second mortgage, when combined with the terms on the assumed mortgage, are such that the borrower is as well or better off than if the entire purchase had been financed with a new mortgage. If the entire purchase can be financed with a new $92,000 loan (80% of value) at 12 percent for 20 years, we must know how to combine a second mortgage with the assumed mortgage that determine whether the assumption would be as attractive as the new mortgage loan. Suppose a second mortgage for $16,669 ($92,000 – $75,331) could be obtained at a 14 percent rate for a 20-year term. To analyze this problem, we compute the combined mortgage payments on the assumed loan, and a second mortgage loan made for 20 years at 14 percent.

Monthly payment, assumed loan*	$726.96
Monthly payment, second mortgage loan†	207.28
	$934.24

*Based on original $80,000 loan, at 10 percent, for 25 years.

†Based on second mortgage loan of $16,669, at 14 percent, for 20 years.

The combined monthly payments equal $934.24. We now want to compute the effective cost of the combined payments that are made on the combined loan of $92,000.

Solution:

$n = 20 \times 12 = 240$

$PV = -\$92,000$

$PMT = \$934.24$

$FV = 0$

Solve for $i = 10.75\%$

Function:

$i\ (n, PV, PMT, FV)$

Using a financial calculator, we find an answer of 10.75 percent. This is the cost of obtaining $92,000 with the loan assumption and second mortgage. Since this is less than the cost of obtaining $92,000 with a new first mortgage at a rate of 12 percent, the borrower is still better off with the loan assumption and a second mortgage.[17] It is important to note, however, that the preceding analysis does not consider the fact that the seller may have *raised the price of the property* to capture the benefit of the assumable below-market-rate loan. Later in the chapter, we will consider this in our analysis.

Second Mortgages and Shorter Maturities

In most cases, second mortgages may not be available for a 20-year period. If a five-year term were available on a second mortgage loan at 14 percent interest, would the borrower still be better off by assuming the existing mortgage and taking a second mortgage? To answer this question, we must determine the combined interest cost on the assumed mortgage, which carries a rate of 10 percent for 20 remaining years, and the second mortgage, which would carry a rate of 14 percent for five years. This combined rate can then be compared with the current 12 percent rate for 20 years presently available, should the property be financed with an entirely new mortgage loan.

To combine terms on the assumable mortgage and second mortgage, we add monthly payments together as follows:

	Monthly Payments
Assumed loan*	$ 726.96
Second mortgage†	387.86
Total	$1,114.82

*Based on original terms: $80,000, at 10 percent, for 25 years.

†Based on $16,669, at 14 percent, for five years.

The sum of the two monthly payments is equal to $1,114.82. However, the combined $1,114.82 monthly payments will be made for only five years. After five years, the second mortgage will be completely repaid, and only the $726.96 payments on the assumed loan will be made through the 20th year.

Whether the combined mortgages should be used by the borrower can now be determined by again solving for the combined cost of borrowing. This cost is based on the monthly payments under both the assumed loan and second mortgage, for the respective number of months payments must be made, in relation to the $92,000 amount being financed. These costs are easily seen as the monthly payments of $387.86 on the second mortgage for *five years* and the monthly payments of $726.96 on the assumed mortgage for *20 years*, both discounted by an interest rate that results in the present value of $92,000.

We must find the interest rate that makes the present value of the combined monthly mortgage payments (grouped cash flows) equal to $92,000. Using a financial calculator, we find that the combined interest cost on the existing mortgage assumed for 20 years and

[17] It should be apparent that such a high interest rate can be paid on the second mortgage because $75,331, the amount assumed, carries a 10 percent rate and represents about 82 percent of the $92,000 to be financed, while the second mortgage of $16,669 represents only 18 percent. When weighted together by the respective interest rates, the total rate paid on the combined amounts is influenced more by the amount assumed at 10 percent. As an approximation of the average "blended" rate for the two loans, we have (.82 times 10%) + (.18 times 14%) = 10.72%, which is approximately the same as the answer we found using the present value factors above.

the second mortgage for five years is 10.29 percent. This combined package of financing must again be compared to the 12 percent interest rate currently available on an $80,000 mortgage for 20 years. Because the effective cost of the two combined loans is less than the market rate, this is the best alternative. It should be noted, however, that for the first five years the combined monthly payments of $1,114.82, should the assumption and second mortgage combination be made, would be higher than the payments with a new mortgage for $92,000 at 12 percent for 20 years, which would be $1,013.00 per month. Although this is offset by the lower $726.96 payments after five years, the borrower must decide which pattern of monthly loan payments fits his or her income pattern, in addition to simply choosing the loan alternative with the lower effective borrowing cost. A borrower may be willing to pay a higher effective cost for a loan (or combination of loans) that has lower monthly payments.

Solution:

Requires cash flow analysis:

Initial flow = −$92,000
Flow 1 = $1,114.82
Number of times = 60 (year 1–5)
Flow 2 = $726.96
Number of times = 180 (year 6–20)

Solve for *IRR:*

IRR (monthly) = 0.8573%
IRR (annualized) = 10.29%

Alternative Solution:

CF_0 = $92,000
CF_j = $1,114.82
N_j = 60
CF_j = $726.96
N_j = 180

Solve for i = 0.8573% (monthly)
= 10.29% (annually)

In recent years, there have been many new loans that combine features of second mortgage lending, consumer lending, and credit card debt. These are described in Concept Box 6.1.

Effect of Below-Market Financing on Property Prices

In many situations, an investor may have an opportunity to purchase a property and obtain financing at a below-market interest rate. We have previously discussed one case where the seller had a below-market-rate loan that could be assumed by the buyer. Below-market financing might also be provided by the seller with a *purchase money mortgage*. In this case, the seller provides some or all of the financing to the buyer at an interest rate lower than the current market rate. Indeed, this type of financing is common during periods of tight credit and high interest rates.

Obviously, below-market-rate loans have value to the buyer. However, because the informed seller also recognizes the value of this type of financing, we would expect the seller to increase the price of the property to reflect it. That is, the "price" of the property would be higher with below-market financing than with market rate financing.

We now consider how a buyer would analyze whether to purchase a property with below-market financing if the price is higher than that of an otherwise comparable property that does not have below-market financing. Suppose that a property can be purchased for $105,000 subject to an assumable loan at a 9 percent interest rate with a 15-year remaining term, a balance of $70,000, and payments of $709.99 per month. A comparable property without any special financing costs $100,000, and a loan for $70,000 can be obtained at a market rate of 11 percent with a 15-year term. Which alternative is best for the buyer? Note that we are assuming that the two loan amounts are the same. In analyzing this problem,

Home Equity Loans and Home Equity Lines of Credit

Concept Box 6.1

Many types of second mortgage loans are used by residential property owners to borrow additional funds after a property has been owned for some time and has appreciated in value. These loans are generally classified as **home equity loans** (HELs). Borrowers would want to consider these alternatives relative to refinancing existing loans. Generally, lenders usually require that borrower-homeowners have accumulated approximately 20 percent of equity in their properties in order to qualify for home equity loans. Borrowers must also qualify for financing based on income and credit history. Two of the more popular loans currently in use are home equity loans (HELs) and home equity lines of credit (HELOCs).

In the cases of both HELs and HELOCs:

1. Amounts received at closing are not taxable. Such amounts are increases in indebtedness and not a "taxable event" as may be the case if a property was sold at a gain.
2. Interest payments are generally tax deductible as long as the lender acquires a lien on the property.

HOME EQUITY LOANS

These loans usually provide borrowers with a *lump sum* amount at closing. In addition to the borrower's personal liability on the note, lenders also acquire a second mortgage lien on the property. Owner's equity is measured as the difference between the appraised value of the property at the time that the HEL is applied for, minus any loan balance owed on the first lien. For example, if a property is currently appraised to be worth $100,000 and it has an existing first lien in an amount of $40,000, the owner's equity would be $60,000. This $60,000 of equity serves as security for the home equity loan. In practice, because the security provided by second liens is inferior to first liens, HELs are riskier to lenders and will carry a higher rate of interest than that available for first-lien financing. Other characteristics of home equity loans are these:

1. Interest rates may be fixed or adjustable.
2. The loan agreement will specify a maturity period.
3. Payments are usually made monthly.
4. Loan payments may be fully amortizing, partially amortizing, or interest only. In the case of the latter two options, payments will be made for a specified number of months, at which point the loan must become either fully amortizing or the remaining balance at maturity must be repaid.

HOME EQUITY LINES OF CREDIT

Not to be confused with HELs, **home equity lines of credit** (HELOCs) are also available to borrowers. These loans have many characteristics that are similar to *consumer credit loans*. Although HELOCs also are secured by second liens, there are many features of HELOCs that differentiate them from HELs. For example:

1. Although the loan will be made for a specific maximum amount, that amount is not necessarily disbursed as a lump sum. Funds may be borrowed (drawn down) against the line as the consumer-borrower desires. However, when the loan balance reaches a maximum amount, no further draws may be made.
2. Like credit card payments, borrowers generally have some flexibility as to the amount of monthly payment that they choose to make. However, lenders will usually insist that monthly payments be at least some minimum amount. To the extent that borrowers choose to make payments that are less than the monthly interest due, the loan balance will increase (negative amortization). Any payments greater than monthly interest due will reduce the loan balance.
3. Interest rates are usually adjustable and, like ARM rates, are usually tied to a well-known interest rate index (e.g., the prime rate).

4. Like consumer credit card accounts, amounts borrowed and monthly loan payments will determine the loan balance, which may increase or decrease from month to month.

Although HELOCs are similar to many consumer credit loans, because of the added security provided by second liens, HELOCs should be available at interest rates below those of credit card debt. This is because credit card debit is usually unsecured and is totally dependent on a borrower's personal credit and capacity to repay.

In addition to the interest rate, HELOC borrowers should consider the following issues:

1. *Early termination fees.* Because these loans are more like a combination of consumer credit and an ARM, the interest rate is likely to be tied to an index. Consequently, at some future time, interest rates could increase dramatically and borrowers may want to switch to a fixed rate loan. In anticipation of this possibility, HELOC lenders may include a termination fee (similar to a prepayment penalty) in the loan agreement.
2. *Inactivity fees.* Because this loan may be used as a line of credit, if borrowers do not use the line or if they attempt to keep only a small loan balance without terminating the account to avoid the penalty described in (1) (while switching their financing to another lender), a monthly inactivity fee also may be included in the loan agreement. Also, like many credit card loans, there may be an annual renewal or administrative fee associated with this type of loan.

we must consider whether it is desirable for the buyer to pay an additional $5,000 in cash (additional equity invested) to receive the benefit of lower payments on the below-market loan. The calculations are as follows:

	Down Payment	Payment
Market rate loan	$30,000	$795.62
Loan assumption	35,000	709.99
Difference	$ 5,000	$ 85.63

Using a financial calculator, we find that making the additional $5,000 down payment would result in earning the equivalent of 19.41 percent because of the lower monthly loan payments. Alternatively, should the buyer decide not to pay the additional $5,000, he or she would have to find a return of 19.41 percent on the $5,000 in an investment with comparable risk. Because the 19.41 percent rate is higher than the 11 percent market rate, buying the house with below-market financing appears to be desirable.

Solution:

$n = 15 \times 12 = 180$

$PV = -\$5{,}000$

$PMT = \$85.63$

$FV = 0$

Solve for $i = 1.6177\%$ per month

$= 19.41\%$ per year

Function:

$i\,(n, PV, PMT, FV)$

Assuming a Lower Loan Balance

For simplicity, it was assumed in the above example that the balance of the assumable (below-market) loan was the same as the amount available for a new loan at the market rate. As discussed previously, an assumable loan may have a lower balance than a new market rate loan because the seller has paid down the loan and the property may have increased in value. Suppose the balance on the assumable loan in our example is only $50,000 and monthly payments are $507.13. The buyer, however, needs financing of $70,000, the amount that can normally be borrowed at market rates. The borrower may also obtain a second mortgage of $20,000 for 15 years at a 14 percent rate, with payments of $266.35 per month. Is it still desirable to assume the loan, take a second mortgage, and pay $5,000 more for the property? We can make the following calculations:

	Down Payment	Payment
Market rate loan	$30,000	$795.62
Loan assumption + second mortgage	35,000	773.48*
	$ 5,000	$ 22.14

*$507.13 on the $50,000 loan assumption plus $266.35 on the second mortgage.

The return is now −2.90 percent. The buyer is clearly better off by not paying $5,000 more for the property to assume the loan. How much more would the buyer be willing to pay? This is the subject of the next section.

Cash Equivalency

In the previous section, we considered how a buyer could analyze whether a premium should be paid for a property with a below-market-rate loan. We now extend that discussion to consider how much the buyer *could* pay to be indifferent to purchasing the property with a below-market-rate loan or one that must be financed at the market rate.

We will use the example from the last section, where a $70,000 loan could be assumed at a 9 percent rate with a remaining term of 15 years and payments of $709.99 per month. Recall that a comparable property with no special financing available would sell for $100,000 and could be financed at a market rate of 11 percent. How much more than $100,000 could the buyer pay if he or she chose to assume the 9 percent loan and still be as well off as if the property were purchased for $100,000 and financed with an 11 percent loan? We first find the present value of the payments that can be assumed using the *market* rate. This is the market value or **cash equivalent value** of the assumable loan. It represents the price at which the old loan could be sold to a new lender/investor.

Solution:

$n = 15 \times 12 = 180$

$i = 11\%/12 = 0.91666\%$

$PMT = \$709.99$

$FV = 0$

Solve for $PV = \$62,466.30$

Function:

$PV\ (i, n, FV, PMT)$

By assuming the existing loan balance, the buyer would obtain financing equal to $70,000.00 instead of $62,466.30 for the same $709.99 payment. Thus, the buyer receives a net benefit of $70,000.00 – $62,466.30 = $7,533.70. Therefore, the buyer could pay $7,533.70 more for the property, or $107,534 (rounded).

In the previous section, we calculated that the return to the buyer would be 19.41 percent if an additional $5,000 more, or $105,000, were paid for the property. It is possible to verify that by paying $107,534, the buyer's return would be exactly 11 percent, the same as the market interest rate on the loan.

Based on the above analysis, the property with an assumable loan could probably sell for as high as $107,534. The buyer would be paying a cash equivalent value of $100,000 for the property plus an additional **financing premium** of $7,534 to obtain the benefit of the below-market-rate loan. The value of the property remains $100,000. This is referred to as the cash equivalent value for the property. This differs from the *price* paid for the house, which includes the $7,534 financing premium. The recognition of this premium is important because if we knew that the property had actually sold for $107,534 but did not consider that it had an assumable below-market-rate loan, we would have an inflated opinion of value. Alternatively, the buyer would never want to agree to pay $107,534 for the property unless the 9 percent below-market financing could be obtained.

Note that the amount of cash (equity) invested in the property is $107,534, less the mortgage balance of $70,000, or $37,534. When $37,534 is added to the cash equivalent value of the loan of $62,466, we obtain the cash equivalent value for the property of $100,000.

Cash Equivalency: Smaller Loan Balance

In the previous section, we determined the indifference price for a property that had an assumable below-market-rate loan. The loan balance was the same as the buyer could obtain with a market rate loan. However, when loan assumptions occur, it is likely that the loan balance is significantly less than would normally be desired. We now modify the example in the last section by considering that the balance of the assumable 9 percent loan is only $50,000 and the buyer would have to borrow an additional $20,000 through a second mortgage to obtain the $70,000 needed. We assume that the second mortgage could be obtained at a 14 percent rate for a 15-year term. We continue to assume that a $70,000 new first mortgage (70% of the property value) could be obtained at an 11 percent rate with a 15-year term.[18] Now, how much could the buyer pay for the property and be indifferent to the two methods of financing?

We begin by finding the present value of the *sum* of the payments on the assumable loan ($507.13) plus payments on the second mortgage ($266.35), using the 11 percent market rate. The difference between the present value ($68,052.27) and the $70,000 available at the market rate is $1,947.73. Thus, the buyer would now pay only an additional $1,947.73 for the property to get the below-market-rate loan. Therefore, the property would probably sell for no more than $101,950 (rounded). This is considerably less than the $107,500 obtained where the assumable loan had a balance of $70,000 instead of $50,000. There are two reasons that the premium is less: First, because the balance of the assumable loan is less, the saving (from lower payments) is less. Second, because this balance is less than the amount of the loan that could be obtained at the market rate, the benefit from lower payments on the assumable loan is reduced by the necessity of obtaining a second mortgage at a higher interest rate than the rate on a new first mortgage. It is important to realize that when carrying out this analysis, the need for a second mortgage must be considered; otherwise, the benefit of the loan assumption is overstated.

[18] Even if an investor did not need a second mortgage, we can only evaluate the benefit of the loan assumption by comparing it with what is currently available in the market. Since market rates are usually based on a loan-to-value ratio of 70 percent or more, a second mortgage must be considered in the analysis.

Solution:

$n = 15 \times 12 = 180$
$i = 11\%/12 = 0.91666\%$
$PMT = \$773.48$
$FV = 0$
Solve for $PV = \$68{,}052.27$

Function:
$PV(n, i, PMT, FV)$

Cash Equivalency: Concluding Comments

In the previous two sections, we showed how to analyze the impact of below-market financing on the sale price of a property. It is important to recognize the relationship between the price at which a property sells and any special (e.g., below-market) financing that might be available. Although we have considered several examples of cash equivalency calculations, we have only introduced a few of the possible situations that could arise in practice. At least three additional situations could arise that would affect the analysis:

1. If the below-market financing is not transferable to a subsequent buyer, this means that a previous buyer may not benefit from the below-market-rate loan for its remaining term. This obviously affects any financing premiums that would be paid for properties.
2. Even if below-market loans were always assumable by subsequent buyers, the value of this type of financing over the remaining term of the loan to a subsequent buyer depends on the market rate of interest at the time of subsequent sales. These rates may be higher or lower than rates prevailing at the time that the present owner purchased the property. If market rates at the time the property is sold are no longer greater than the contract rate on the assumable loan, then the subsequent buyer would not pay a premium. Hence, the likelihood of subsequent sales and interest rates at such points in time adds an element of uncertainty to the benefit of assuming any loan and should tend to reduce the amount buyers are willing to pay for such loans.
3. Even if the buyer plans to own the property for a time period exceeding the loan term, interest rates could drop after the loan is assumed. Because borrowers can usually refinance when interest rates drop, a below-market-rate loan has less value if interest rates are expected to fall. In effect, the value of the below-market financing is reduced by the "option" to refinance if interest rates fall.

All of the situations discussed above tend to reduce the premium a buyer would pay for a below-market-interest-rate loan. Thus, our analysis is likely to indicate the *upper limit* on the premium associated with below-market-rate loans. The best way to verify the value of such premiums is by observing how much more buyers pay for below-market financing in contrast to properties without special financing.

Wraparound Loans

Wraparound loans are used to obtain additional financing on a property while keeping an existing loan in place. The wraparound lender makes a loan for a face amount equal to the existing loan balance plus the amount of additional financing. The wraparound lender agrees to make the payments on the existing loan as long as the borrower makes payments on the wraparound loan. Instead of making payments on the original loan in addition to payments on a second mortgage, the borrower makes a payment only on the wraparound loan.

Suppose a property owner named Smith has an existing loan with a balance of $90,000 and monthly payments of $860.09. The interest rate on the loan is 8 percent and the remaining loan term is 15 years. From the time Smith originally obtained this loan, the property has risen in value to $150,000. Smith's current loan balance is 60 percent of the current value of the property. He would like to borrow an additional $30,000, which would increase his debt to $120,000, or 80 percent of the property value.

Assume that the current effective interest rate on a first mortgage with an 80 percent loan-to-value ratio is 11.5 percent with a term of 15 years, and the current effective interest rate on a second mortgage for an *additional* 20 percent of value ($30,000) would be 15.5 percent for a term of 15 years.

A lender other than the holder of Smith's existing loan is willing to make a wraparound loan for $120,000 at a 10 percent rate for a 15-year term. Payments on this loan would be $1,289.53 per month. If Smith makes this loan, the wraparound lender will take over the payments on Smith's current loan; that is, Smith will pay $1,289.53 to the wraparound lender, and the wraparound lender will make the $860.09 payment on the original loan. Thus, Smith's payment would increase by $429.44 ($1,289.53 − $860.09) per month. Because the wraparound lender is taking over the payments on the old loan, Smith will actually receive only $30,000 in cash (the $120,000 amount for the wraparound loan less the $90,000 balance of Smith's current loan).

Is the wraparound loan a desirable alternative for Smith to obtain an additional $30,000? The rate on the $120,000 wraparound loan (10%) is less than the market rate (11.5%) on a new first mortgage for the entire $120,000. Thus, the wraparound loan would be more desirable than refinancing with a new first mortgage.[19] Why would the wraparound lender make a loan that has a lower rate than a new first mortgage? The answer is that the wraparound lender is primarily concerned with earning a competitive rate of return on the *incremental* funds loaned (i.e., the additional $30,000). It is the effective cost of the incremental funds loaned that the borrower also should be concerned about.

What is the cost of the incremental $30,000? This is analogous to determining the incremental borrowing cost of a loan that we discussed at the beginning of the chapter. That is, we want to know the incremental cost of the 80 percent wraparound loan versus the 60 percent existing loan. To get the additional $30,000 on the wraparound loan, the borrower must pay a 10 percent interest rate on the entire $120,000, not solely the additional $30,000. Because the rate on the existing $90,000 is only 8 percent, the incremental cost of the additional $30,000 is greater than 10 percent. The question is whether the incremental cost is more or less than the 15.5 percent rate for a second mortgage of $30,000.

The incremental borrowing cost of the wraparound loan can be determined by finding the interest rate that equates the present value of the additional payment with the additional funds received. Using a financial calculator, we find that the interest rate is 15.46 percent or about 15.5 percent. This is the same rate as that for a second mortgage, which is what we would expect. The wraparound lender can charge a lower rate on the wraparound loan and still earn a competitive rate on the incremental funds loaned because the existing loan is at a below-market rate. The wraparound rate of 10 percent is, in effect,

[19] It is assumed that there are no points on the wraparound loan so that the effective cost of the wraparound loan is 10 percent. The cost of a wraparound loan can be compared with the cost of a new first mortgage because both rates reflect the cost of a loan for $120,000.

a weighted average of the rate on the existing loan (8 percent) and the rate on a second mortgage (15.5%).[20] If the existing loan were at the market rate for a 60 percent loan, then the wraparound rate would have to be equal to the rate on an 80 percent loan, so that the wraparound lender would earn a rate of return on the incremental funds equal to a second mortgage rate.

Solution:

$n = 15 \times 12 = 180$

$PV = -\$30{,}000$

$PMT = \$429.44$

$FV = 0$

Solve for $i = 15.46\%$

Function:

$i\,(n, PV, PMT, FV)$

Is there any reason why the wraparound lender should be willing to make the loan at a rate that is more attractive than a second mortgage? The wraparound loan is, in effect, a second mortgage because the original loan is still intact. Furthermore, the loan-to-value ratio is increased by the same amount with the wraparound loan as it would be with a second mortgage. However, the wraparound loan has one advantage: The wraparound lender makes the payments on the first mortgage loan. Hence, control is retained over default in its payment, whereas if a second mortgage was made, the second mortgage lender would not necessarily be aware of a default on the first mortgage loan and might not be included in foreclosure action resulting from it. In a typical wraparound mortgage agreement, the wraparound lender is obligated to make payments on the original mortgage only to the extent that payments are received from the borrower, and the borrower agrees to comply with all of the covenants in the original mortgage except payment. Any default by the borrower will be realized by the wraparound lender, who may not want to see the property go into foreclosure. The wraparound lender may make advances on the first mortgage and add them to the balance on the wraparound loan, foreclose on its mortgage, or negotiate for the title to the property in lieu of foreclosure, while still making payments on the first lien. Thus, the wraparound lender may be willing to earn an incremental return that is slightly lower than a second mortgage rate.

It should be noted that the original mortgage may contain a prohibition against further encumbrances or a due-on-sale clause that may preclude use of a wraparound loan to access equity in, or finance the sale of, property. In the absence of these restrictions, the original lender may also be willing to work out a deal with Smith that would be attractive to both of them. For example, this lender might offer Smith a new first mortgage at the same 10 percent rate as the wraparound loan (rather than the 11.5% market rate on a first mortgage) if Smith agrees to borrow the additional \$30,000 from the bank. Again, because the 10 percent rate applies to the entire \$90,000 (not only the additional \$30,000), the original lender can earn an incremental return of 15.5 percent on the incremental funds advanced. Thus, the existing lender can earn a competitive rate of return on the new funds and keep the existing borrower as a customer. The lender still earns only 8 percent on the existing loan, but this would also be true if the

[20] The weighted average is (90,000 ÷ 120,000 × 8%) + (30,000 ÷ 120,000 × 15.5%) = 9.875 percent, or about 10 percent, which is the rate on the wraparound loan. Note that the weighted average is less than the 11.5 percent rate on a new \$120,000 first mortgage, which indicates that the existing loan is at a below-market rate.

borrower gets a second mortgage or a wraparound loan from a different lender. Thus, the original lender may be willing, in effect, to offer the same deal as a wraparound lender by charging a rate on a new first mortgage that is equal to the wraparound rate of 10 percent.[21]

Buydown Loans

The final type of loan situation we consider is the **buydown loan.** With a buydown loan, the seller of the property (frequently a builder) pays an amount to a lender to buy down, or lower, the interest rate on the loan for the borrower for a specific period of time. This may be done in periods of high interest rates to help borrowers qualify for financing. For example, suppose that interest rates are currently 15 percent and a purchaser of a builder's property has only enough income to qualify for a loan at a 13 percent fixed rate. Let us assume that the loan will be for $75,000 with monthly amortization based on a 30-year term. Payments based on the market rate of 15 percent would be $948.33 per month. Payments at a 13 percent rate would be only $829.65 per month. Based on the buyer's income, the buyer would qualify to make payments of $829.65 but not $948.33. Suppose that the builder wanted to buy down the interest rate from 15 to 13 percent, thereby enabling the bank to make the loan, so that payments are only $829.65 per month for the first five years of the loan term but will increase to $948.33 for the remaining loan term. To accomplish this, the builder would have to make up the difference in payments ($118.68 per month for the five-year period). If this difference were paid by the builder to the lender at the time the loan closed, the amount paid would have to be the present value of the difference in payments, discounted at the market rate of 15 percent. The builder would therefore pay $4,988.67 to the lender to buy down the loan. When coupled with the payments received from the buyer, the lender would earn a market rate of 15 percent and be willing to qualify the buyer.

Solution:

$n = 5 \times 12 = 60$

$i = 15\% \div 12 = 1.25\%$

$PMT = \$118.68$

$FV = 0$

Solve for $PV = \$4{,}988.67$

Function:

$PV(n, i, PMT, FV)$

The buydown has the advantage of allowing borrowers to qualify for the loan when their current income might not otherwise meet the lender's payment-to-income criteria. Based on our discussion of cash equivalent value, however, you should realize that the builder will probably have added the buydown amount to the price of the property. Thus, the borrower might be better off bargaining for a lower price on the property and obtaining his or her own loan at the market rate. Probably, the same home or a similar one could be obtained for $4,988.67 less without a buydown. The borrower is, in effect, paying $4,988.67 in "points" to lower the interest rate to 13 percent from 15 percent.

[21] This is often referred to as a "blended rate" because the 10 percent rate is a weighted average of the rate on the existing loan and the rate on the incremental funds loaned.

It should also be noted that many buydowns are executed with graduated payments for three or five years; that is, to continue with our current example, they may be initiated with monthly payments of $829.65 and step up each year by a specified amount until $948.33 is reached in the fifth year.

Some buydown programs are also used in conjunction with adjustable rate mortgages, where the initial rate of interest will be bought down. Because initial rates on ARMs are typically lower than those on fixed rate mortgages, this results in even lower initial payments, thereby allowing more buyers to qualify. However, this type of buydown practice has been discouraged because payments may increase considerably, particularly if there is an increase in the market rate of interest. In these cases, payments would rise because of higher market rates and because future payments have not been bought down.

Conclusion

This chapter has illustrated a number of problems concerning financing situations that borrowers and lenders might face. In today's era of creative financing, many other examples could be discussed. However, we have chosen examples that illustrate the main concepts and approaches to solving important problems. These can be applied to other situations that you might want to analyze. Thus, this chapter should be viewed as introducing various tools that can be used to handle problems relating to both residential and commercial properties.

To keep our analysis as straightforward as possible and focus on the key new concepts we wanted to introduce, we have used fixed rate mortgages in all our examples in this chapter. However, the analyses also apply to other types of mortgages, such as ARMs, and floating rate and other loans.

Key Terms

biweekly payments, *162*
buydown loan, *177*
cash equivalent value, *172*
effective cost of refinancing, *161*
financing premium, *173*
home equity line of credit, *170*
home equity loan, *170*
incremental cost of borrowing, *150*
loan refinancing, *158*
marginal cost of borrowing, *150*
market value of a loan, *165*
origination fees, *153*
wraparound loan, *174*

Useful Web sites

www.businessfinance.com/wraparound-mortgage.htm—Examples of wraparound loans.

www.fha-home-loans.com/buydown_fha_loan.htm—Discussion of how FHA buydown loans are structured.

www.bankrate.com—Good source of rates and articles on different kinds of mortgages. Includes some useful mortgage calculators to choose between loan alternatives.

www.mgic.com—Mortgage Guarantee Insurance Corporation, a national provider of private mortgage insurance.

www.freddiemac.com/pmms/pmms30.htm—This is a good site for finding fixed rates and points for 30-year mortgages.

www.freddiemac.com/pmms/pmmsarm.htm—This is a good site for finding monthly average commitment rates and points on one-year adjustable rate mortgages.

www.ipd.com—This website provides objective measurement and analysis of various properties. The company that runs this website does not invest in the market and does not offer any direct investment advice, so it tends to be unbiased.

Questions

1. What are the primary considerations that should be made when refinancing?
2. What factors must be considered when deciding whether to refinance a loan after interest rates have declined?
3. Why might the market value of a loan differ from its outstanding balance?

4. Why might a borrower be willing to pay a higher price for a home with an assumable loan?
5. What is a buydown loan? What parties are usually involved in this kind of loan?
6. Why might a wraparound lender provide a wraparound loan at a lower rate than a new first mortgage?
7. Assuming the borrower is in no danger of default, under what conditions might a lender be willing to accept a lesser amount from a borrower than the outstanding balance of a loan and still consider the loan paid in full?
8. Under what conditions might a property with an assumable loan sell for more than comparable properties with no assumable loans available?
9. What is meant by the incremental cost of borrowing additional funds?
10. Is the incremental cost of borrowing additional funds affected significantly by early repayment of the loan?

Problems

1. A borrower can obtain an 80 percent loan with an 8 percent interest rate and monthly payments. The loan is to be fully amortized over 25 years. Alternatively, he could obtain a 90 percent loan at an 8.5 percent rate with the same loan term. The borrower plans to own the property for the entire loan term.
   a. What is the incremental cost of borrowing the additional funds? (*Hint:* The dollar amount of the loan does not affect the answer.)
   b. How would your answer change if two points were charged on the 90 percent loan?
   c. Would your answer to part (*b*) change if the borrower planned to own the property for only five years?
2. An investor has $60,000 to invest in a $280,000 property. He can obtain either a $220,000 loan at 9.5 percent for 20 years or a $180,000 loan at 9 percent for 20 years and a second mortgage for $40,000 at 13 percent for 20 years. All loans require monthly payments and are fully amortizing.
   a. Which alternative should the borrower choose, assuming he will own the property for the full loan term?
   b. Would your answer change if the borrower plans to own the property only five years?
   c. Would your answers to (*a*) and (*b*) change if the second mortgage had a 10-year term?
3. An investor obtained a fully amortizing mortgage five years ago for $95,000 at 11 percent for 30 years. Mortgage rates have dropped, so that a fully amortizing 25-year loan can be obtained at 10 percent. There is no prepayment penalty on the mortgage balance of the original loan, but three points will be charged on the new loan and other closing costs will be $2,000. All payments are monthly.
   a. Should the borrower refinance if he plans to own the property for the remaining loan term? Assume that the investor borrows only an amount equal to the outstanding balance of the loan.
   b. Would your answer to part (*a*) change if he planned to own the property for only five more years?
4. Secondary Mortgage Purchasing Company (SMPC) wants to buy your mortgage from the local savings and loan. The original balance of your mortgage was $140,000 and was obtained five years ago with monthly payments at 10 percent interest. The loan was to be fully amortized over 30 years.
   a. What should SMPC pay if it wants an 11 percent return?
   b. How would your answer to part (*a*) change if SMPC expected the loan to be repaid after five years?
5. You have a choice between the following two identical properties: Property A is priced at $150,000 with 80 percent financing at a 10.5 percent interest rate for 20 years. Property B

is priced at $160,000 with an assumable mortgage of $100,000 at 9 percent interest with 20 years remaining. Monthly payments are $899.73. A second mortgage for $20,000 can be obtained at 13 percent interest for 20 years. All loans require monthly payments and are fully amortizing.

a. With no preference other than financing, which property would you choose?

b. How would your answer change if the *seller* of Property B provided a second mortgage for $20,000 at the same 9 percent rate as the assumable loan?

c. How would your answer change if the seller of Property B provided a second mortgage for $30,000 at the same 9 percent rate as the assumable loan so that no additional down payment would be required by the buyer if the loan were assumed?

6. An investor has owned a property for 15 years, the value of which is now to $200,000. The balance on the original mortgage is $100,000 and the monthly payments are $1,100 with 15 years remaining. He would like to obtain $50,000 in additional financing. A new first mortgage for $150,000 can be obtained at a 12.5 percent rate and a second mortgage for $50,000 at a 14 percent rate with a 15-year term. Alternatively, a wraparound loan for $150,000 can be obtained at a 12 percent rate and a 15-year term. All loans are fully amortizing. Which alternative should the investor choose?

7. A builder is offering $100,000 loans for his properties at 9 percent for 25 years. Monthly payments are based on current market rates of 9.5 percent and are to be fully amortized over 25 years. The property would normally sell for $110,000 without any special financing.

   a. At what price should the builder sell the properties to earn, in effect, the market rate of interest on the loan? Assume that the buyer would have the loan for the entire term of 25 years.

   b. How would your answer to part (*a*) change if the property is resold after 10 years and the loan repaid?

8. A property is available for sale that could normally be financed with a fully amortizing $80,000 loan at a 10 percent rate with monthly payments over a 25-year term. Payments would be $726.96 per month. The builder is offering buyers a mortgage that reduces the payments by 50 percent for the first year and 25 percent for the second year. After the second year, regular monthly payments of $726.96 would be made for the remainder of the loan term.

   a. How much would you expect the builder to have to give the bank to buy down the payments as indicated?

   b. Would you recommend the property be purchased if it was selling for $5,000 more than similar properties that do not have the buydown available?

9. An appraiser is looking for comparable sales and finds a property that recently sold for $200,000. She finds that the buyer was able to assume the seller's fully amortizing mortgage which had monthly payments based on a 7 percent interest rate. The balance of the loan at the time of sale was $140,000 with a remaining term of 15 years (monthly payments). The appraiser determines that if a $140,000 loan was obtained on the same property, monthly payments at the market rate for a 15-year fully amortizing loan would have been 8 percent with no points.

   a. Assume that the buyer expected to benefit from the interest savings on the assumable loan for the entire loan term. What is the cash equivalent value of the property?

   b. How would your answer to part (*a*) change if you assumed that the buyer only expected to benefit from interest savings for five years because he would probably sell or refinance after five years?

10. A borrower is making a choice between a mortgage with monthly payments *or* biweekly payments. The loan will be $200,000 at 6 percent interest for 20 years.

    a. How would you analyze these alternatives?

    b. What if the biweekly loan was available for 5.75 percent? How would your answer change?