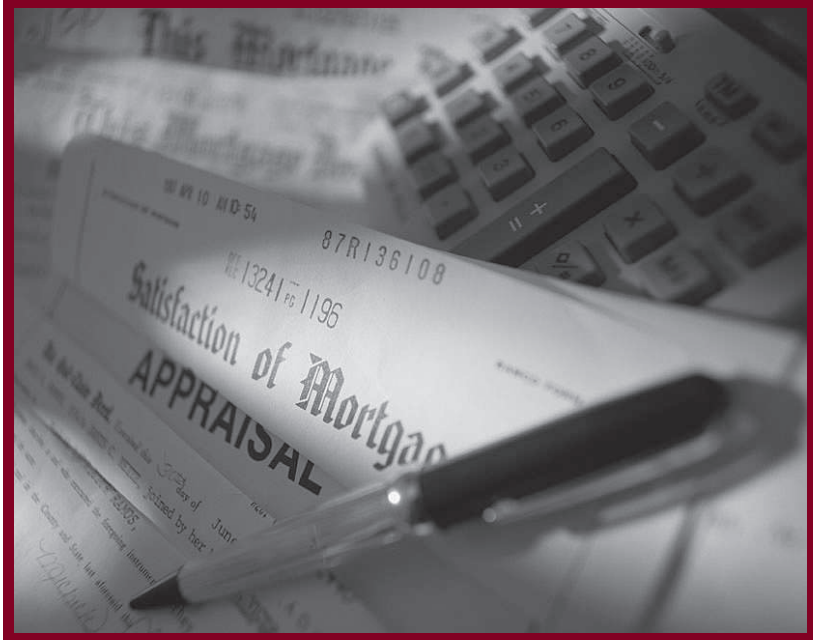
Reviewing
CAPTIALIZATION RATES



International Real Estate Institute

FOREWORD

With the advent of state appraiser certification and increased fee competition, more state certified appraisers are performing and reviewing income property appraisals. Knowledge of current practice of estimating overall capitalization rates and the basic mathematical theory of capitalization and discount rates is essential for proper application and review. Three methods of estimating capitalization rates and the use of discounted cash flow analysis are presented.

In addition, the basic arguments about the reinvestment rate of the internal rate or return are explained; authors that have been on both sides of the issue are cited. Illustration of the internal rate of return, modified internal rate of return, and financial management rate of return are presented. The authors challenge if reinvestment is necessary in analysis of a typical income-producing property. A new adjustment to the internal rate of return theory creates another-rea/ estate rate of return (RERR)- method.

By applying this technique to partitioning between annual cash flows and sales proceeds the percentage contribution of cash flows increases and the percentage contribution of sales proceeds decreases.

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With increasing opportunities to appraise, and to review appraisals of, income properties by primarily residential appraisers, additional appraisal skills regarding the income approach and capitalization rates are required. One of the most challenging areas of the appraisal for review is the capitalization rate applied by the appraiser in the income approach of the appraisal report.

THE BASICS

The classical standard of income-based valuation is the present value of future benefits; in the case of an income-producing property, those future benefits are anticipated either future net operating incomes or cash flows. The basic capitalization formula is Value = Net Operating Income (NOD/Capitalization Rate. The overall capitalization rate (OAR) has two components: return on the investment (interest) and return of the investment (recapture of principal). Hence, an overall capitalization rate is similar to a mortgage loan constant that includes the interest rate and the sinking fund factor for the recapture of loan principal.

There are several methods of estimating overall capitalization rates to be used in an income property appraisal. Three of these methods are selecting overall rates from comparable improved sales, using Ellwood's mortgage-equity method, and using the internal rate of return (IRR) to discount future cash flows to present value. Please note that the IRR is not an overall capitalization rate; it is an interest rate and is sometimes defined as a discount rate. Appraisal books and courses also mention the built-up method for estimating overall capitalization rates; although this method is helpful in understanding the construction of capitalization rates, it is not useful in estimating overall rates to be applied in appraisals.

CAPITALIZATION RATES FROM COMPARABLE SALES

If there is an active sales market for comparable properties, overall capitalization rates can be estimated from comparable improved sales where the price and the net operating income of the sale are known. The basic valuation formula, VALUE=NOI/OAR, can be revised to OAR=NOI/PRICE. Hence, the overall capitalization rate can be estimated from each comparable sale by dividing the net operating income by the price. The degree of comparability is based on the age and condition of the improvements, rent per square foot, vacancy percentage, operating expenses per square foot and/or per unit, and the net operating income per square foot. The appraiser should also note whether or not reserves for replacements are included in the comparable sale's operating expenses.

CAPITALIZATION RATES FROM MORTGAGE-EQUITY ANALYSIS

The mortgage-equity method of estimating capitalization rates is based on the current mortgage financing terms that are available to the subject property. This method is a revision of the band of investment method that is a weighted average of the mortgage and equity portions of the overall capitalization rate. The band of investment method adds the result of the loan-to-value (LTV) ratio multiplied by the annual mortgage constant (K) to the result of the equity percentage multiplied times the equity rate of return. For example, assuming an equity return rate of 12%, a LTV ratio of 75%, mortgage interest rate of 8%, and a mortgage term of 25 years, the calculation of the basic capitalization rate would be calculated thusly:

	LTV		K		AVERAGE
MORTGAGE	75%	x	0.0926	=	0.0695
EQUITY	25%	x	0.1200	=	0.0300

Basic Overall Capitalization Rate: 0.0995 or 9.95%

This basic overall capitalization rate is adjusted based upon the mortgage principal paid off during the holding period and whether the appraiser expects the property to depreciate or appreciate in value during the holding period. Because the reduction of mortgage principal is a benefit to the equity investor, the adjustment to the overall rate is deducted. The adjustment calculation is the LTV times the sinking fund factor (SFF) at the equity rate for the holding period term times the % of loan paid off during the holding period. Assuming a ten-year holding period, the example continues:

BASIC RATE: 0.0995	LTV		SFF		% PAID		
Less Mortgage Principal	75%	x	0.057	x	0.1924	=	- 0.0082

Adjusted Basic Overall Capitalization Rate: 0.0913 or 9.13%

The overall rate is further adjusted by a deduction if appreciation in value is expected or an increase if depreciation in value is expected. For example, assuming a 1% per year decline in value during the holding period, the sinking fund factor (at the equity yield rate for the holding period term) is multiplied times the future value factor less one at the annual increase percentage for the holding period term, as follows:

ADJUSTED RATE: 0.0913	LTV		SFF		
Plus Decline in Value	0.057	x	0.1046	=	+ 0.0060

Overall Capitalization Rate: 0.0973 or 9.7%

DISCOUNTED CASH FLOW ANALYSIS

Another method of estimating the market value or leased fee value of an income-producing property is termed discounted cash flow analysis (DCF). The DCF method estimates expected future cash flows and discounts those cash flows to present value, using an investor-market discount rate; this discount rate is also defined as the investor's internal rate of return (IRR). Several national investor surveys report discount (IRR) rates for different classes of income properties. Cushman & Wakefield's Valuation Advisory Services and the Korpacz Real Estate Investor Survey report two investor surveys periodically. Please note that these investor surveys are typically for investor-grade income properties. A recent Cushman & Wakefield Investor Survey (Fall, 2001) reported the overall average range of discount (IRR) rates from 12.0% to 12.2%; whereas, overall capitalization rates ranged from 9.2% to 9.4%.

In the DCF method, there are usually two cash flows: the annual cash flows from noperations (NOI) and the proceeds from a sale of the property at the end of the anticipated holding period. These two cash flows are discounted to present value at the investor-market discount (IRR) rate, and then added together for the total present value. For example, assuming an investor IRR of 12%, a 10-year holding period, annual cash flows of $100,000 and sales proceeds before income taxes of $1,000,000, the present value can be calculated:

ANNUAL CF		PV/1 PER PERIOD		PV CF
$100,000	x	5.6502	=	$565,020
SALES PROCEEDS		PV OF 1		PV SP
$1,000,000	x	0.321973	=	$321,973

Total Present Value (PV CF + PV SP): $886,993 or rounded $890,000

REINVESTMENT CONCERNS

Traditional financial and appraisal literature is replete with arguments concerning the reinvestment rate, overall capitalization rates, and the internal rate of return. The basic mathematical theory of the internal rate of return assumes that proceeds received from investments are reinvested at the same rate as the internal rate of return. Two theoretical problems typically cited with the internal rate of return are the possibility of multiple rates of return with the same data (given that cash flow changes to a loss and back to a profit during the analysis period), and the problem with the assumed high reinvestment rate at the internal rate Regarding the latter, Pyhrr and Cooper state:

The IRR is an internal rate of return on capital within an investment. No mention has been made of a rate of return on cash flows withdrawn on the investment. However, there is an implicit assumption that the cash proceeds from the investment can be reinvested at the calculated IRR. If the timing of the cash flows differs among the investments being compared, and if the investor is choosing between mutually executive investment alternatives, the IRR may provide a misleading indicator of investment desirability. The go/no-go decision (accept-reject) will be the same using both PV and IRR Approaches, but the two may rank projects differently. In the PV approach, cash flows are assumed to be reinvested at the required IRR (discount rate); this is considered to be a more conservative and consistent assumption by many analysts.[1]

Finance literature makes the same assumption regarding the IRR reinvestment; for example, Block and Hirt wrote: A prime characteristic of the internal rate of return is the assumption that all inflows can be reinvested at the yield [the IRR rate] from a given investment . . . for investments with a very high IRR, it may be unrealistic to assume that reinvestment can take place at an equally high rate.

THE DEBATE

The debate in real estate appraisal literature has traditionally centered on the conflict between sinking fund recapture at a lower safe rate verses annuity recapture at the higher IRR or market rate. For example, assume that a property produces an annual net income of $2,774 for an expected term of 5 years; the market discount rate (IRR rate) is 12%, and the safe investment rate is 7%. The present value of an annual annuity of $2,774 at 12% for 5 years is $10,000; and, reciprocally, the installment to amortize a loan of $10,000 at 12% interest for 5 years is $2,774. However, the lower safe reinvestment rate of 7% would indicate a lower present value of $9,439 (3.4026 * $2,774). A formula for the installment to amortize a mortgage loan (mortgage loan constant) is the interest rate per period plus the sinking fund factor at the same interest rate; hence, i+[i/(1+i)n-1], where i = interest rate per period and n = number of periods. Mr. Peter Gray, an honorary member of the Institute of Actuaries, credited Hoskold for being the first to publish the mortgage loan constant as being the sinking fund factor plus the rate of interest.[3]

Some of those authors supporting the use of a sinking fund factor at a lower safer rate were: Henry Hoskold (1877), Herbert Hoover (1909, yes he was the President), Grimes and Craigue (1928), Ivan Thorson (1934), Gibbons and Rushmore (1975), and Messner and Findlay (1975). Those in favor of annuity valuation, or reinvestment at the higher IRR rate, were T. A. O'Donahue (1910), Fredrick M. Babcock (1939), George Schmutz (1936), Alfred A. Ring (1963), Gene Dilmore (1964), and H. S. Kern (1980).4 T. A. O'Donahue argued for the amortization feature of an annuity: ". . . the annuity should provide interest at the stipulated rate on the outstanding capital only . . ." He also criticized Hoskold for not understanding that ". . . there is no question of interest on the redemption fund."[5]

Gene Dilmore wrote in 1964 that he objected to the sinking fund method of capitalization at a safe rate primarily because: The method requires the separate evaluation of a fund invested in other than real estate while actual returns of capital, in the aggregate and over the long run, are reinvested in real estate at a rate reflecting a given risk rather than a safe rate.[6]

Mr. Dilmore demonstrated that an ordinary loan amortization does not require reinvestment of the principal proceeds each payment period and/or for the investor (lender) to earn the stated interest rate, or internal rate of return. He also concluded that the annuity method of capitalization at the market rate of interest was the only correct method.

However, most contemporary finance and real estate literature, for example college textbooks, continue to focus on reinvestment at the IRR rate as a problem.' A typical finance textbook would state that reinvestment is at the same rate as the internal rate of return; whereas, in practice being able to invest smaller sums of money at the higher IRR rate seems unlikely. Perhaps an example of the internal rate of return, (IRR), the modified internal rate of return (MIRR), and the financial management rate of return (FMRR) will help to clarify and simplify this reinvestment issue.

INTERNAL RATE OF RETURN

Let us assume that we are a mortgage lender and have agreed to loan or invest $10,000, to charge 12% interest (which coincidentally equals the internal rate of return in this case), and for the loan to be repaid over five years with annual payments at the end of each year. Based on the above definition of a mortgage loan constant as being the interest rate plus the sinking fund factor at the same interest rate, the annual payment is calculated to be $2,774 (rounded). Hence, this amortization table discloses:

YEAR	PAYMENT	INTEREST	PRINCIPAL	BALANCE
1	$2,774	$1,200	$1,574	$8,426
2	$2,744	$1,011	$1,763	$6,663
3	$2,774	$800	$1,975	$4,688
4	$2,774	$563	$2,211	$2,477
5	$2,744	$297	$2,477	$0
Total	$13,870	$3,870	$10,000	IRR $12.0%

The amortization table to the left reveals that interest is calculated at 12% per year on the unpaid balance, the balance is reduced each year by the difference between the payment and the interest, and that the principal reduction is not reinvested at any rate of interest to achieve the internal rate of return yield of 12%. And the internal rate of return of return, or yield, is exactly 12% per year to the investor. This example tends to support the views of O'Donahue and Dilmore.

MODIFIED INTERNAL RATE OF RETURN

James E. Gibbons and Steven Rushmore in 1975 suggested modifying the internal rate of return to overcome this reinvestment problem.8 To overcome the reinvestment concern about the internal rate of return being greater rate of return that the market rate, the modified internal rate of return was developed. This technique compounds the positive cash flows forward at theoretical market rate of interest, somewhat less than the internal rate of return, in an attempt to duplicate market reality. These future values are then summed and compared to the original investment; whatever interest rate causes the original investment to grow to the sum of these future values over the investment term is calculated to be the modified internal rate of return (MIRR). Our example using the $10,000 investment at a 10% market reinvestment rate is illustrated below:

YEAR	CASH FLOWS	TERM	FUTURE VALUES
1	$2,774	4	$4,062
2	$2,774	3	$3,692
3	$2,774	2	$3,357
4	$2,774	1	$3,052
5	$2,774	0	$2,774
	MIRR $11.11%		$16,936

MODIFIED INTERNAL RATE OF RETURN

Market Rate: 10.0%

Note that in the example to the left, the reinvestment rate of 10% thereby reduces the internal rate of 12% to the modified internal rate of 11.11%.

FINANCIAL MANAGEMENT RATE OF RETURN

Steven D. Messner, M. Chapman Findlay, and J. W. Levine developed the financial management rate of return model (FMRR) in 1973 to overcome all of the objections to the IRR. However, in practical application the FMRR is helpful in avoiding the possibility of multiple IRR's when the cash flows include positive and negative changes during the holding period. The basic steps in calculation the FMRR are:

1. To remove all future outflows by utilizing prior inflows when possible.
2. To discount all remaining outflows to the present at the safe rate.
3. Compound forward those positive cash flows remaining at the appropriate [market] rate.[9]

Continuing with our example of an investment of $10,000 and internal rate of return of 12%, a market rate of 10%, and a safe rate of 7%, we also assume that the market rate of return requires an initial investment sum of at least $2,500. Since there are no negative cash flows after the initial down payment in our investment, a calculation of the safe rate is unnecessary according to the FMRR theory. The FMRR data is identical to the MIRR as follows:

FINANCIAL MANAGEMENT RATE OF RETURN	YEAR	CASH FLOWS	TERM	FUTURE VALUES
	1	$2,774	4	$4,062
Market Rate: 10.0%	2	$2,774	3	$3,692
Safe Rate: 7.0%	3	$2,774	2	$3,357
Requires $2,500+	4	$2,774	1	$3,052
	5	$2,774	0	$2,774
		FMRR $11.11%		$16,936

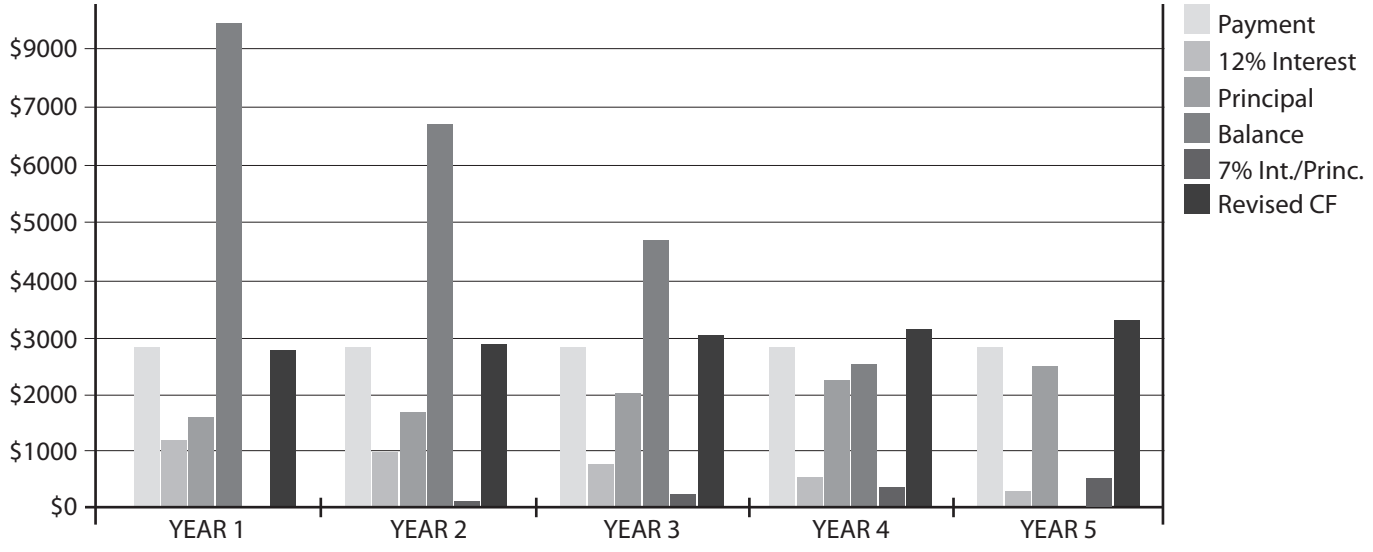
Hence the financial management rate (FMRR) equals 11.11 %, which is identical to the modified rate (MIRR) under the stated assumptions. It should be mentioned, however, that the financial management rate is useful to avoid multiple internal rates when there are negative and positive cash flow.

REAL ESTATE RATE OF RETURN

An interesting question arises: What would happen to the internal rate of return if, in fact, the recapture portion (principal) of our investment were invested at a safe rate, say a Treasury Bill rate of 7%? This investment would actually add interest to our cash flow starting in year two. With all other assumptions being the same: an investment of $10,000, 12% interest rate, term of five years, annual payment or cash flow of $2,774, a market rate of 10%, and a safe rate of 7%. The principal received each year is invested at the treasury bill rate of 7%, and the resulting interest is added to the payment (cash flow) of $2,774 to compute the revised cash flow. The table shows comparable calculations under those assumptions:

YEAR	PAYMENT	12% INT.	PRINCIPAL	BALANCE	7% INT/PRINC.	REVISED CF
1	$2,774	$1,200	$1,574	$8,426	$0	$2,774
2	$2,774	$1,011	$1,663	$6,663	$110	$2,884
3	$2,774	$800	$1,975	$4,668	$227	$3,000
4	$2,774	$563	$2,211	$2,477	$365	$3,139
5	$2,774	$297	$2,477	$0	$520	$3,294
IRR: 14.99%	$13,870	$3,870	$10,000		$1,222	$15,094

Recalculating the internal rate of return based on the revised cash flows, the IRR calculates to be 14.99% as compared to the original internal rate of return of 12%, the modified rate of 11.11 %, and the financial management rate of 11.11 %. Why don't we name this last rate of return the real estate rate of return (RERR). We are calculating interest and returns based on cash flows rather than sinking fund factors. Therefore, if we are prudent investors, if we receive the specified cash flows on our $10,000 investment in a timely manner, and if we invest the principal received each year at a very conservative rate of interest, the real estate rate (RERR) will consistently exceed the internal rate, modified rate, and financial management rate by quite a bit. In this latter case, we will have earned interest in our outstanding investment at the annual rate of 14.99% and recaptured our total investment over the investment period. Of course in the real estate rate (RERR) example, if we reinvested the principal reduction received each year at a rate higher than the safe rate, say the market rate of 10%, the RERR would be an even higher rate of 16.3%.



THE EFFECTS OF RERR ON IRR PARTITIONING

Let us add to our example the sales proceeds of $10,000 in year six, keep all other assumptions the same, recalculate the internal rate, and then partition the internal rate according to cash flows and sales proceeds.

IRR PARTITIONING	YEAR	CASH FLOWS	SALE PROCEEDS	TOTAL
	0	$10,000	-	-
	1	$2,774	-	$2,774
	2	$2,774	-	$2,774
	3	$2,774	-	$2,774
	4	$2,774	-	$2,774
	5	$2,774	$10,000	$12,774
	TOTALS	$13,870	$10,000	
	PV @ 27.74%	$7,060	$2,940	
	% of IRR	70.6%	29.4%	100%

Note that the resulting internal rate equals 27.74%, and that the present value of the annual cash flows of $2,774 each represents 70.6% of the internal rate, and the present value of the sales proceeds of $10,000 equals 29.4% of the internal rate.

Next, the cash flows are revised like the above real estate rate (RERR) example to include the interest earned on the principal reinvested at the market rate of 10.0% according to the following chart:

RERR PARTITIONING	YEAR	CASH FLOWS	SALE PROCEEDS	@ 30.33%
RERR: 10% Market Rate: 10%	1	$2,700	-	$2,128
	2	$2,932	-	$1,726
	3	$3,108	-	$1,404
	4	$3,305	-	$1,145
	5	$3,526	$10,000	$938
	TOTALS	$15,645	$10,000	$7,341
	PV @ 30.3%	$7,341	$2,659	
	% of RERR	73.4%	26.6%	

Hence the revised real estate (RERR) is 30.33%; and the revised cash flows contribute 73.4% of the real estate rate, and the sales proceeds contribute 26.6% of the real estate rate. According to these examples, the investment of principal reductions at the market rate of 10.0% increased the annual cash flows contribution by approximately 2.8% of the real estate rate and accordingly reduced the sales proceeds contribution to the RERR by the same percentage.

CONCLUSIONS

The basic conclusions from this reinvestment analysis are as follows:

1. On a typical amortized real estate investment, the reinvestment assumption is unnecessary.
2. Where actual reinvestment of principal received occurs, even at low safe rates, the RERR consistently exceeds the IRR.
3. When partitioning the RERR, the percentage from the revised cash flows contribute more to the RERR than the reversionary sales proceeds because of increased annual cash flows due to the actual investing of principal funds received.

Additional research regarding the impact of the real estate rate's assumptions on the holding period, risk analysis, and investor behavior may be helpful.

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