FINANCIAL SERVICES REVIEW

Financial Services Review 13 (2004) 111–121

The impact of loan rates on direct real estate investment holding period return

James E. Larsen

Department of Finance and Financial Services, Raj Soin College of Business, Wright State University, Dayton, OH 45435, USA

Received November 2003; accepted February 2004

Abstract

Today's low mortgage interest rates make direct real estate investments attractive to individual investors. However, low rates may result in an investor paying too much for the property. Sensitivity analysis conducted on a set of projected financial statements for a direct real estate investment shows the potential impact of changing rates on holding period return. Higher subsequent loan rates can have a significant negative effect on the investor's return, but the impact may be mitigated by extending the holding period. Individuals can use the system presented here to compare the expected return of alternate holding periods given expected interest rates. © 2004 Academy of Financial Services. All rights reserved.

JEL Classification: G12

Keywords: Holding period return; Mortgage rates; Direct real estate investment; Sensitivity analysis

1. Introduction

The literature contains numerous studies that examine the effect of including real estate investments in a mixed-asset portfolio. In general, the authors of these papers conclude that significant diversification benefits are available for investors who do so.[1] Therefore, in pursuing their financial planning goals, individuals with the required capital and risk tolerance may wish to capture these benefits. While an individual can incorporate real estate

* Tel.: +1-937-775-2870; fax: +1-937-775-3545.
E-mail address: james.larsen@wright.edu.

into a mixed-asset portfolio with indirect investment vehicles such as real estate investment trusts, mortgage-backed securities, etc., the focus of this paper is on direct investment.

In this paper, we report the results of sensitivity analysis conducted on a set of projected financial statements, conducted to determine the impact of mortgage loan interest rates on a direct real estate investment. First, we demonstrate that initial loan rates can have a significant effect on the investor's return. Because this effect also applies to subsequent investors, we next show that higher subsequent loan rates can also dramatically affect the initial investor's holding period return. Extending the holding period may mitigate the latter effect that results from decreased reversion value. Investors can use the system presented here to help ensure that their financial planning goals are achieved because it enables them to better formulate an estimate of reversion value and to compare the expected return of alternate holding periods given a prediction of subsequent interest rates

The remainder of the paper is organized in the following manner. In the next section we review the pertinent literature. The third section contains a brief review of historical interest rates. Examples of a direct real estate investment and an analysis of the potential impact of current and subsequent interest rates on the investor's return are presented in the fourth section. A summary and conclusions appear in the last section.

2. Literature review

Financial analysis of a direct investment opportunity is an important prerequisite to investment. But what investment horizon should be used for this purpose? Ideally, one should match the analytical holding period with the actual time the investment will be in place. The literature provides no evidence concerning the degree to which this occurs, but intuition and a review of the limited available published research suggest that the match is far from perfect for institutional investors. Farragher and Kleiman (1996) analyze survey data and report that for investment analysis purposes, holding periods vary widely. Nineteen percent of the insurance company, REIT, and pension fund respondents stated that they used a holding period of five years or less; 8% reported using seven years; 70% reported using a 10-year holding period; and 3% reported the use of a 15 year holding period. The respective percentages for private investment company respondents were 33%, 13%, 47%, and 7%. Two studies of empirical data provide a measure of actual investment holding periods for institutional investors. Collett, Lizieri, and Ward (2003), and Fisher and Young (2000) report that in recent years the average institutional holding periods for properties located in the United Kingdom and the United States, respectively, are slightly less than eight years.[2]

Researchers have also identified factors associated with the length of actual holding periods. Collett, Lizieri, and Ward (2003), and Fisher and Young (2000) discover that holding periods are related to property type, market conditions, and transaction costs. Gau and Wang (1994) analyze data for commercial and apartment properties in Vancouver owned by individuals, partnerships and corporations and conclude that holding periods are most closely associated with the property owner's investment and consumption preferences, and current market interest rates. But what if interest rates are expected to change over the investor's holding period? Gau and Wang (1994) observe that for tax exempt investors such

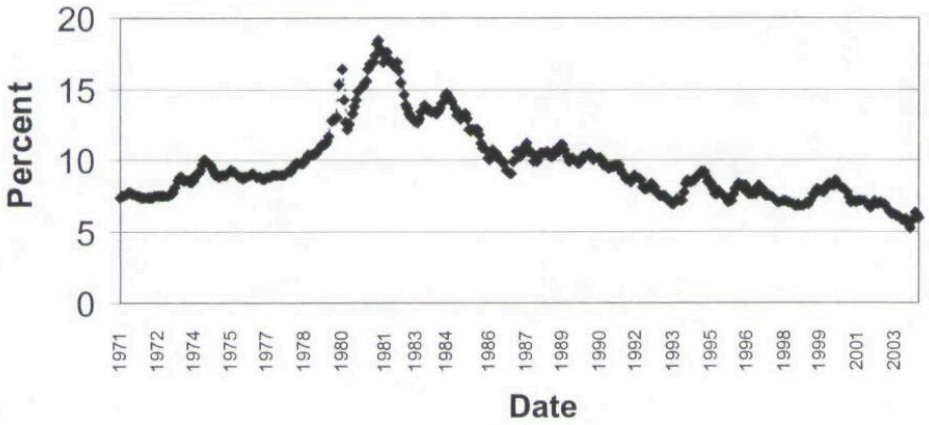

Fig. 1. 30-year conventional loan rate.

as REITs, the present value of a property is independent of the holding period even if the term structure of interest rates varies over time. However, we demonstrate that this may not be the case for investors subject to income tax.

3. Review of mortgage interest rates

The explicit interest rate associated with a particular direct investment mortgage loan depends upon a variety of factors. These factors include loan to value ratio, credit worthiness of the borrower, property type, tenant quality, whether the interest rate is fixed or variable, and other terms peculiar to the loan agreement (e.g., points) or qualifying standards imposed by the lender (e.g., required level of replacement reserves in the cash flow statement). Commercial mortgage lenders normally require a maximum initial loan to value ratio in the range of 70–80%. Payment patterns may take a variety of forms (e.g., interest only, variable rate). At the present time, common terms offered by commercial banks include fixed rate loans amortized over 30 years, but with a 5-year (or 10-year) balloon payment. The interest rate on this type of loan was in the range of 5.5–6% as of October 2003.

Lack of standardized loan terms for mortgages originated to facilitate direct real estate investments means that obtaining time series interest rate data for these loans is problematic. It is possible, however, to use other time series data as a proxy for the elusive direct investment loan rate. One such proxy is the 30-year conventional mortgage loan rate data compiled by the Federal Home Loan Mortgage Corporation (FHLMC). In addition, some industry insiders suggest that one can approximate the rate for direct real estate investment loans by adding 200 basis points to the prime rate. Doing so as of October 2003 implies a rate of 6%, while the 30-year FHLMC rate as of the same date was 5.92%.

Using these proxies, it is not difficult to demonstrate that the interest rate on direct investment loans is currently low compared to historic levels. The FHLMC 30-year conventional mortgage rate and the prime rate are graphically depicted for the period April 1971 through October 2003 in Fig. 1 and Fig. 2, respectively. The mean value for the mortgage rate series is series is 9.59%. The highest rate, 18.45%, occurred in October 1981. The lowest

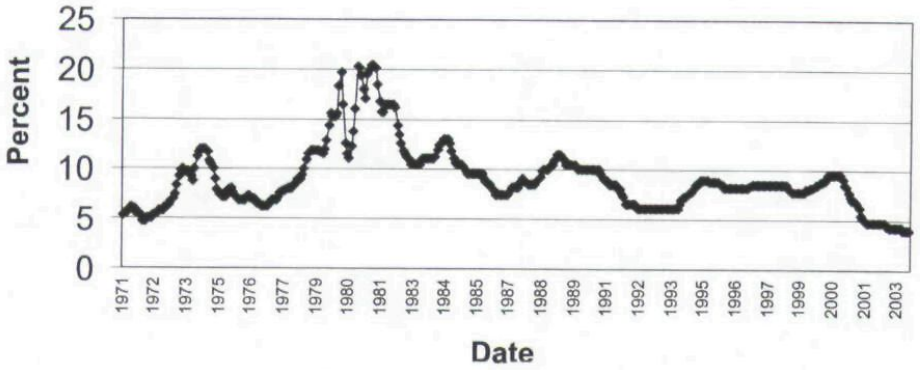

Fig. 2. Prime rate: 1971–2003.

rate, 5.23%, occurred in June 2003. The mean value for the prime rate series is 9.03%. The highest rate, 20.5%, occurred in August 1981. The lowest rate, 4%, occurred in July through October 2003. The last time that the prime was this low preceded the time series shown in Fig. 2; April 1959.[3] Ma (1990), Sarkar (2003), and Wu and Zhang (1996), among others, provide evidence that interest rates follow a mean reversion process. If this is the case, the above data suggests that both the prime and conventional loan rates will trend upward.

4. The effect of loan rates on holding period return

When an individual uses borrowed funds to make a direct real estate investment, two things are being obtained: an asset—the real estate, and a liability—the mortgage loan. The price of both the asset and the liability influence the affordability of the transaction, and the low interest rates that have characterized the marketplace recently have facilitated many transactions. A low interest rate means that an investor can afford to pay more for a property, ceteris paribus. Low rates, however, also introduce the possibility that investors will pay too much for the property.

A real estate investor's total return consists of two parts: the cash flow associated with operating the property, and the cash flow associated with the eventual sale of the property (reversion value). If an investor overestimates either component his or her realized return will be less than anticipated. Compared to a higher mortgage rate, a low rate results in a lower mortgage payment that, in turn, results in increased cash flow from operation. Mortgage rates fluctuate, however, and if they increase by the time the investor is ready to sell, the reversion value is likely to decrease causing the investor's realized return to fall short of expectations. This is a very real possibility today because current interest rates are well below historic means.

Consider an individual contemplating the purchase of a four-unit apartment building, Mythical Apartments, for $500,000. The six-year old property, located in a lower-middle income neighborhood of a Midwestern city, is appraised 90% improvements, 10% land. The investor plans to obtain a 75% loan to value, 5.5% fixed rate loan (amortized over 30 years) with a balloon payment required after five years (and in a second iteration, 10 years).[4] To

Table 1
Statement of projected revenues, expenses, & cash flows: mythical apartments

Year	2004	2005	2006	2007	2008
Potential Gross Income	60,000	63,600	67,416	71,461	75,749
− Vacancies & Bad Debts	3,000	3,180	3,371	3,573	3,787
Effective Gross Income	57,000	60,420	64,045	67,888	71,961
− Operating Expenses	15,070	15,974	16,933	17,949	19,026
Net Operating Income	41,930	44,446	47,113	49,939	52,936
− Debt Service	25,551	25,551	25,551	25,551	25,551
− Depreciation	15,682	16,364	16,364	16,364	16,364
Income Before Tax	698	2,532	5,198	8,025	11,022
− Income Tax	2,828	3,707	4,928	6,221	7,592
Income After Tax	(2,130)	(1,175)	271	1,804	3,430
+ Depreciation	15,682	16,364	16,364	16,364	16,364
After tax cash flow	13,552	15,188	16,634	18,168	19,793
Projected after-tax reversion value					
Gross selling price (2008)					669,113
− Selling Expenses					46,838
Net Selling Price				622,275	
Purchase Price			500,000		
− Accumulated Depreciation			81,136		
Adjusted Basis				418,864	
Taxable Gain				203,411	
× Marginal Tax Rate				.40	
Tax on Gain					81,365
Profit on Sale					540,910
− Mortgage Loan Payoff					346,727
After tax cash flow from reversion					194,183
+ Replacement reserve recovery					7,441
ATCF from reversion + RR recovery					201,624
Calculation of income tax					
Income before tax	698	2,532	5,198	8,025	11,022
+ Replacement reserves	1,320	1,399	1,483	1,572	1,666
+ Debt principal	5,052	5,337	5,638	5,956	6,292
Taxable Income	7,069	9,267	12,319	15,553	18,979
× Tax rate	0.40	0.40	0.40	0.40	0.40
Income Tax	2,828	3,707	4,928	6,221	7,592

simplify the analysis we initially assume that rental income, all operating expenses, and property value will grow at an annual rate of 6%.[5] In addition, we assume that there are no transaction costs associated with acquisition, 7% transaction costs associated with disposition, that the investor is subject to a marginal income tax rate of 40%, and that the property is purchased in January, (the first month of the investor's tax year) 2004. Based on these assumptions, an Excel spreadsheet was used to generate the statement of projected revenues, expenses, and cash flows as well as the reversion value at the end of the investor's planned five-year holding period that is shown in Table 1.

The annual net cash flows are used to calculate the investor's expected internal rate of return (IRR) of 20.95%; the IRR shown on the first line of Table 2, column 6.[6] For expository expedience, we assume that this rate exactly matches the investor's required return. Therefore, the property appears to be an acceptable investment. Examination of the remainder of

Table 2
Effect of Initial Interest Rate on Expected IRR

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	LTV	70%	70%	70%	75%	75%	75%	80%	80%	80%
	Operating expense/EGI	23.8%	26.4%	29.1%	23.8%	26.4%	29.1%	23.8%	26.4%	29.1%
Mortgage rate										
5.5	IRR	19.00	18.45	17.90	21.61	20.95	20.31	25.29	24.49	23.70
6	IRR	18.47	17.92	17.36	20.94	20.29	19.64	24.45	23.65	22.86
6.5	IRR	17.93	17.37	16.82	20.27	19.62	18.98	23.59	22.79	22.00
7	IRR	17.37	16.82	16.27	19.58	18.93	18.28	22.71	21.92	21.12
7.5	IRR	16.81	16.26	15.70	18.88	18.23	17.58	21.82	21.02	20.23
8	IRR	16.25	15.69	15.14	18.18	17.52	16.87	20.91	20.12	19.32
8.5	IRR	15.67	15.12	14.56	17.46	16.81	16.15	19.99	19.20	18.41
9	IRR	15.09	14.54	13.98	16.73	16.08	15.43	19.06	18.27	17.48
9.5	IRR	14.51	13.95	13.40	16.00	15.35	14.70	18.12	17.33	16.54
10	IRR	13.91	13.36	12.80	15.26	14.61	13.96	17.17	16.38	15.59
Reduction in expected IRR from 5.5–10% loan rate		26.80%	27.60%	28.50%	29.40%	30.30%	31.30%	32.10%	33.10%	34.20%

column 6 in Table 2 reveals that if the initial mortgage loan carried a higher interest rate this would not be the case.

To demonstrate the impact of higher initial loan rates on expected holding period return given different sets of assumptions, the spreadsheet shown in Table 1 was recalculated assuming a higher (80%) and lower (70%) LTV, as well as (10%) higher and (10%) lower assumed operating expenses. These results are also summarized in Table 2. Again, for simplicity, it was assumed that the loan rate is constant for any of the LTV ratios examined here. Therefore, it is not surprising that a comparison of the figures in columns 2, 5, and 8, or columns 3, 6, and 9, or columns 4, 7, and 10 shows that expected IRR is positively related to LTV. A comparison of the figures in columns 2, 3, and 4, or columns 5, 6, and 7, or columns 8, 9, and 10 shows the equally intuitive negative relationship between expected holding period return and the ratio of operating expenses to effective gross income. Perhaps of more interest is the magnitude of the impact of higher initial loan rates on expected IRR given different LTV ratios and the operating expense/effective gross income ratios that is shown on the last line of Table 2.

Focusing on our original example, we recalculate the cash flows to determine the maximum price the investor (demanding a 20.95% return) could pay for the property given a higher initial loan rate. These values are shown in column 3 of the upper panel of Table 3. At least the direction of the results, but perhaps not the magnitude of the price discounts, shown in column 3 of Table 3 will be obvious to most readers.

A less obvious effect (and the primary purpose of this study), however, is the potential impact of higher subsequent mortgage rates on the investor's holding period return. Specifically, our simulation analysis shows that failure to consider the possibility of higher subsequent loan rates means that the reversion value may be overestimated and, therefore, the investor's realized return may be less than the expected. To illustrate this point, consider a second investor contemplating purchase of Mythical Apartments at the end of the original

Table 3
Interest Rates, Property Prices and Rates of Return

(1)	(2)	(3)	(4)	(5)	(6)
Mortgage interest rate	Original investor		Maximum price for second investor to earn target return	Original investor	
	IRR with price = $500,000	Max price to earn target return		Revised property growth rate	Revised IRR
Five year holding period					
5.5	20.95	500,000	669,113	6.00	20.95
6	20.29	483,409	646,589	5.60	19.81
6.5	19.62	467,565	625,397	4.58	18.68
7	18.93	452,542	605,304	3.90	17.56
7.5	18.23	438,292	586,246	3.23	16.46
8	17.52	424,774	568,163	2.59	15.37
8.5	16.81	411,941	550,997	1.96	14.30
9	16.08	399,755	534,697	1.35	13.23
9.5	15.35	388,177	519,211	0.76	12.17
10	14.61	377,172	504,490	0.18	11.12
Ten year holding period					
5.5	21.11	500,000	895,424	6.00	21.11
6	20.63	486,508	871,252	5.71	20.82
6.5	20.13	473,425	847,823	5.42	20.54
7	19.62	460,725	825,079	5.14	20.25
7.5	19.09	448,417	803,038	4.85	19.97
8	18.56	436,510	781,714	4.57	19.69
8.5	18.01	425,005	761,112	4.29	19.42
9	17.46	413,903	741,229	4.02	19.14
9.5	16.90	403,198	722,060	3.74	18.87
10	16.33	392,888	703,597	3.47	18.61

The figures in column (1) are today's interest rates for purpose of interpreting columns (2) and (3), but those same figures refer to the interest rate prevailing in five years (upper panel) or 10 years (lower panel) for purpose of interpreting columns (4), (5), and (6). The entries in columns (2) and (3) all assume that the sale price at reversion will be $669,113 (upper panel) or $895,424 (lower panel). The amounts in column (4) represent the maximum price that the second investor can pay and still earn the rate of return that could be earned if 5.5% financing were available. Each figure in column (5) represents the annual growth rate in property value for the original investor assuming a purchase price of $500,000 and a sale price equal to the figure shown on the same row in column (4). Each entry in column (6) assumes the first buyer paid $500,000 for the property, paid a mortgage rate of 5.5%, and sold the property for the amount shown on the same row in column (4).

investor's holding period. Assume that the operating cash flow projections shown in Table 1 actually occurred and that the second investor has identical expectations regarding rent, expense, and property value growth rates, and plans to finance the property in a fashion identical to the original investor. These assumptions were used to generate the statement shown in Table 4. If the second investor pays $669,113 for the property (the selling price assumed by the first investor), the second investor's expected return will also be 20.95%.

If, however, loan rates have increased since the original investor obtained ownership, the second investor must pay less than $669,113 to earn a return of 20.95% (i.e., the same effect of higher interest rates on purchase price that applied to the original investor shown in

Table 4
Statement of projected revenues, expenses, & cash flows: mythical apartments

Year	2009	2010	2011	2012	2013
Potential Gross Income	80,294	85,112	90,218	95,631	101,369
− Vacancies & Bad Debts	4,015	4,256	4,511	4,782	5,068
Effective Gross Income	76,279	80,856	85,707	90,850	96,301
− Operating Expenses	20,195	21,407	22,691	24,053	25,496
Net Operating Income	56,084	59,449	63,016	66,797	70,805
− Debt Service	34,192	34,192	34,192	34,192	34,192
− Depreciation	20,986	21,898	21,898	21,898	21,898
Income before tax	906	3,359	6,926	10,707	14,715
− Income tax	3,773	4,948	6,581	8,311	10,145
Income after tax	(2,866)	(1,590)	344	2,395	4,570
+ Depreciation	20,986	21,898	21,898	21,898	21,898
After tax cash flow	18,119	20,309	22,243	24,293	26,468
Projected after-tax reversion value					
Gross Selling Price (2013)					895,424
− Selling Expenses					62,680
Net Selling Price				832,744	
Purchase Price			669,113		
− Accumulated depreciation			108,579		
Adjusted Basis				560,534	
Taxable Gain				272,210	
× Marginal Tax Rate				.40	
Tax on Gain					108,884
Profit on Sale					723,860
− Mortgage loan payoff					463,999
After tax cash flow from reversion					259,861
+ Replacement reserve recovery					9,949
ATCF from reversion + RR recovery					269,810
Calculation of income tax					
Income before tax	906	3,359	6,926	10,707	14,715
+ Replacement reserves	1,765	1,871	1,983	2,102	2,228
+ Debt principal	6,760	7,141	7,544	7,970	8,419
Taxable Income	9,431	12,371	16,453	20,779	25,362
× Tax rate	0.40	0.40	0.40	0.40	0.40
Income Tax	3,773	4,948	6,581	8,311	10,145

column 3 of Table 3 also applies to the second investor).[7] To illustrate this fact the spreadsheet used to generate the statement shown in Table 4 was recalculated assuming various mortgage interest rates to determine the maximum amount that the second investor could pay (revised purchase price) and still earn the required 20.95% return. The second investor's revised purchase prices are shown in column 4 of Table 3. Finally, the spreadsheet used to generate the statement shown in Table 1 was recalculated using the second investor's revised purchase price as the original investor's gross selling price to determine the impact of the revised price on the original investor's realized return. Examination of these figures, shown in column 6 of the upper panel of Table 3, reveals that the impact on the original investor's return can be dramatic. If, for example, interest rates revert to the FHLMC historic mean (approximately 9.5%), the original investor's return could fall to 12.17%, or 8.78 percentage points lower than the desired 20.95%.[8]

One way an investor may be able to reduce the negative impact of increasing mortgage interest rates is to extend the holding period. Of course, extending the holding period increases the probability that the interest rate will increase from the low rates that prevail today which, ceteris paribus, would lower the reversion value. But extending the holding period also increases the cash flows from operating the property and moves the reversion value farther into the future. Both of these factors reduce the negative impact on IRR because of reduced reversion value because the present value of the reversion value will constitute a smaller percentage of the present value of the investment's total cash inflows. To demonstrate this possibility, the cash flows shown in Tables 1 and 4 were extended to 10 years (statements not shown). Again, we assume that the investor's rent and expense growth rate assumptions are realized. Next, we calculate the maximum amount that the second investor could pay and still earn the initial investor's required return assuming a variety of interest rates apply in 2013. These prices are shown in column 4 in the lower panel of Table 3. Finally, we calculate the impact of each revised selling price on the original investor's realized return. These figures are shown in column 6 in the lower panel of Table 3.

Comparison of the original investor's revised IRR in the upper and lower panels of Table 3 shows an advantage gained by extending the holding period. Given a 10-year holding period, reversion of rates to the FHLMC historic mean (approximately 9.5%) would result in a return to the original investor only 2.24 percentage points below the target return (21.11–18.87%).

An investor can use the system presented here to compare alternative holding periods. Using the examples presented above where the investor pays $500,000 for the property, assume that expected loan rates at 2008 (for the five-year holding period) and 2013 (for the 10-year holding period) are 7% and 8%, respectively. Examination of column 6 in Table 3 indicates that the investor's expected five-year holding period return will be 17.56%, while the expected 10-year holding period return is 19.69%. These values can then be compared to the investor's required rate to determine whether the investment should be made. Alternatively, as shown in column 5 of Table 3, the model presented here can be used to estimate the growth rate in property value to be used in a spreadsheet analysis.

5. Summary and conclusions

Empirical evidence indicates that individuals may achieve diversification benefits by incorporating real estate investments into their mixed-asset portfolio. Historically, such investments have provided many investors with handsome returns. But, the low mortgage rates that prevail today introduce the possibility that individuals will pay too much for the property. The results of the sensitivity analysis conducted in this study demonstrate that the return to a direct real estate investor may be affected by changing interest rates. First, it was shown that the initial (fixed) mortgage interest rate impacts either the amount that an investor can afford to pay for the property, ceteris paribus, to earn a particular return, or (holding the purchase price constant) will impact the investor's rate of return. These results are fairly obvious, but the second issue addressed is less transparent. Next, (using holding periods that fall within the range used by institutional investors) it was shown that if the interest rate

increases by the end of the investor's holding period, the reversion value may be overstated causing the realized return to be lower than anticipated. Of course, the opposite also applies; lower rates will increase both reversion value and holding period return, ceteris paribus. Given the current level of interest rates compared to historic means, however, it seems more likely that rates will be higher in the future. It was also shown that investors can reduce the impact of increased loan rates on the reversion value by extending the holding period. Doing so gives the interest rate more time to increase, but causes the reversion value to constitute a lower proportion of the investor's total return (i.e., there are more years of operating return in the IRR calculation). In addition, pushing the reversion date further into the future reduces the present value of any selling price discount.

The results of this study demonstrate the importance of incorporating estimates of future loan rates into the direct real estate investment decision-making process. Individual investors cannot ignore the factors associated with holding period selection identified by previous researchers, but using the system demonstrated here will allow them factor the possibility of changing interest rates into the decision-making process. The system is straightforward. First, the loan rate that will prevail at the time of property disposition should be estimated. Second, the subsequent loan rate estimate should be used to predict the price subsequent investors might pay. Third, the selling price prediction should be used to determine the investment acquisition price and expected holding period return. The expected holding period return should be compared to the investor's required rate to determine if the investment should be made. Finally, to simplify our analysis, we initially assumed that rental income, all operating expenses, and property value would grow at the same rate. The growth rate in property value, however, need not be assumed to equal the growth rate in rental income and operating expenses. The model presented here can be used to more accurately estimate the property value growth rate.

Notes

1. Excellent reviews of the pertinent literature are presented by Seiler, Webb, and Myer (1999) and Sirmans and Worzala (2003).
2. Fisher and Young (2000) also provide a more comprehensive review of holding period literature.
3. The prime rate time series data, available from the Federal Reserve Bank, actually extends back to 1929. We graph the series only from 1971 to be consistent with the available information for 30-year mortgages.
4. Based on the first year of the projected financial statement, we assume the lender finds acceptable the property's debt coverage ratio (1.64 = operating income/debt service), break-even occupancy ratio [67.7% = (debt service + operating expenses)/ potential gross income], gross income multiplier (8.33 = purchase price/potential gross income), and cash-on-cash return (10.8% = after-tax cash flow/equity). For simplicity sake we assume identical loan rates for the five and 10-year balloon loans, although as the presentation in a previous section clearly indicates this may not be the case.

5. We assume that, because of "mean reversion," interest rates will be higher in the future than they are today. However, the interest rates discussed in preceding sections are nominal, rather than real. Because the nominal interest rate is (approximately) the sum of the real rate and the expected rate of inflation, an increase in nominal interest rates must be caused either by an increase in the real rate or in the expected rate of inflation. If it is the latter, gross rents and expenses may increase at a higher rate. This detail is not included in our analysis to simplify the story.
6. We have followed a common practice in real estate; debt service is included in the cash flows and the IRR is calculated using the investor's initial equity position rather than the total cost of the property. In addition, we assume that replacement reserves (equal to $1,320 in the first year, and increasing at 6% per year) are placed in a non-interest bearing account, that no funds are expended from the account, and that the amount in reserve is recovered at the end of the holding period.
7. Of course, if rates have increased, the second investor may be requiring a higher rate of return.
8. This effect is also positively related to the original investor's LTV ratio. The effect is also influenced by the LTV employed by the subsequent investor, the subsequent investor's required rate of return, and the proportion of debt service to total cash flow for both investors.

References

Collett, D., Lizieri, C., & Ward, C. (2003). Timing and the holding periods of institutional real estate investors. *Real Estate Economics, 31,* 205–222.

Farragher, E. J., & Kleiman, R. T. (1996). A re-examination of real estate investment decision making practices. *Journal of Real Estate Portfolio Management, 2,* 31–39.

Fisher, J. D., & Young, M. S. (2000). Institutional property tenure: Evidence from the NCREIF database. *Journal of Real Estate Portfolio Management, 6,* 327–338.

Gau, G. W., & Wang, K. (1994). The tax-induced holding period returns of real estate investors: Theory and evidence. *Journal of Real Estate Finance and Economics, 8,* 71–85.

Ma, C. (1990). Mean reversion in GNMA returns. *American Real Estate and Urban Economics Association Journal, 18,* 207–226.

Sarkar, S. (2003). The effect of mean reversion on investment under uncertainty. *Journal of Economic Dynamics and Control, 28,* 377–396.

Seiler, M. J., Webb, J. R., & Myer, F. C. N. (1999). Diversification issues in real estate investment. *Journal of Real Estate Literature, 7,* 163–179.

Sirmans, C. F., & Worzala, E. (2003). International direct real estate investment: A review of the literature. *Urban Studies, 40,* 1081–1114.

Wu, Y., & Zhang, H. (1996). Mean reversion in interest rates: New evidence from a panel of OECD countries. *Money, Credit and Banking,* 28, 604–621.