REAL ESTATE ISSUES

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Writer's Showcase

Grave Dancer Sam Zell opens this number of *REI* with a broadside that questions many cherished assumptions—and threatens the value structure of American real estate. Like him or not, Zell needs to be heard and we're glad to give him a platform.

While a great deal of real estate development is still done by the seat of the pants, a growing number of those developers who are still at work make use of more sophisticated methods. Joseph W. O'Connor, chief executive officer of Copley Real Estate Advisors, applies his very practical mind to development decisions using techniques that will surprise many an old-timer. His article is followed by a practical approach to the subject of shared tenant services by Thomas B. Cross, whose company has broad experience in the field.

Institutional involvement in real estate is the common thread that links the next group of articles. Waller and Wurztebach explore duration strategies for managing savings and loan interest rate risks. Page and Sirmans then compare secondary mortgage market yields of FRMs and ARMs, and Owers and Rogers discuss the selling-off of real estate assets in conjunction with the restructuring of asset holdings to improve the performance of firms.

Three articles on a grab bag of real estate themes close out this number of *Real Estate Issues*: Cashdan on variance in housing starts as they relate to interest rates; Hysom on the market for self-service storage facilities; and Shedlarz and Webb on the implications of a recent Ohio property tax case that in their view "demonstrates a return to crude, literal methods of valuation by the Ohio Supreme Court."

As I write this, the stock and bond markets are booming, inflation seems to have been checked and most economic forecasts are relentlessly rosy. My guess, though, is that by the time our Fall/Winter number is published, *REI* will be look for more articles about the effects of disinflation, space gluts and development slowdowns. If you'd care to anticipate the trend by putting such thoughts together now, we'd like to see the results.

Jared Shlaes
Editor in chief

REAL ESTATE ISSUES

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MODERN SARDINE MANAGEMENT

Mr. A had a can of sardines. He sold them to Mr. B for $1. Mr. B sold them to Mr. C for $2. Mr. C sold them to Mr. D for $3. Mr. D opened them and found they were rotten. He complained to Mr. C that he wanted his money back. Mr. C said "No, you don't understand. There are eating sardines and trading sardines. Those were trading sardines."

by Samuel Zell

Premise: The current oversupply of real estate is different from past cyclical excesses. The present situation is a result of commoditization of real estate. Real estate investment rather than being the result of in-depth understanding of the dynamics of the industry, has become the in-depth focus on the numbers. This numerical orientation has replaced discipline and understanding. The results of this misdirection will be one of the biggest losses of capital in the country's history.

Real estate represents a unique investment in a non-fungible asset. The unique characteristics are induplicable. Modern valuation techniques applicable to industrial analysis are being applied to brick and mortar. Focused analytical approach emphasizes broad numerical assumptions that presume real estate to be a national market.

Samuel Zell is founder, principal and chairman of the board of Equity Financial and Management Company, a Chicago-based nationwide real estate organization which owns and operates a national portfolio of residential and commercial properties. He also is chairman, president and chief executive officer of Great American Management and Investment, Inc. and chairman of the board of First Capital Financial Corporation, a wholly-owned subsidiary of Great American. Mr. Zell is a frequent contributor to various real estate publications as well as a speaker and panelist. He is a graduate of the University of Michigan and the University of Michigan Law School.

Real estate investment decisions do not lend themselves to macroeconomic issues. Real estate is a local market, by definition. It is not possible to focus on national trends; one must focus on local issues and characteristics. Internal rates of return and other mathematical formulas for real estate projections attempt to legitimize the presumption of predictable results.

Twenty years ago the real estate investor was taught that the three most important lessons of real estate were "location, location, location". Today this axiom is replaced by internal rates of return, price per unit or square foot and projections of future inflation rates. Although these new factors are relevant, they also indicate we have lost sight of the basic characteristics that drive and determine the value of real estate. The current love affair with projections has substituted modern analytical techniques for the basic understanding of the business.

Real estate, as an investment vehicle, historically has been driven by cash flow. Its role in an investment portfolio was stability, low risk, tax benefits and inflation protection. The high inflationary period from 1977 to 1981 distorted this perception. The proliferation of real estate syndicators, REITS, pension funds and financial institutions, viewing real estate as growth stock, unrealistically raised performance expectations. Without

FAST EDDIE HAD A CAN OF SARDINES, WHICH HE SOLD TO ABEL ABDULLAH FOR $1.

ABDULLAH SOLD THEM TO PETER PREPPIE FOR $2.

PREPPIE SOLD THEM TO MARVIN MULLET FOR $3...

...WHO OPENED THEM AND FOUND THEY WERE ROTTEN. HE WANTED HIS MONEY BACK! EEECH!

NO... YOU DON'T UNDERSTAND. THERE ARE EATING SARDINES AND TRADING SARDINES. THOSE WERE TRADING SARDINES!

giving up the stability characteristics discussed above, the "numbers crunchers" have elevated real estate beyond realistic expectation. This elevation process has been achieved by superimposing numerical assumptions and attempting to make real estate conform to expectations applicable to other businesses. A typical real estate analysis today assumes stable growth with yearly increases in revenues generated by inflation. Future revisions and alterations in demand or competition are not incorporated or anticipated. If an analyst made the same assumptions of General Motors or other cyclical companies, the price of the earnings ratios would double. Such an analysis would receive very little credibility from the street, but is accepted in real estate as a matter of course.

Using numerical analysis on real estate and conversion of the investment vehicle to a performance vehicle, reflects a naivete that only can lead to disaster. The proliferation of non-real estate thinking individuals in the business has created performance indexes that border on the ludicrous. The idea that a localized market participant, namely real estate, can be realistically valued and incorporated into a meaningful nationwide measuring system does not make sense. The concept of quarter to quarter valuation of brick and mortar generates numbers only relevant to institutional investors who demand tables comparable to those used in stock market investment.

How meaningful are these numbers? Are comparables really a true measure of value? Does the sale of the Bank of America Tower in San Francisco reflect the market, or is it a unique property sale? Because real estate is a singular and nonfungible asset, its price structure mirrors not only its income, but also the buyer's perception of its future competitive role in a specific community. The biggest losses in the past high inflationary period will be recognized on acquisitions whose price justification will be comparable sales. This misconception further distorts evaluation when investors use sales and performance in other cities as part of purchase justification.

Historically, the premier purchase of real estate occurred by opportunistic purchasing. Conventional wisdom made the acquisition of the Uris properties by Olympia & York in 1976 the single best acquisition of the last decade. Would the indexes of real estate valuation in 1976 suggest this was the appropriate time to commit funds to New York office space? Would an assessment of comparables in New York have supported the purchase? Clearly none of these tests would have endorsed this move. Yet the results of that acquisition have been spectacular.

Real Estate Performance

Real estate performance is a reflection of past and not a precursor of future levels of activity. The most significant factor influencing real estate's future value is competition. One could argue that the higher the occupancy and the rates, the more likely this level of performance will not continue. Real estate performance is what encourages new development. When evaluating a market, the true test of its strength and the likelihood of future performance is the relationship between the economics of development and market performance. For example, if office rents in a given market are strong at $20 net a square foot, and cost of construction is $150 a square foot, then development and new competition follows. Thus, a new development that earns a 13.33% yield encourages new buildings. Construction continues until the yield factor declines to discourage new market additions. The yield factor declines as a result of both increasing vacancy factors and reduction in rates or concessions. Trying to equate real estate economics with corporate strategies indicates the greatest weakness in analytical comparison. For example, a consumer product company develops a new product. Assuming it is successful, the company is able to materially improve its profitability by increasing market share. Market share expansion leads to large production runs which lower cost and increase margins. Real estate works in reverse. Whereas a consumer product has an almost unlimited audience for expansion, the market for real estate is confined to the size of the building. The more successful the developer at renting his building and increasing rates, the more likely to attract competition. Therefore the economies of scale which increase margins and profitability in consumer products are not available to real estate because of its finite size.

Bar To Access

Rather than focus on numerical indexes in investment decisions, the investor should focus on unique characteristics that protect the investment from competition. Thus bar to access is a critical element in the evaluation. A regional shopping center illustrates this principle. A center is anchored by major department stores which represent the magnets that attract shoppers to the mall. When the developer negotiates his lease with major tenants, an integral portion consists of operating agreements and radius clauses. Operating agreements require the retailer to operate the store at that location under its name for periods as long as 30 years. Radius clauses provide the retailer will not operate another store within a defined surrounding geographical area. These two factors enable this type of investment to be more secure and with a greater promise of success because the likelihood of competition is less probable.

The recent legislation in San Francisco limiting the height and density of the downtown area is another example of a bar to access. This legislation precludes the ability of competitors to enter the market. It also changes the economics of development since limiting the height reduces the economies of scale therefore requiring more land per square foot of building. These factors, combined with the limited geography of the city, make this a protected high cost (to the user) market.

Houston, with no zoning, presents the reverse case. The boom in energy was the engine that encouraged the massive oversupply in every form of real estate. But this oversupply was further exacerbated by the lack of

impediments to expansion. Thus, residential properties of recent vintage were razed for new office space. Every piece of land represented another opportunity with unfortunately predictable results. The ease with which supply was increased reflects a market with no bars to access.

Demographics is another statistical benchmark currently influencing real estate investments. Although demographics provide a window in a geographical area to future expectations, they do not provide leading indicators for the potential success of a given investment. In many instances, just the reverse occurs. Investors often have had difficulty distinguishing between what portends well for those in the real estate activity business versus those in the investment real estate business. Therefore, growth statistics may be very bullish for builders, architects and construction lenders, but this activity only attracts competition. The most intelligent investment may perform poorly if it is surrounded by too much supply. Quality, as a bar to access, only works if the quantity element of the equation is under control.

The ultimate bar to access is replacement cost. If in the above-mentioned example, the rents were $12 net and new construction was still $150 a foot, there would be no incentive for competition until rates rose to a level that allowed for profitable development.

Replacement Cost

Replacement cost is a component which requires careful analysis. It is not limited to cost of construction, and it requires an understanding of all the development elements. During construction land cost and interest are major elements subject to wide swings. The land prices and construction loan costs fluctuate widely depending on local conditions. In boom periods, land values have doubled and tripled in response to a development frenzy. Cost of funds also has wide fluctuations. These two factors materially influence an investor's perception of his vulnerability to new competition and the comfort he can draw from the cost of acquisition.

Securitization

Securitization is another magic word that has been added to real estate lexicon. It represents the pooling of real estate mortgages into commercially tradeable instruments. Just as the current massive oversupply of real estate is a function of buyer rather than user demand, so too is securitization growth the result of demand by traders and institutions, not from a shortage of funds. Consequently scandals continue to surface as, lenders find their security pools impaired, and default rates are above historical levels. When an underwriter is processing a loan he knows will sell immediately, his care and concern is directly related to the length of time he owns the loan. This phenomenon is strikingly similar to the developer who builds a project for sale rather than a development he anticipates owning long-term.

The current attempt to develop securitized commercial mortgages only extends the separation of the investor from the risk he is taking. Securitization converts mortgages into a commodity that blurs the risk to the investor. Whereas government bonds and government agency bonds trade at a risk differential, the risk is clearly deliniated an an efficient market follows. In real estate mortgages, the amount and quality of information either precludes investigation or requires effort that is unlikely to be undertaken. The proliferation of securitized transactions represent a further move toward the replacement of real estate expertise with the common denominator, a Masters of Business Administration (M.B.A.).

Segmentation

Segmentation and market timing are new additions to the real estate vocabulary. Segmentation represents an attempt to subdivide the demand side of the equation so as to justify creation of a new product. The current boom in the construction of new lodging facilities is a clear example.

A hotel is a hotel unless it's a budget facility, a highway facility, a convention facility, a suite facility, a luxury facility or a super luxury facility. The most recent phenomenon is the suite hotel. Many markets in the country have no suite facilities or very few, and thus we are seeing them being constructed in a rapid proliferation. When an investor is considering this type of investment, what is the relevant market analysis? The developer presents the case that the all-suite hotel is not impacted by other similar facilities. Reality says that all lodging, in any given market, competes with one another. Although its nature may differ, there is almost always a price point that will change behavior. Certainly airline deregulation has proven that price is a very strong factor in behavior modification. The creation of low prices has dramatically increased the number of seats available, thereby affecting the full price carriers. Is the lodging industry any different? Can we justify the proliferation of new segmented facilities based on demand for lodging, or does it reflect application of unused increased capacity? Does the hotel chain with a development department make future investment decisions because of need in the marketplace, or need in the department? Once again we see a recurring theme in lodging that has been perceived in all real estate, separation of risk from responsibility. Historically, hotel chains or franchise operations owned the facilities they built. Thus overbuilding had direct and often times catastrophic impact on the owner. The market became the ultimate disciplinarian.

Today the hotel chains operate on management fees that put the entire responsibility for financial failure on the investor. A new hotel that does poorly creates massive losses for the owner and a diminution of income for the manager. Thus when a feasibility study on a new facility is undertaken, the investor, not manager, faces the responsibility for a poor decision.

Market Timing

Market timing is another concept borrowed from the managerial world and incorporated into real estate. The

developer who begins a building in the midst of over-supply justifies his investment on the scientific premise that between 4:00am and 2:00pm on March 27, 1989, there will be a shortage of space. Coincidentally, that specific moment in time is when his building will be completed. This kind of thought process once again replaces the fundamental of the real estate market with statistical analysis operating in a vacuum. Can the developer predict new competition? Can he predict recessions that slow absorption? Can he predict a tenant's willingness to remain in less desirable space until a better or cheaper situation is available? The array of variables is so unpredictable that the risk of failure becomes unquantifiable. The at-risk owner-developer would never endorse this endeavor, but by separating the risk from the creator of the project, we have perpetuated development without focus on demand and economic exposure.

Today the greed for product creation is unchecked. As long as lenders or buyers are willing to support investments without the developer taking any risk, the over-supply scenario will continue. When developers work for a fee off the top, somewhat like an investment banker in a merger, the fear of loss will not discipline the process. If the creator of the product is not dependent on the success of his creation for financial reward, then his orientation will shift from what works to what sells. The real estate world has altered the definition of success from cash flow of occupied real estate to groundbreaking ceremonies.

Allocation Of Resources

Allocation of resources represents another element distorting the real estate market. When major pension funds with billions of dollars decide that their involvement in real estate should be increased from 2 to 10%, tremendous funds become diverted to real estate. These new sources of capital are allocated to the industry because a group of non-real estate people have reached a conclusion, usually on the advice of advisors who profit handsomely by the investment of funds.

Once an allocation decision has been made, it also becomes a benchmark for the in-house fund managers. The next trustees meeting will undoubtedly include the question, "How have we done at increasing our percentage in real estate?" Compensation for these people tends to be oriented toward asset allocation of objectives, rather than incentives based upon fund performance.

This kind of allocation once again disregards the opportunistic nature of the business. Real estate success has gone to those with deep pockets and the ability to take advantage of the cyclical nature of the business. The great fortunes made in real estate have come from buying property during market troughs and holding them through cycles. Because of the fiduciary nature of these funds, the increase in allocation usually is made after the cycle has peaked, thus the process is reverse of what had been successful. Abstract fund allocation continues the thesis of distancing the real estate participant from the property.

The real estate business is entrepreneurial, fraught with risk and the commensurate reward. It is a business that does not lend itself to empirical analysis distanced from the realities of the marketplace. It is a highly leveraged business that requires an attention to detail that does not lend itself to delegation. The conversion of real estate from a localized to a national business has not improved the performance and has led to the greatest oversupply of brick and mortar in the country's history.

Loss Of Discipline

The loss of discipline has been the major contributor to this sorry state. Discipline comes from the marketplace, from fear of loss and the consequences that come from overindulgence. When the developer is long gone with profit in the bank, his appetite for future activity is not diminished by vacancy in the market. The fact that he has developed and sold a product that resulted in major losses for the buyer is not his concern.

Discipline also has evaporated from the lending community. The lender must be fearful with a focus on his ability to get repaid rather than on up-front points. Demanding and getting significant equity from the developer means that the creation process is a shared risk where both parties have similar concern for the project's success. Realistic evaluation of the risk elements by the lending community requires a reversion to past techniques. True equity requirements imposed on the developer not only insures caution and discipline, but also reduces the debt service load in the initial years. Office development with rental achievement clauses were a standard fixture of the pre-inflationary period. The commitment of funds not only required impelling market consideration, but also required a tenant commitment for a significant percentage of the space. The lending community now finds itself with losses from lack of focus and confusion about their role. Greed has caused reaching for a "piece of the action" at the cost of safety and preservation of principal.

Lending Community

The lending community further has been buffeted by a shortage of opportunities to loan large amounts of funds. With the disappearance of energy, agriculture and LDC, hard pressed lenders have over-committed to the real estate community to keep the asset side of their balance sheet from withering. Financial deregulation also has added to the lack of discipline in the marketplace. Savings and loan associations raised massive funds in the brokered market without subjecting themselves to testing their financial ability. The Federal Deposit Insurance Corporation (FDIC), by insuring deposits of all institutions up to $100,000, makes the flow of funds indiscriminate. Since the holder of a certificate of deposit is looking to the federal insurance and not the institutions for repayment, the funds flow to the institution willing to pay the most, without regard of their ability to invest or repay. The spate of failures here in the last few years have been marked by a large flow of funds

emanated from brokered deposits of unnamed investors who were getting a superior yield without the commensurate risk.

The institutions themselves also have lost their internal discipline. Over the past few years, the majority of savings and loans have converted from mutual institutions to stock companies. With these conversions, the quarter-to-quarter results affected stock prices, which in turn affected executive compensation and the ability to raise capital. Thus, risky loans with large up-front fees energized the earnings statement and the stock prices, and left for the future the issue of fund repayment. The volatility of interest rates discouraged lenders from holding single-family, fixed-rate loans which now are routinely sold into the securitized market. Without the base of single family loans, these institutions have been forced to seek lending opportunities outside their areas of expertise. The results have been predictable; losses, fraud and the acceptance of risk levels inappropriate to the perceived reward.

This new flow of funds into real estate has pressured traditional lenders to relax their standards in order to remain competitive. Once again, we see a repetition of supply and demand skewing the marketplace with distorted results.

Syndication Growth

The astronomical growth of the syndication business in the past five years also has severly affected the real estate market. The billions of dollars diverted to real estate through limited partnerships have materially contributed to an oversupply in the marketplace. In a manner similar to the REIT experience 10 years earlier, exponential growth in the available funds was unrelated to the growth of opportunity. Thus, the business became one of raising money rather than investing. These companies have been predominantly market rather than real estate driven. As the flow of funds increased, the talent needed for investment decreased. This marketing orientation rewarded those who raised and invested the funds rather than focusing on the results of these investments. Since the measure of success is in the future, and those who invest are not penalized for poor performance, the process is undisciplined. The talent making these investment decisions generally has been inexperienced, without knowledge of the previous market cycles. The results, unfortunately, are predictable and add to the perpetuation of an industry that has lost touch with the basics.

Conclusion

The recovery of the market will be slow and painful. The monetization of the currency that previously bailed out real estate excesses will not appear this time. Oversupply and deflation will make internal rates of return, projected rental increases and numerical justification of investment irrelevant in the future. Success or failure will accrue to those who have focused their efforts on the basics that make the business work. The Hewlett-Packard jockeys of the scientific real estate community will be replaced by the traditional real estate *professional* who has learned his trade in operation and not in projection of real estate.

Unfortunately, the size of the losses will ultimately bring the real estate business back to reality. These losses will instill the discipline that the players have been unable to implement. Savants will look back on this period and equate it to the historic excesses of the past. The tulip craze in Holland in the 17th century, the railroad boom of the 19th century, and the Florida land boom of the 1920s all reflect the frenzies of those eras when the participants lost sight of the underlying fundamentals. The moral of the story is: when they stop eating the sardines and only focus on trading them, the stench will become overpowering.

The Ballard Award Manuscript Submission Information

The editorial board of *Real Estate Issues* is accepting manuscripts in competition for the 1986 Ballard Award. The competition is open to members of the American Society of Real Estate Counselors and other real estate professionals. The $500 cash award and plaque will be presented in November at the Society's 1986 Convention in New York City to the author whose manuscript best exemplifies the high standards of content maintained in the Journal. The selection is made by Editor in Chief Jared Shlaes and Associate Editors James Gibbons and Roger Foster. Any articles published in the Journal during the present calendar year (Spring/Summer and Fall/Winter editions) are eligible for consideration.

The annual Ballard Award was first presented in 1985 to James A. Graaskamp, CRE, for his article, "Identification and Delineation of Real Estate Market Research," which appeared in the Spring/Summer issue. Funding for the award is provided by the generous contribution of the William S. Ballard Scholarship Fund in memory of Mr. Ballard, a former CRE.

To be considered eligible for judging, all manuscripts must be submitted by August 1, 1986. See page 35, "Contributor Information for *Real Estate Issues*," for specific guidelines in manuscript preparation.

REAL ESTATE DEVELOPMENT: INVESTMENT RISKS AND REWARDS

The results of a 20-year research project are discussed as to the value of investing pension fund dollars in developmental real estate. The risk factors and bottom line are studied and evaluated.

by Joseph W. O'Connor

How does a developer create value in a property? What are the profit margins and what are the risks? The following article answers these questions based on the author's 20-year statistical, investment study of the risks and rewards of a large real estate portfolio containing over $2 billion in developmental properties.

Development investment strategy can be segmented into six distinct stages. The first stage, *planning and design,* includes supply and demand considerations, a market analysis and some pro forma representation of expected performance. For example, if a building is constructed within a market with certain supply/demand considerations, can a profit be expected? Does this project have a reasonable return on its cost? Can the investor protect his/her costs and risks?

The second phase involves obtaining the necessary *regulatory approvals.* In some markets, such as Houston, this is a period of weeks; while in others, like Boston, it can be a period of years or longer. Next are the elements of *financing, construction, leasing* and *operation.* Most investors only get involved in the operational phase of real estate investing when they buy completed, leased buildings at a 9% cash yield. Certain institutional investors however, integrate backward along this development line; they're willing to take more risks in different real estate markets at varying times to increase returns. For example, given the present strength of industrial real estate markets in many areas of the United States, investors are willing to assume leasing risks more readily for industrial property. Developmental investors manage

risk by underwriting different positions in selected markets at varying points in time dependent on an analysis of the supply/demand equation, the development risks and the available profit margins.

Cash Yields

When a real estate investor projects yields, he/she considers three critical factors: cash-on-cash yield, the effect of inflation and/or economic growth on the property's income stream and the property's projected residual value. Inflation of rents and cash flow is largely outside

EXHIBIT 1

The Development Process
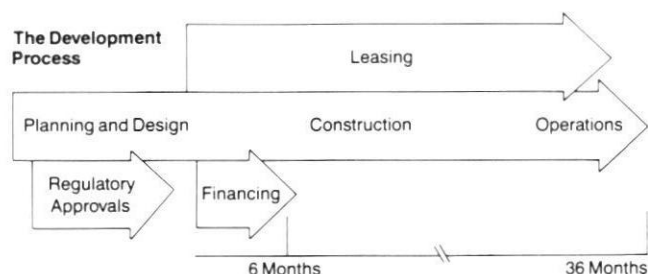
the control of individual investors. Similarly, residual value is usually controlled by changes in inflation and reproduction costs. Cash-on-cash yield however, is more readily controlled utilizing different investment strategies, and it is this area where developmental real estate advisors can have the most significant impact.

EXHIBIT 2

EXPECTED NOMINAL RETURNS
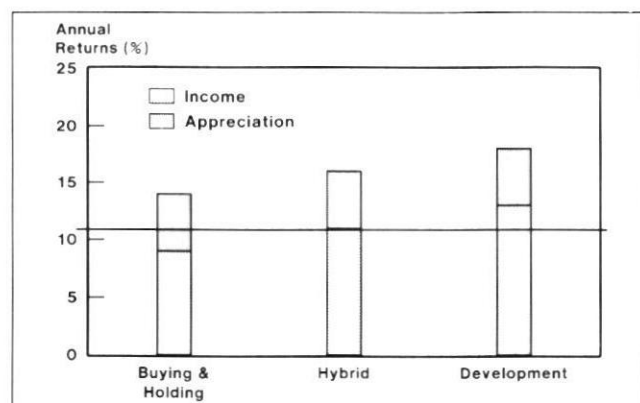
Exhibit 2 illustrates three strategies employed by investors in today's real estate marketplace. The first strategy, buy and hold, invests in completed, fully leased income producing property on an unleveraged basis. The lower segment represents the expected first year cash yield and indicates that an unleveraged property investment in today's market should have a 9% cash yield. Given a 5% inflation expectation, a 13–14% discounted yield could be projected. The second strategy employs a hybrid real estate investment structure where the investor assumes some lease-up risk and has a higher cash yield, maybe 10½ or 11%, and a discounted yield of 14–16%. The third strategy, real estate development, would have a 12.5 or 13% annual cash yield and a discounted yield before leverage of about 17 or 18%.

EXHIBIT 3

IMPUTED DEVELOPMENT PROFIT
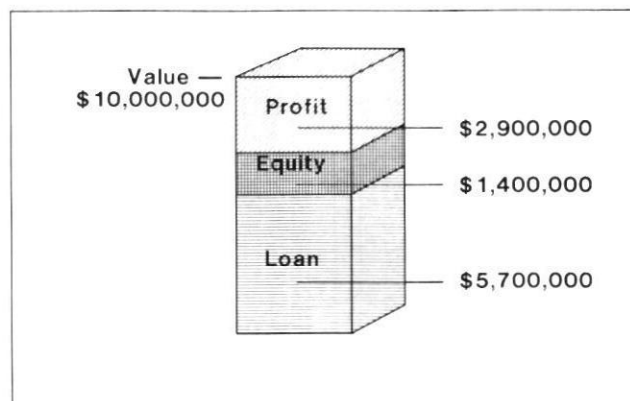
A typical profile for a $10 million development commitment is shown in Exhibit 3. Here a completed, fully leased office building with a 9% cash yield would have a value of about $10 million in the marketplace. However, based on current development profit margins, the actual cost of developing that asset over 18–24 months would be about $7.1 million. This indicates you can build at a 12½% cash yield and sell at a 9% cash yield; the difference provides a very substantial profit margin.

This exhibit also illustrates that many developmental investors use outside leverage to enhance returns. In this particular example, $1.4 million of equity is used to build a $10 million building which should have about $2.5–3 million of developmental profit when completed and leased. When assessing financial risk in developmental situations, it's important to note that an investor can forsake a profit of $2.5 million before starting to impair invested capital.

Development Risk In A Large Real Estate Portfolio

Currently there are two theories concerning the risks in real estate development. The first is that a long-term developmental investment program is made up of spectacular successes and failures. In other words, development is a roll of the dice. The second is conveyed by most real estate developers—that the high profit margins in real estate development always cover the developmental risk in new investments.

In order to quantify where developmental investing falls in the risk spectrum, the following portfolio, developed over a period of almost 20 years, is cited. This portfolio represents 40 development projects, about $2 billion of assets and 23,000,000 sq. ft. of space developed since 1967. This study analyzes the volatility of returns in that portfolio. How variable were the critical risk components of each project? Was the uncertainty in construction and lease-up adequately rewarded by consistently higher returns? How different were the actual cash-on-cash yields from what was anticipated at the start of the property development?

EXHIBIT 4
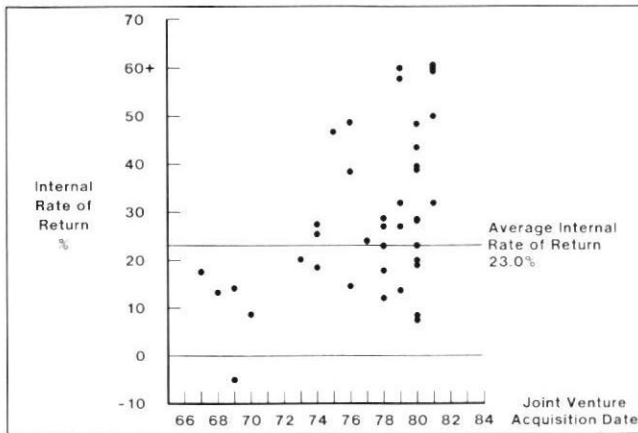
EXHIBIT 5

Exhibit 4 shows an internal rate of return analysis on 40 of these investments ranging from a low of −5% to investments that have internal rates of return approaching 60, 70 and 80%. This represents the return to the investor. The developer's return is not included. The horizontal axis indicates the year the development was started.

This portfolio is a good sample to study. It represents a significant investment with a substantial number of properties, about 500 individual buildings constructed in 100 different phases of development. Twenty-two developers created these properties in 12 different states over the last 17 years in good and bad markets and in times of high and low inflation. Each investment is at least four years old, with the average age being 7.7 years. The sample does have two limiting factors: it was managed by only one investment advisor with a very different specific strategy and it lacks a few real estate components since it does not include any residential, large mixed-use complexes or large downtown high-rise office buildings.

From the data in Exhibit 4, there was an actual loss of capital on a developmental investment in 3% of the cases. An additional 7% of the sample yielded returns below what could have been obtained in a safe investment such as a high grade corporate bond. However, 90% of the time the portfolio exceeded its alternative safe investment yield. In addition, this large, diversified portfolio had a consolidated internal rate of return of 23% and exceeded the expected return of a so called safe real estate project 85% of the time.

Joint Ventures

The next step in the study is to take a specific group of joint ventures and examine their performance in detail. Where were the risks in each development and was the volatility expected? Eighteen joint ventures, shown as lighter dots in Exhibit 5, were selected for this analysis and have a consolidated average internal rate of return over 17 years of 24% versus 23% for the entire sample, and reflect a diversification (9 states) and age (8.3 year
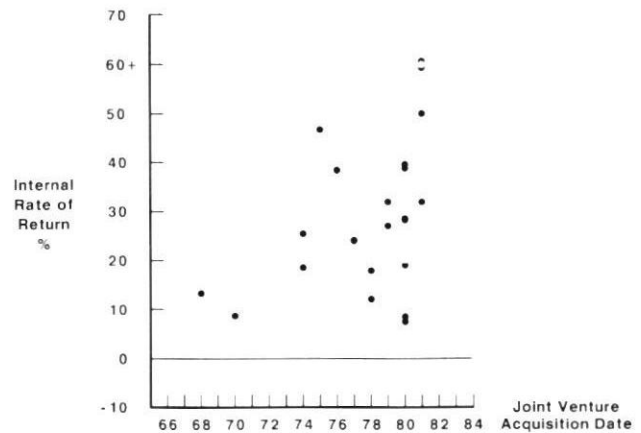
average) similar to the larger portfolio. The developments were built in 47 different phases over the last 17 years, have almost 300 individual buildings and constitute nearly $1.4 billion of assets.

EXHIBIT 6

$$\text{Cash-on-Cash} = \frac{\text{Net Cash Flow}}{\text{Total Cost}}$$

As mentioned earlier, initial cash-on-cash yield, the equation in Exhibit 6, is the most important determinant of the profitability of the risks of real estate development. Comparable quality property can be bought in the marketplace at a 9% yield. The difference between that 9% and what is earned on a developmental investment represents the profit for the risk taken.

Cash-on-cash yield is net cash flow divided by total development cost. In assessing the risks of obtaining higher cash-on-cash yields, the volatility of the denominator, total costs, is examined. How do costs vary in this sample? Was the budget maintained or where were the cost overruns? Was it in shell cost, the cost of the physical structure, tenant improvements or soft costs (i.e., interest expense during construction and lease-up cost)?

First to be assessed is the volatility in costs, the denominator of the cash-on-cash equation followed by the returns to the numerator, the actual net income. These

two components, income and cost, determine yield. When an investment is approved and before the first spade goes into the ground, the best pro forma estimate of income and total cost need to be compiled. The following analysis examines the difference between what was expected to happen to the 47 different phases of the 18 developmental investments, the pro formas and what actually happened. By quantifying the variance from an original best estimate, comes an assessment of the risks innate to investing in real estate development. Again it is important to realize that these 47 projects were built during the last two decades, in good and bad real estate markets, in periods of high and low inflation.

EXHIBIT 7
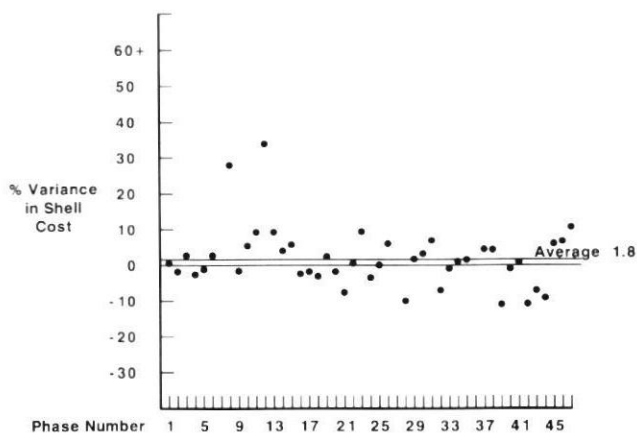
The Results

Shell costs, the cost of building the basic building shell, are shown in Exhibit 7. This illustrates the percentage of variance of shell cost from pro forma—a positive (+) variance means there were increased costs. Ninety-five percent of the cases remained within ±10% of the pro forma of hard shell cost. The mean variance from pro forma is 1.8%. The average over 17 years in over $1 billion worth of development, was that pro forma shell cost was missed by 2%. The volatility is quite limited and that's what you would expect. These are fairly simple office, R&D and industrial buildings with uncomplicated construction built over relatively short periods of time.

Variance in tenant improvement cost from pro forma is shown in Exhibit 8. There is more variability here than in shell cost because you can't get firm prices for tenant improvements prior to the start of construction; tenant improvement cost is determined by what each tenant needs for his own space. However, in reviewing this data, positive variances—high increases in tenant improvement costs—are not necessarily bad. In many instances, there are direct correlations between extra improvements and higher rental income. The variability is significant. On average, the sample was 7.8% over budget for tenant improvements.

EXHIBIT 8
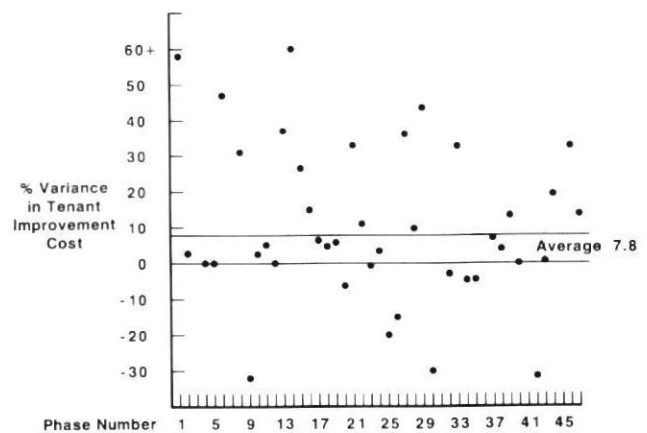
EXHIBIT 9
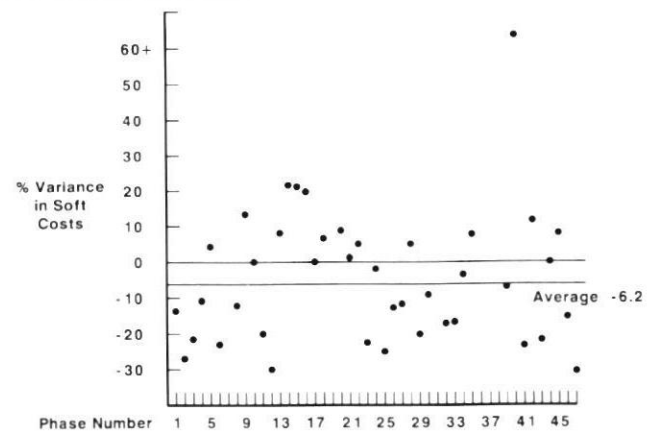
Variance in soft costs from budget is shown in Exhibit 9. Soft costs are primarily interest expense during lease-up and some marketing expenses. Although one would expect a fair amount of volatility in soft costs, on average there was a favorable variance of 6.2%. The soft costs were 6% less than what was expected when the investment was approved.

EXHIBIT 10
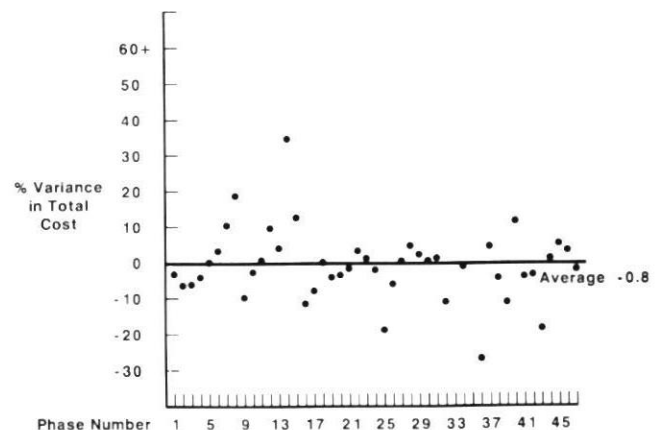
Exhibit 10 summarizes the results for the total cost component on the cash-on-cash equation. It shows that 93% of the sample was within ±10% of the pro forma estimate of total cost. More important, on average the 47 phases of these 18 developments constructed over a 17-year period came in at 1% under their originally expected total cost.

EXHIBIT 11
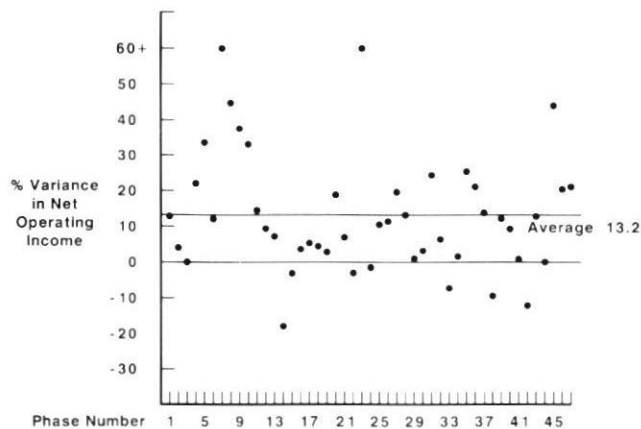
Next, what is the net cash flow from the leasing of these properties relative to what was expected? Exhibit 11 illustrates that 4% of the sample was significantly below pro forma net operating income, while 53% of the sample clusters between 0–15% were above the net operating income expected when the project was started. Overall, net operating income had a positive variance of about 15%. Income was 15% higher than the investors anticipated.

EXHIBIT 12
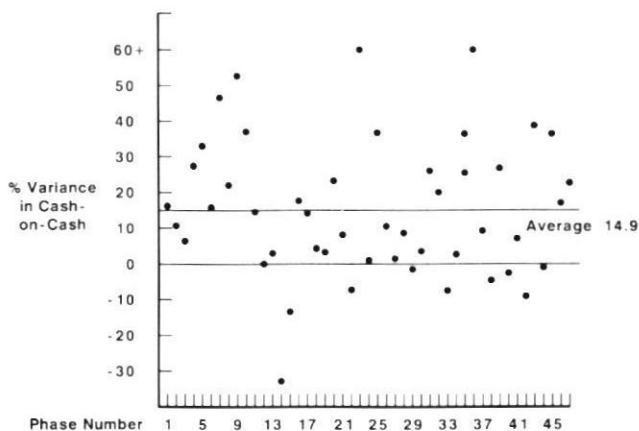
What happens to these individual components as expressed by the variance in cash-on-cash yields? Exhibit 12 describes the variance in actual cash-on-cash yields in the 47 investment sample. In nine situations (i.e., 19%

of the sample), the cash-on-cash yields were lower than anticipated. However, 81% of the developments had cash yields equal to or greater than their initial pro formas, and the whole portfolio had cash-on-cash yields 15% higher, on average, than original pro forma.

EXHIBIT 13
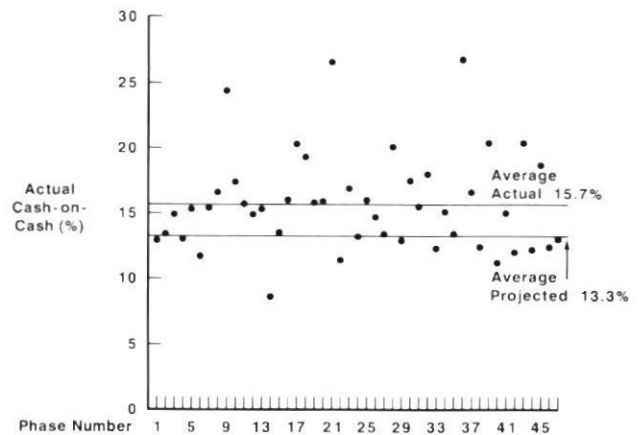
To put this in perspective, the actual cash-on-cash yields from pro forma are included, not just the variances from pro forma. Exhibit 13 shows the actual cash-on-cash yields, 15.7% on average on an unleveraged basis. Assuming a property can be sold at 9% yield, there clearly has been a substantial increase in value during the development period. Although there has been a significant amount of volatility from pro forma in a number of key areas, the end result has been a portfolio that met or exceeded expectations more than 80% of the time. The standard deviation on these actual cash-on-cash yields is 3.8%. Even moving down two standard deviations, actual cash-on-cash yield would be about 9% on the low side, which is what one would expect to pay currently when buying a property.

Conclusion

The risk factors in this portfolio have been in lease-up, the present area of concern for most developers. It has not been in hard construction cost. In this analysis, there is manageable risk in development if done on a dollar cost averaging basis, in relatively small buildings over long periods of time, with professional development partners. The overall variances have been favorable, in fact, much more favorable than one might initially anticipate. Certainly there has been more volatility in returns than in an unleveraged nondevelopmental portfolio. That risk however, has been extremely well rewarded in this large development portfolio over a long period of time. The study indicates a 900–1,000 basis points yield advantage over the standard real estate portfolio.

Exhibit 14 displays the Frank Russell Property Index beginning in January, 1978. This is a log chart where a straight line represents a constant rate of return. The real estate line, an aggregate of several unleveraged

dicates that over the last seven years, $1 invested in real estate on an unleveraged basis in 1978 would have a value of $2.40 in 1985.

Based on the entire portfolio of 40 investments with an average compounded annual return of 23%, $1 invested in that developmental portfolio in 1978 would have had a value of $4.25 for the same period. These are historic returns, and in today's marketplace margins are going to shrink. This example does indicate however, the spread between nondevelopment and development returns. One dollar invested in unleveraged real estate in 1978 grew by $1.40 in seven years, while $1 invested in leveraged developmental real estate in 1978 increased in value by $3.25. The difference, $1.85 of profit on that original $1 invested, represents the investment premium for assuming the risks of real estate development.

Historically, investors have been well rewarded for investing in real estate development. In the future, real estate markets are going to be more difficult and development profit margins will shrink. But overall there is a good argument to be made for investing in real estate development based on its historical performance over the last 20 years.

nondevelopmental portfolios, consistently shows less volatility than the S&P 500 and the Shearson Lehman Bond Index. Strictly on a return basis, this index in-

SHARED TENANT SERVICES: DEVELOPER DREAM OR DILEMMA?

"An intelligent building is one that is fully leased".

by **Thomas B. Cross**

Shared tenant services (STS) have been around since the invention of the telephone. Historically, there always have been buildings where the owner/developer provided telephone service along with a range of other intelligent offerings. These innovative developers were the first to offer air conditioning and then centralized HVAC, jogging tracks and other premium tenant services.

The recent explosion in STS is a result of the computer revolution, the AT&T divestiture, and most important, a competitive edge. Starting two years ago, the breakup of the Bell System has caused enormous confusion on the part of everyone, including AT&T.

When there is uncertainty often there is opportunity as well. Two years ago new management companies were formed to provide advanced telecommunications services on a multi-tenant or shared tenant (STS) basis to large buildings and office parks. In other words, provide tenants with equipment, long distance, maintenance and all the other services available from the Bell System before the AT&T divestiture.

Many office building/park owners and developers, perceiving telecommunications could enhance the value of their real estate, began independently and with the help of STS companies to offer enhanced services. Today tenant services include:

- local telephone service,
- long distance service,
- telephone equipment,
- billing, administration and maintenance.

Given proper management (to be discussed later), telecommunication services can be a highly profitable
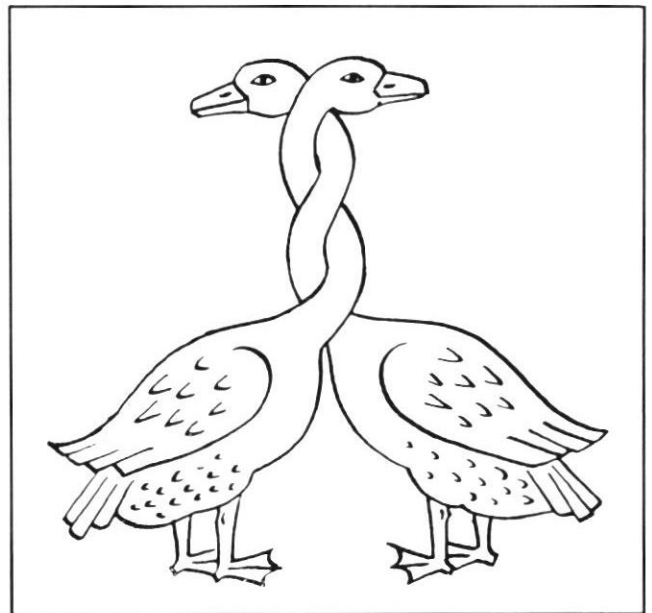
business. Often more money can be made on dialtone (telecommunications) than on dirt (real estate).

Industry Update

During 1985 the multi-tenant telecommunications industry grew exponentially. Most of the major developers, building system control companies, telecommunications providers, telephone companies and new management entered the STS business.

The primary focus of these companies is on the development of telecommunication services for new buildings, not existing ones. This has occurred because many developers need telecommunication services and other tenant amenities to attract tenants in markets where the vacancy rates often exceed 20%. There is a Catch-22 nature to this emerging industry. Developers interested in telecommunications services are those in high

Thomas B. Cross *is managing director of Cross Information Company and vice president of Intelligent Buildings Corporation. He has co-authored several books on teleconferencing, personal computers and software, and received the Distinguished Author Award from the International Facility Management Association.*

vacancy markets. While many of the latest generations of telecommunications systems are modular (enabling the tenant to purchase only as much equipment as needed) and expandable to thousands of telephones, the long tenant leaseup and recovery on investment time in telecommunications is more than most STS companies can afford.

With respect to existing buildings or retrofits, there is a growing awareness that certain types of telecommunications services can be sold to existing tenants. These services often take the form of enhanced telecommunications features such as voice mail, teleconferencing and telephone message centers.

Tenants who already have equipment may be the first attracted to these enhanced services allowing the STS company to provide basic telephone services. For example, one company formed for an existing building, the Rockefeller Center Telecommunications Company in New York City, was created to support new and existing tenants.

No matter how sophisticated the telecommunications system, tenants are needed to make both the dirt and dialtone work. Like any adolescent, this industry is going through puberty. There is a lot of enthusiasm but little operating experience in this area. In Figure A is a listing of some of the companies involved in this new industry, with new companies emerging daily. One suggestion is to check references before signing a contract.

The Dilemma—Roach Motels

Management of a telecommunications system requires a separate, technically oriented and competent team. This is a subtle but critical issue concerning the profitability of an STS project. Many developers have operated under the assumption that the company who sold them the PBX telecommunications system also would provide the sales and tenant support.

The key to successful intelligent services in a building is its *management* and *marketing*. Where these projects fail or are marginally successful, there is a lack of proper management by either the building owner/manager or the STS provider.

For example, one multi-tenant building failed because neither the owner nor the PBX vendor properly managed the system. Both thought the other was selling to and supporting the tenants. The PBX vendor believed the shared telephone system was a complete failure and subsequently, declined to bid on other multi-tenant telecommunications projects in the area.

There are other pitfalls to this business. Most tenant agreements provide for indemnification of the STS provider in the event of system failure. There are instances where a telephone system failed for days. This is an untenable situation for the developer because this type of failure can occasionally happen, similar to the power or HVAC system not working. At the same time, the telecommunications service provider should be held accountable for failures beyond a reasonable period

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FIGURE A

Shared Tenant Service Providers

Developers And Joint Ventures
Electronic Office Centers
Harbor Bay Telecommunications Development and Teleport
Honeywell Telecommunications, Miami, Florida
International Business Centers
LinCom Corporation, Dallas, Texas
Merrill Lynch and Fidelity Management
Multinet Communications Corporation, Irving, Texas
Olympia & York
O'Neill Development
Portman Properties
Trammell Crow Company
WRC Telecommunications, Seattle, Washington
Watson-Casey

Building Systems/Controls Companies
Honeywell
Johnson Controls
MCC Powers
United Technologies

Large Telecommunications And/Or Diversified Corporations
American Network
AT&T
Bell Operating Companies—BellSouth, US West, etc.
Cable and Wireless of North America
CP National
Datapoint
Fairchild Communications Networks and Services
General Electric
GTE Realty Corporation
ITT
Merrill Lynch
Pacific Telecom, Inc.
Planning Research Corporation
Republic Telcom
Riverside Telephone Company
IBM-RealCom
ShareTech—AT&T—United Technologies (joint venture)
TDX Systems, Inc.
United Telecommunications
US Network Services Corporation
Wang Laboratories
Western Union

Management Companies And Others
ALLCOM
Alpha Communications
Amerinex
Financial Place Communications
InfoEx
Information Exchange, Austin, Texas
Info Structures
Intelligent Buildings Corporation
Multi-Tenant Communications, McLean, Virginia
Multi-Tenant Telecommunications Association
Pacific Management
Rose Associates
ShareNet
Telecom Plus Shared Tenant Services
Telesphere International
TEL-Management, Dallas, Texas

(e.g., after four hours, a penalty would be assessed).

The bottom line for developers is to be aware the telecommunications business is like any other building service that needs to be properly operated and managed. An intelligent telecommunications system also is one that is fully leased. The lack of proper system management results in few tenant telecommunications customers and also may hurt the real estate sales. The overall impact is large financial losses and what is becoming known as the roach motel syndrome—where money goes in but nothing comes out.

Profits And Perils Of Telecommunications Services To Developers/Owners

The following are some of the major advantages and disadvantages to providing telecommunications enhanced real estate.

Marketing Edge

Advantage

Offering advanced equipment and services has become the latest method of attracting tenants. Where telecommunications are available, developers report they are quickly achieving and maintaining higher tenant occupancy. At the same time, many developers are being dragged into the telecommunications business because the developer across the street is providing the service.

Disadvantage

If the dialtone is going to be as successful as the dirt, a knowledgeable and competent sales force is required. Telecommunications services *do not* sell themselves. Moreover, if leasing agents are used, they must be aware of the system's advantages and also should be compensated for selling these services.

Better Use Of Leased Space And Cable Plant

Advantage

Switching equipment can occupy valuable space that could be used for office leasing, and the cable plant system, normally a write-off expense loss to the owner/developer, can be managed as an asset to the land development. Previously developer/owners have overpaid the telephone company for cable plant and conduit. The courts have upheld the ruling that the telephone companies own the conduit after the wire is pulled through. Sometimes the telephone company has refused access or sharing of the conduit system, forcing the developer to provide a redundant conduit plant system or pay higher costs for use of the cable plant and conduit. Due to the introduction of shared tenant services (STS) or joint tenant services (JTS), many of the public utility commissions are allowing the developer to own and manage their own conduit and cable plant systems.

In some circumstances, the telephone companies are required to pay the owner of the cable plant a fee for access and use which often exceeds the actual cost of providing the plant. And, while this is not the largest

source of income for the owner, it could be a revenue source during the life of the project. With the high cost of the cable plant, it can be of considerable value if and when the land development is sold.

Disadvantage

Cable plant and conduit represent costly and complex technology. While there are revenue opportunities, there are also risks assumed by the telephone company after installation. Telephone cable plant is not just one piece of wire and often comprises tens of thousands of individual wires that must be accounted for, tracked, logged and replaced. Therefore, to be profitable, it should be closely managed.

Revenue Generator

Advantage

Multi-tenant telecommunications can be an additional revenue source to the owner. Sharpen your pencil and get intimately familiar with your computer spreadsheet program. This is a business of nickels and dimes and it may involve a few nickels of revenue each month coming from long distance, telephone sets, maintenance or moving and changing telephones. However, these nickels add up. The net profit on an average long distance telephone call ranges from $.25–.50. Take into account the number of long distance telephone calls you make each day and the number of people in your organization who make calls, and you get an idea of the amount of money that can be generated. The same applies to the other revenue sources, but long distance remains the real moneymaker. And, whether you believe that long distance rates are going up or going through the floor, AT&T will probably not go out of business, and will continue to give additional discounts or incentives to large volume users (e.g., AT&T's new MEGACOM service). By packaging long distance calls together, there still will be economies of scale for large buildings or office parks.

In the future, there will be opportunities for profit from enhanced services. These services include voice mail, telephone answering and message centers, teleconferencing, 800/900/976 services, data communications and computer services. Even today, Trammell Crow is providing voice mail services in one of their buildings. Small and medium tenants who could not otherwise afford the high cost of such systems are finding these services are cost effective when shared with others.

Disadvantage

However, not all buildings make money. In large warehouses or other structures where telephone densities and long distance usage is low, the cost for installation and support may be more than that generated from revenues. To be a likely candidate for telecommunications services, the building should generally exceed 300,000 sq. ft., with a 3-year buildout, have no major anchor tenants (many 20,000 sq.ft. tenants are preferred), and have 60% of the tenants subscribe to the telecommunications

system. Also, recognize that it probably takes in excess of $1 million to finance this project. Much of the equipment can be leased however, be prepared to spend at least $500,000 for the management of this project until positive cash flow takes place, usually in 18-24 months.

More Effective Land Development Management

Advantage

Due to the increasing complexities of design, construction and management of high-tech offices and other facilities, integrated telecommunications and information systems management is desired to reduce waste, coordinate planning and provide for expansion.

Disadvantage

The key word is management. Most developers know little about telecommunications and they have added appropriate staff or consultants to help them through this maze. It has been said that there is more copper wire in most buildings than structural steel, and in the future there will be more wire, fiber optics, personal computers and electrical devices requiring more power than can accurately be predicted.

Again, this is a Catch-22 environment. If the building is planned for enormous amounts of information technology, will it be desired in the future? Or, will the focus be only on the price per square foot? In educating the tenants about the intelligent planning in the building, some will recognize the value of this effort in terms of lower operating costs, greater flexibility in growth and office movement and reduced staff needed to manage this process. Developers must recognize that intelligent buildings are not for everyone and forego those tenants who do not require such services. This is a difficult decision particularly where high vacancy rates exist.

Designing For Communications

Advantage

Because buildings are initially wired for integrated voice/data services, there is no requirement to add special conduit in most situations. Some buildings are being designed with fiber optic wiring systems to save space normally needed for twisted pair wiring schemes.

Disadvantage

Since it is difficult to determine the tenants' needs, many developers overspend in the area of communications. With the advent of return air plenum HVAC systems, most wiring systems are manufactured with Dupont Teflon® or other fireproof coatings. IBM, AT&T and others have developed building-wide wiring or Local Area Networks (LANs) that propose to provide a single solution for interconnecting all computer or telephone devices throughout the building. A truism about wiring is that no wiring system fits all. The building developer is caught in a tricky situation. If he/she designs the building to provide maximum communications capability

through the use of a single wiring system, will all the tenants require its use? Most companies have a multi-vendor environment where the devices have their own data communication protocols and other interface systems that require a special or custom approach, limiting the desire for access to the building system.

Once the developer/owner decides to provide telecommunications services, there are other concerns such as who will provide the systems/services? The basic options are:

- developer/owner funded—staff management,
- developer/owner funded—independent management,
- developer/owner and telecommunications provider joint funding—independent management,
- telecommunications provider funded and managed—concession paid to developer/owner.

Other variations exist. Leasing companies, building system control companies and others are getting into the telecommunications business. In addition to AT&T, other long distance companies will be part of the shared tenant services business. Plus major insurance companies are forming telecommunications management entities to provide STS services to buildings/parks owned by the parent.

STS Check List

Below is a check list to review before entering the telecommunications business:

1. *Develop a business plan for telecommunications*
   There are companies, like Intelligent Buildings Corporation of Colorado, who evaluate your project for telecommunications. It is surprising to find there are 300,000 sq. ft. projects that are as profitable as others at 500,000 sq. ft. It depends on the nature and type of building, tenant mix and other factors. A computerized spreadsheet is helpful in evaluating the optimistic versus the worse case projections. Recognize that telecommunications loses money for the first few years of operations. If your projections show this will be true for more than two years, it may be better to wait until there are more tenants.

2. *Research your locale to see if there are other STS companies providing services*
   Visit their operations, see if they are interested in working with your project and ask for a proposal. If you like their recommendations, check references (call tenants of projects managed/owned by the STS provider). Also, evaluate their funding capacity—just because the company is a $20 billion telephone company doesn't mean it has the financial commitment for your project and the 20 others on line. Secure a letter of bank or other financial commitment bearing your project's name.

3. *Evaluate their management team — review resumes and obtain commitments*
   The people you deal with initially will not necessarily manage your project. Most STS companies are overextended due to the number of projects being implemented. This is causing top talent to be sparse with the actual work being done by junior personnel. In regard to enhanced services, check to see if the provider has experience in local area networks, teleconferencing, electronic mail and other new technologies. Basic telephone service is needed today however, a vision of the future also is necessary.

4. *Review your management necessities*
   Is there a real need to provide telecommunications services to tenants? Many developer/owners want STS but often do little to support it with prospective tenants. During the first year, 25% of a construction manager's and salesperson's time should be devoted to planning/construction and sales/marketing efforts. If this is not possible, STS service should not be provided.

5. *Take into account regulatory issues*
   Most states have rules concerning multi-tenant telecommunications, joint tenant or shared tenant services. Some states have prohibited the resale of local service, required redundant cable plant and imposed other limitations. The issues are impediments to STS but do not eliminate the business opportunity. In many states however, there are few restrictions and fair rates for STS projects. The most critical regulatory issue has to do with cable plant, mentioned earlier. Even if you do not plan to provide telecommunications services to tenants, *do not* sign an agreement with the local telephone company without professional cable engineering advice.

6. *Do your legal homework*
   Have your attorney write the contract. Ask for proposed developer *and* tenant contracts from the STS provider however, use them only as draft versions. The best strategy is to have a law firm which specializes in STS work provide your attorney with the basic document, then have him/her provide the necessary verbage that applys to your particular state. Since this is a brand new area of the law with little precedent that involves new issues (i.e., roof rights, air clearances), get as much legal advice as possible. A great deal of money is involved, and it would be unfortunate to lose or spend it in litigation.

Once started, you will find other issues to review that are unique to your project.

Get professional help early, pay attention to the project and provide the necessary construction and sales support needed for growth. If this is done, you should reap the reward of enhanced real estate and telecommunications value.

MANAGING SAVINGS AND LOAN PORTFOLIOS

The concept of duration is considered to explain why interest rate increases were so detrimental to the S&Ls.

by Neil G. Waller and Charles H. Wurtzebach

During the 70s, the economy experienced dramatic increases in interest rates causing savings and loan associations to suffer significant losses in net worth. A major reason for these losses was the historical mismatch of assets and liabilities.

Theoreticians and practitioners were quick to recognize the problem was an imbalance and consequently, a number of new asset and liability instruments were introduced most of which were designed to shorten asset and lengthen liability maturities. The ultimate purpose was to match their maturities. This article addresses maturity matching strategy and compares it to an alternative plan based on the concept of duration.

Duration Properties

The life of a mortgage or bond is defined as its term-to-maturity however, this only provides information regarding the time of the last payment, and it doesn't discuss the size or timing of the payment stream, or the relation with the yield-to-maturity. In 1938, Frederick R. Macaulay proposed a measure he called duration whose formulation is:

$$ D = \frac{\sum\limits_{t=1}^{m} \dfrac{t \times CF_t}{(1+r)^t}}{\sum\limits_{t=1}^{m} \dfrac{CF_t}{(1+r)^t}} $$

Where:
  D = duration
  r = yield-to-maturity
  t = time of cashflow
  m = term-to-maturity
  CF_t = cashflow at time t

Duration is simply a weighted average time where the time of each flow is weighted by its percentage contribution to the price of the security. This is illustrated in Exhibit 1 showing the duration of a 12% annual coupon bond priced at par with five years to maturity. The first year's cashflow of $120 contributes approximately 10.71% to the bond's price of $1,000. Multiplying one

Neil G. Waller is assistant instructor of real estate for the Department of Finance at North Texas State University. He received his B.S.B.A. and M.A.B.A. degrees from the University of Florida and currently is a doctoral candidate in finance and real estate at the University of Texas at Austin.

Charles H. Wurtzebach is associate professor of real estate and finance at the University of Texas at Austin. He also is the director of the University of Texas Real Estate Program and has authored numerous articles.

EXHIBIT 1

Duration Of A 5-Year, 12% Annual
Coupon Bond, Priced At Par

1 Year	2 Cashflow	3 PU Factor @ 12%	4 PU of CF	5 Col 4 ÷ Price	6 Col 1 × 5
1	$ 120	.8928	$ 107.14	.10714	1071
2	120	.7971	95.66	.09566	.1913
3	120	.7117	85.41	.08541	.2562
4	120	.6355	76.26	.07626	.3050
5	120	.5674	68.09	.06809	.3404
5	$1,000	.5674	567.40	.56740	2.8370
			Price = $1,000.00		Duration = 4.037

EXHIBIT 2

Duration Of A Fully Amortizing 30-Year
Mortgage, With A 12-Year Effective Life
Or A 3-Year Rollover

Interest Rate	3 Year Rollover	12 Year Effective Life	30 Year Term
8%	2.64454	7.32213	9.56393
9%	2.61402	7.04085	9.00954
10%	2.58311	6.76738	8.49076
11%	2.55196	6.50287	8.00729
12%	2.52072	6.24822	7.55829
13%	2.48948	6.00399	7.14242
14%	2.45837	5.77054	6.75806
15%	2.42745	5.54801	6.40334
16%	2.39680	5.33636	6.07630

year by 10.71% shows the cashflow contributes approximately .1071 years to the total duration of the bond (4.037 years). The fifth year's return of principal however, accounts for about 56.74% of the bond's price and 2.837 years (5 × .5674) of the total duration.

Duration is used as a measure of the bond's interest rate risk. For a given infinitesimal change in interest rates, Δi, the percentage change in the bond's price, P, is given by:

$$P = -D\Delta i$$

For example, the bond in Exhibit 1 initially was priced at par to yield 12% to maturity. If market interest rates rise by 1%, the new discount factor will be 1.1312 (1.12 × 1.01). By revaluing the bond at this new discount rate, its price falls $39.278 from par to $960.722. This price decline of 3.9278% is approximately equal to the negative of the bond's duration, 4.037, multiplied by the 1% change in the market interest rate. The accuracy of this relationship improves for smaller changes in interest rates, and for infinitely small changes it is exact.

Additivity
Another property is additivity which describes the duration of a mortgage portfolio as simply the sum of each individual duration weighted by its percent of value contributed to the portfolio. This property is valuable as a summary statistic. For example, a large mortgage port-

folio with a duration of seven years will drop in value by approximately 7% if interest rates rise by 1%. Also, if the portfolio is compared to another having a duration of seven years, irregardless of the maturity make-up of the two portfolios, both will behave alike in response to changes in interest rates.

Managing Savings And Loan Interest Rate Risk
Savings and loan associations historically have mismatched the maturities of assets and liabilities. Up until the early 70s, assets were predominately 30-year mortgages while liabilities were all in a maturity class of less than two years. Through the 50s and 60s, savings and loans followed an extreme lend-long, borrow-short strategy which has risks. If interest rates increase, both assets and liabilities decrease in value. However, assets lose

EXHIBIT 3

Portfolio Securities And Net Worth

ASSETS (Initial Value: ($1,000,000)
Mortgages
    Fixed Rate: 30 years (effective 12 years), 13%, duration 6.003 years
    Rollover : 30 years (balloon 3 years), 12%, duration 2.52 years
    GPM : 30 years (effective 12 years), 13%, 7.5% per year graduations for first 5 years, duration 6.479 years
Consumer loans
    1 year @ 14%, duration .53 years
    2 years @ 14%, duration .995 years
    3 years @ 14%, duration 1.437 years
Fixed Assets: Constant*
Liquid Assets: Constant*
Other Assets: Constant*

LIABILITIES (Initial Value $1,000,000)
Savings Accounts
    Passbook: Constant**
    Certificates: Semi-annual pay
        1 year @ 10%, duration .976 years
        2 years @ 10%, duration 1.861 years
        3 years @ 11%, duration 2.635 years
        4 years @ 11%, duration 3.341 years
        6 years @ 11%, duration 4.546 years
        8 years @ 12%, duration 5.356 years
        10 years @ 12%, duration 6.079 years
FHLB Advances: Constant*
Other Liabilities: Constant*

NET WORTH
Assets $1,000,000
Liabilities ($1,000,000)
Net Worth   −0−

*These assets and liabilities are generally fixed components of the portfolio.
**Passbook accounts are payable on demand causing their durations to be extremely short, probably less than .5 years. Their value is assumed to be highly interest inelastic or effectively constant.

EXHIBIT 3 CONTINUED: CASE I

Maturity of Assets > Maturity of Liabilities
Duration of Assets > Duration of Liabilities

Assets	Percent of Portfolio	Duration	Effective Maturity	Weighted Duration	Weighted Eff. Maturity	Initial Value (000)	Value After 2% Rise (000)	Value After 2% Decline (000)
Mortgages								
Fixed Rate	.78	6.003	12	4.683	9.36	$ 780	$695.0	$ 881.5
Rollover								
G.P.M.								
Consumer Loans								
1 year	.01	0.530	1	0.005	0.01	10	9.9	10.1
2 year	.01	0.995	2	0.009	0.02	10	9.8	10.2
3 year	.01	1.437	3	0.014	0.03	10	9.7	10.3
Fixed Assets	.03					30	30	30
Liquid Assets	.11					110	110	110
Other Assets	.05					50	50	50
TOTAL	1.00			4.711	9.42	$1,000	$914.4	$1,102.1
Liabilities								
Savings Accounts								
Passbook	.50					$ 500	$ 500	$ 500
Certificates								
1 year	.10	0.976	1	0.097	0.1	100	98.2	101.9
2 year	.10	1.861	2	0.186	0.2	100	96.5	103.6
3 year	.10	2.635	3	0.263	0.3	100	95.2	105.2
4 year	.10	3.341	4	0.334	0.4	100	93.9	106.6
6 year								
8 year								
10 year								
FHLB Advances	.06					60	60	60
Other Liabilities	.04					40	40	40
TOTAL	1.00			0.880	1.0	$1,000	$983.8	$1,017.3
Net Worth						– 0 –	($ 69.4)	$ 84.80

more due to their long-term nature resulting in a loss in net worth. If interest rates decline, S&Ls with a lend-long, borrow-short strategy can benefit.

For example, suppose an 8%, 30-year mortgage (duration 9.5 years) is financed by a five-year, 7% annual bond (duration 4.1 years). If interest rates rise by 1%, the mortgage's value would drop by approximately 9.5%, and the bond's by 4.1%. The end result is a decrease in net worth of approximately 5.4%. If rates decline by 1%, this result would reverse and net worth would increase by 5.4%. Historically, then, S & Ls always have been exposed to some interest rate risk, beneficial or detrimental, because of their lend-long, borrow-short portfolio structure. But during the 50s and early 60s, S & Ls were successful. Interest rates were low and stable adverse movements were not considered a significant risk, and similar rates were anticipated in the future. Long-term mortgages were originated based on a risk premium assuming that interest-rate risk would continue to be insignificant.

Problems arose when dramatic and unanticipated increases in interest rates occurred. This trend started in the mid-60s and accelerated in the 70s. Since these changes were unanticipated, interest rate risk premiums on seasoned mortgages were insufficient to cover losses. Beginning in the late 60s profit margins began to narrow, and in the 70s they turned to losses as interest rates soared to historic levels. The mismatch of assets and liabilities, while a success in the 50s and early 60s, proved to be a disaster in the 70s. Interest rate risk was no longer insignificant and during the 70s, S & Ls began taking steps to shorten asset and lengthen liability maturities.

Although the traditional long-term, fixed-rate mortgage was still offered, most S & Ls moved to alternative mortgage instruments (AMIs) including rollovers, graduated payment (GPM), and adjustable rate mortgage loans (ARMs). While rollovers and adjustable rate mortgages both provide for periodic interest rate adjustments, they also shorten maturities.

A common feature of both the traditional mortgages and the AMIs is that as interest rates rise their durations are reduced (see Exhibit 2). The old, low interest rate traditional mortgages of the 50s and 60s were very sensitive to changes in interest rates. An 8%, 30-year mortgage has a duration of 9.56 years and this mortgage's value

EXHIBIT 3 CONTINUED: CASE II

Maturity of Assets > Maturity of Liabilities
Duration of Assets = Duration of Liabilities

Assets	Percent of Portfolio	Duration	Effective Maturity	Weighted Duration	Weighted Eff. Maturity	Initial Value (000)	Value After 2% Rise (000)	Value After 2% Decline (000)
Mortgages								
Fixed Rate	.19	6.003	12	1.141	2.28	$ 190	$169.3	$ 214.7
Rollover	.16	2.520	3	0.403	0.48	160	152.2	168.2
G.P.M.	.10	6.479	12	0.648	1.20	100	92.8	108.2
Consumer Loans								
1 year	.12	0.530	1	0.064	0.12	120	118.8	121.3
2 year	.12	0.995	2	0.119	0.24	120	117.7	122.4
3 year	.12	1.437	3	0.173	0.36	120	116.7	123.5
Fixed Assets	.03					30	30	30
Liquid Assets	.11					110	110	110
Other Assets	.05					50	50	50
TOTAL	1.00			2.548	4.68	$1,000	$957.5	$1,048.3
Liabilities								
Savings Accounts								
Passbook	.13					$ 130	$ 130	$ 130
Certificates								
1 year	.07	0.976	1	0.068	0.07	70	68.7	71.3
2 year	.10	1.861	2	0.186	0.2	100	96.5	103.6
3 year	.10	2.635	3	0.263	0.3	100	95.2	105.2
4 year	.20	3.341	4	0.668	0.8	200	187.8	213.2
6 year	.30	4.546	6	1.363	1.8	300	275.5	327.4
8 year								
10 year								
FHLB Advances	.06					60	60	60
Other Liabilities	.04					40	40	40
TOTAL	1.00			2.548	3.17	$1,000	$953.7	$1,050.7
Net Worth						– 0 –	$ 3.8	($ 2.4)

will fluctuate by 9.56% for a 1% change in interest rates. Note, however, this mortgage's duration decreases as interest rates rise; e.g., with 16% market interest rates, the duration is reduced to 6.07 years. This demonstrates that the higher interest rate originations of the 70s served in themselves to shorten the duration (and therefore reduce the interest rate sensitivity) of traditional mortgages.

The most effective AMI for reducing mortgage life is the rollover, typically ballooning in three years. As shown in Exhibit 2, the duration of these instruments is relatively insensitive to changes in interest rates falling into a tight pattern around 2.5 years. On average, the value of these rollover mortgages is one-third as sensitive to interest rate changes as are full 30-year mortgages.

Also shown in Exhibit 2 is the duration of a 30-year mortgage assuming an effective life of 12 years. This is more representative of the true life of a typical mortgage since, on average, 30-year mortgages are paid off in 12 years. Note that reducing the effective life from 30 to 12 years only reduces the duration by an average of one-and-a-half years.

On the other side of the balance sheet major changes

were implemented to lengthen the maturity of liabilities. At the beginning of the 70s, passbook accounts comprised nearly 60% of all S & L deposits. Overall, all deposits had maturities of less than two years or a duration of one year.

From 1970-73, new two and four year certificates were offered and passbook accounts dropped dramatically. By 1974, 22% of deposits had maturities longer than two years, and by 1978 this portion of deposits with longer maturities increased to 31%.

The trend toward longer-term maturities was reversed in 1978 when six month money market certificates (MMCs) were offered to prevent massive disintermediation. The new MMCs proved to be popular and by the end of 1979, MMCs accounted for one-fourth of total S & L deposits. Much of this growth represented transfers from longer-term accounts with maturities of four years, causing the average maturity of liabilities to shorten considerably.

Thus, S & Ls were only partially successful at correcting the historic mismatch of assets and liabilities. By the end of the decade, new AMIs and higher rates had shortened the duration (and to some degree, the maturity) of assets.

EXHIBIT 3 CONTINUED: CASE III

Maturity of Assets = Maturity of Liabilities
Duration of Assets < Duration of Liabilities

Assets	Percent of Portfolio	Duration	Effective Maturity	Weighted Duration	Weighted Eff. Maturity	Initial Value (000)	Value After 2% Rise (000)	Value After 2% Decline (000)
Mortgages								
Fixed Rate	.19	6.003	12	1.141	2.28	$ 190	$169.3	$ 214.7
Rollover	.16	2.520	3	0.403	0.48	160	152.2	168.2
G.P.M.	.10	6.479	12	0.648	1.20	100	92.8	108.2
Consumer Loans								
1 year	.12	0.530	1	0.064	0.12	120	118.8	121.3
2 year	.12	0.995	2	0.119	0.24	120	117.7	122.4
3 year	.12	1.437	3	0.173	0.36	120	116.7	123.5
Fixed Assets	.03					30	30	30
Liquid Assets	.11					110	110	110
Other Assets	.05					50	50	50
TOTAL	1.00			2.548	4.68	$1,000	$957.5	$1,048.3
Liabilities								
Savings Accounts								
Passbook	.06					$ 60	$ 60	$ 60
Certificates								
1 year	.08	0.976	1	0.078	0.08	80	78.5	81.5
2 year	.10	1.861	2	.186	0.20	100	96.5	103.6
3 year	.10	2.635	3	.263	0.30	100	95.2	105.2
4 year	.10	3.341	4	.334	0.40	100	93.9	106.6
6 year	.15	4.546	6	.681	0.90	150	137.8	163.7
8 year	.15	5.356	8	.803	1.20	150	135.8	166.3
10 year	.16	6.079	10	.972	1.60	160	143.1	179.9
FHLB Advances	.06					60	60	60
Other Liabilities	.04					40	40	40
TOTAL	1.00			3.317	4.68	$1,000	$940.8	$1,066.8
Net Worth						– 0 –	$ 16.7	($ 18.5)

For liabilities, however, neither durations nor maturities were significantly altered.

Duration vs. Maturity Strategies

To eliminate interest rate risk, S & Ls were advised to match the maturities or effective maturities of assets and liabilities. For small changes in interest rates, duration represents the percentage change in a security's value. Therefore, if assets and liabilities have the same duration, small changes in interest rates will cause the asset and liability values to change equally, leaving net worth (assets minus liabilities) unchanged.

To compare the duration and maturity strategies, a hypothetical S & L portfolio of assets and liabilities was constructed (see Exhibit 3). The S & L is assumed to raise $1,000,000 in liabilities and to immediately invest this amount in assets. In Cases I, II, and III, the portfolio is structured based on a maturity or duration strategy. The change in net worth resulting from a 2% market interest rate change is then examined.

Case I simulates the position of S & Ls at the end of the 60s. At that time, these institutions had the bulk of their assets in 30-year mortgages and liabilities in passbook accounts. Both the effective weighted average maturity (9.42 years) and duration (4.711 years) of assets were greater than the effective maturity (one year) and duration (.88 years) of liabilities. If interest rates had dropped in the 70s, the S & Ls would have experienced a gain in net worth and benefited from the change in interest rates. But interest rates rose dramatically causing net worth to decline. This is demonstrated in Case I where a 2% rise in the interest rate decreases net worth by $69,400, whereas a 2% decline in the interest rate increases net worth by $84,000. The change in net worth, ranging over $154,200, illustrates the risk and volatility associated with an extreme lend-long borrow-short position.

By matching the duration of assets and liabilities, net worth is protected for infinitely small changes in interest rates. This strategy is illustrated in Case II. The durations of assets and liabilities were matched (2.548 years) by restructuring the portfolio so more wealth is held in the short-term loans and longer-term certificates. A 2% interest rate shock then results in a change in net worth ranging over $6,200. In contrast with Case I, the duration strategy has reduced net worth volatility to approxi-

mately ¹⁄₂₅th the range of Case I. If the change in interest rates had been infinitely small, then net worth would have been completely protected. The change results from the large, 2% interest rate shock.

In Case III, liabilities again were restructured so that asset and liability effective maturities were equal (4.68 years) however, the assets' durations (2.548 years) fall below liabilities' durations (3.317 years). A 2% rise in interest rates now causes net worth to increase by $16,700, whereas a 2% decline causes net worth to fall by $18,500. A 2% interest rate shock results in a change ranging over $35,200. The maturity strategy has a beneficial impact if interest rates increase, but a decline in interest rates is detrimental to net worth. Suppose an S & L, after suffering losses through the 70s, had followed a recommended maturity strategy and by the end of the decade had matched maturities. The S&L, instead of eliminating interest rate risk, might have suffered losses again in the early 80s as interest rates declined.

The thrust of this analysis is to demonstrate that the response of net worth to fluctuations in interest rates is a function of asset and liability durations, not maturities. If the duration of assets is greater than that of liabilities, a decline in interest rates favorably impacts net worth. If the duration of assets is lower than that of liabilities, an increase in interest rates benefits net worth. When durations are matched, the risk is greatly reduced for discrete interest rate fluctuations.

These relationships give rise to a set of active duration strategies for managing interest rate risk. If interest rates are expected to rise, then an S&L should shift its portfolio so that assets' durations are less than liabilities' durations. If interest rates expect to fall, this structure should be reversed. If the course of interest rates is uncertain, asset and liability durations should be matched to reduce the impact whichever way the shift occurs. Thus, duration can be used as either an active or passive strategy for managing interest rate risk.

Conclusion

The concept of duration is important because it provides the theory that explains why the interest rate increases were so detrimential to the S&L industry. Furthermore, in application, duration theory and strategies provide savings and loan associations with the framework to systematically manage interest rate risk.

COMPARISON OF SECONDARY MORTGAGE MARKET YIELDS OF FRMs AND ARMs

An examination of the yield differences between ARMs and FRMs sold in the secondary market in the last four years.

by Daniel E. Page and C. F. Sirmans

Recent regulations, such as the Depository Institutions Deregulation, the Monetary Control Act of 1980 and the Garn-St. Germain Act of 1982, have changed the basic structure of the thrift institution. These new regulations were designed to reduce the interest rate vulnerability faced by thrifts causing the lending authority to be expanded and new alternative mortgage instruments (AMIs) to be offered.[1]

The new banking deregulation has resulted in the 1980s thrift becoming more like a mortgage banker. They originate mortgages but retain only the ones that meet their firm's investment goals. Also more mortgages are being sold in the secondary mortgage market.

Home mortgages are an attractive investment for pension funds since the long-term nature of mortgages is a good match for pension fund money and also the risk is relatively low. Dunn and McConnell[2] calculated that from 1971 to 1978, the average annual returns on Ginnie Mae mortgage pass-through securities were greater and the standard deviation of returns lower than Treasury Bonds.

Adjustable rate mortgages (ARMs) are particularly attractive to pension funds as an investment. Since the ARM permits the interest rate to move up or down according to some interest rate index, the investor is ensured of keeping in tune with the market. How the market prices ARMs, as compared to fixed rate mortgages (FRMs), is of significant importance to the mortgage investor.

This article examines the yield differences between ARMs and FRMs sold in the secondary market for the

Daniel E. Page, Ph.D., is an assistant professor of finance at Auburn University. He has published numerous articles in finance and real estate journals including American Real Estate and Urban Economics Journal, The Appraisal Journal and Real Estate Issues.

C. F. Sirmans, Ph.D., is a professor of finance and Chairholder of Real Estate at Louisiana State University. He has published extensively in various real estate journals and has authored several real estate textbooks.
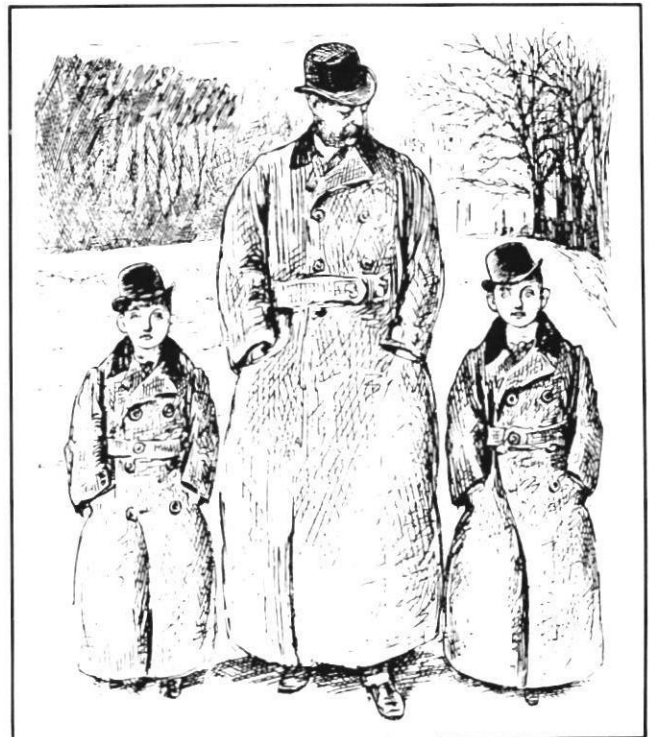
period July 1981 to May 1985 and the factors that make up the difference in yields. An interest rate risk premium is estimated using Ibbotson and Sinquefield's[3] technique. This article also extends the earlier work by Page and Sirmans[4] on yield differences between ARMs and FRMs and presents a better understanding of what makes up the various risk premia between them. Understanding the yield difference helps to explain the pricing of ARMs.

Components Of Yield Differences

The interest rate on a FRM can be viewed as a function of the risk-free rate and premium. The risk premium is

related to several factors such as default risk, expected inflation, interest rate risk, holding period risk and a premium for other options, e.g., assumability, pre-payments and other covenants.

The risk premium for an ARM is composed of the same factors as the FRM except for interest rate risk. A true ARM (one that can be instantaneously adjusted) can eliminate interest rate risk for the mortgage lender.

Subtracting the ARM from the FRM yield provides the differences in the various risk premia. The effects of each risk on the total rate difference is examined by hypothesizing the sign of the various risks. Some factors increase while others decrease the difference.

The following details the various risk premia and offers a hypothesis about the sign of the premium difference.

A. *Real Risk-Free Rate*
Assuming the real risk-free rate is equal across the FRM and ARM, then the yield difference of the real risk-free premium equals zero.

B. *Expected Inflation*
The expected inflation premium in the FRM and ARM depends on the expected lives of the mortgage instruments. How ARMs are priced in the market has not been empirically answered. However, ARMs purchased by the FHLMC are indexed to the FHLBB's mortgage contract rate on existing homes, which is a long-term rate. This suggests that ARMs and FRMs are priced with the same expected life. FRMs and ARMs, which originate at the same time, have equal expected inflation premiums. Thus, the yield difference equals zero.

C. *Expected Holding Period*
The expected holding period of the mortgage can greatly affect the yield. In the primary mortgage market when points are charged, the effects are obvious. The yield declines as the holding period increases. This effect is not as straightforward in the conventional secondary market. FRMs are priced based on the repayment patterns of prevailing FHA loans which is 12 years. However, there is no historical holding period data on ARMs. If interest rates decline and refinancing was not costly, then the holding price of a FRM would be less than an ARM since the latter is indexed to rate declines. But, if interest rates rise, the ARM mortgagor, because of indexing, may be forced to sell and get into cheaper housing. The holding period of ARMs in this case would be less than FRMs. Therefore, the sign of the holding period difference cannot be determined *a priori*.

D. *Default Risk*
Studies by Vandell[5] and Webb[6] indicate the default risk associated with an ARM is greater than on a FRM. This suggests that the yield difference of the default premium would be negative. This negative default risk difference keeps the total from becoming very large. In fact, holding everything else constant, the larger default risk

premium on ARMs would result in the ARM yield being greater than the FRM yield.

E. *Interest Rate Risk*
In contrast to the default risk premium difference, the interest rate risk premium on the FRM makes the yield on the FRM greater than the ARM. Thus, the yield difference is positive.

F. *Various Options*
Various option differences that might exist between FRMs and ARMs—due on sale clauses, assumption differences and prepayment penalties—influence the yield difference. *A priori* these differences would be difficult to sign.

Results

The data consists of the weekly FRM and ARM competitive yields accepted by the FHLMC from financial institutions selling mortgages for the period July 1981 to May 1985. The FHLMC, who announced its ARM purchase program on May 29, 1981, will buy ARMs if they fit the following guidelines: mortgage interest rates can be adjusted without a limit or have a rate increase cap of two percentage points per year; negative amortization is not allowed; the maturity of the loan cannot be adjusted; mortgage interest rates can be adjusted only once a year; and the index to adjust mortgage interest rates must be the FHLBB's mortgage contract rate on existing homes.[7]

As previously discussed, changes in inflation expectations increase the difference, while other factors such as default risk decrease the difference. *A priori* it is expected that the yields on the cap ARMs are higher than the no cap ARMs. The rationale is the no cap ARM provides the lender greater flexibility.

Columns 2, 3, and 4 of Table 1 are the yields on FRMs, no cap ARMs and 2% cap ARMs purchased by the FHLMC during the period July 1981 to May 1985. The difference in yields is listed in columns 5 and 6. The average variance for the period studied is 108 basis points; 63 basis points is the average difference between FRMs and 2% cap ARMs. The mean differences between FRMs and no-cap ARMs and 2% cap ARMs, when there are paired observations, are 1.03% and .71%, respectively. *A priori* this was the expected result. Furthermore, the mean difference between the no-cap ARM (col.3) and the 2% cap ARM (col.4) is .32%. This suggests that during the time period studied the average price of the 2% cap is 32 basis points.

Table 2 lists the results of a paired difference test that was performed to determine if the average differences were significant. The results indicate that the differences between FRMs and no cap ARMs, and FRMs and 2% cap ARMs are significant at the .001 level of significance.

In the study by Ibbotson and Sinquefield, the authors show the difference between the expected return on a long-term bill and the expected return on a short-term bill is an interest rate risk premium. Columns 7 and 8 in Table 1 are the yields on a 10-year Treasury Bond and a one-year Treasury Bill for the period July 1981 to May

TABLE 1

Yield Data

(1) Week	(2) FRM Yield	(3) ARM No Cap	(4) ARM 2% Cap	(5) (2-3) No Cap Diff	(6) (2-4) 2% Cap Diff	(7) Ten Yr Bond	(8) One Yr Bond	(9) (7-8) Int Rate Risk	(10) (5-9) No Cap Tot Diff	(11) (6-9) 2% Cap Tot Diff
07/15/81	16.73	14.79	14.50	1.94	2.23	14.08	13.56	0.52	1.42	1.71
07/22/81	16.996	15.50	15.50	1.496	1.496	14.56	14.40	0.16	1.33	1.336
07/29/81	17.06	N/A	16.31	N/A	0.75	14.59	14.25	0.34	N/A	0.41
08/05/81	17.20	15.44	16.35	1.76	0.85	14.90	14.63	0.27	1.49	0.58
08/12/81	17.08	15.50	16.25	1.58	0.83	14.61	14.43	0.18	1.40	0.65
08/19/81	17.15	15.94	16.31	1.21	0.84	14.83	14.70	0.13	1.08	0.71
08/26/81	17.93	16.13	16.75	1.80	1.18	15.32	14.99	0.33	1.47	0.85
09/02/81	18.14	16.44	N/A	1.70	N/A	15.44	15.05	0.39	1.31	N/A
09/09/81	18.813	16.63	17.351	2.183	1.462	15.37	14.80	0.57	1.61	0.892
09/16/81	18.62	16.69	17.25	1.93	1.37	15.05	14.21	0.84	1.09	0.53
09/23/81	18.63	16.56	16.94	2.07	1.69	15.21	14.16	1.05	1.02	0.64
09/30/81	18.89	16.63	17.29	2.26	1.60	15.68	14.54	1.14	1.12	0.46
10/07/81	18.63	17.00	17.40	1.63	1.23	15.02	13.71	1.31	0.32	-0.08
10/14/81	18.37	17.34	17.59	1.03	0.78	14.88	13.42	1.46	-0.43	-0.68
10/21/81	18.46	17.61	N/A	0.85	N/A	15.21	13.60	1.61	-0.76	N/A
10/28/81	18.90	18.00	N/A	0.90	N/A	15.25	13.36	1.89	-0.99	N/A
11/04/81	18.14	17.06	17.25	1.08	0.89	14.22	12.35	1.87	-0.79	-0.98
11/10/81	17.03	16.06	16.38	0.97	0.65	13.29	11.29	2.00	-1.03	-1.35
11/18/81	16.50	15.94	16.13	0.56	0.37	13.09	10.78	2.31	-1.75	-1.94
11/25/81	16.56	15.81	16.05	0.75	0.51	13.12	10.63	2.49	-1.74	-1.98
12/02/81	16.19	15.55	15.81	0.64	0.38	13.32	10.85	2.47	-1.83	-2.09
12/09/81	16.70	15.90	16.09	0.80	0.61	13.66	11.13	2.53	-1.73	-1.92
12/16/81	16.81	15.96	16.23	0.85	0.58	13.58	11.53	2.05	-1.20	-1.47
12/23/81	16.93	16.30	16.62	0.63	0.31	13.99	12.16	1.83	-1.20	-1.52
12/20/81	17.20	16.50	16.70	0.70	0.50	14.07	12.23	1.84	-1.14	-1.34
01/06/82	17.51	16.80	17.05	0.71	0.46	14.47	12.34	2.13	-1.42	-1.67
01/13/82	17.815	17.14	17.35	0.675	0.465	14.76	12.84	1.92	-1.245	-1.455
01/20/82	17.70	16.90	17.15	0.80	0.55	14.73	13.11	1.62	-0.82	-1.07
01/27/82	17.705	17.10	17.35	0.605	0.355	14.42	12.78	1.64	-1.035	-1.285
02/03/82	17.695	N/A	17.30	N/A	0.395	14.66	13.19	1.47	N/A	01.075
02/10/82	18.01	17.30	N/A	0.71	N/A	14.87	13.43	1.44	-0.73	N/A
02/17/82	17.95	17.125	N/A	0.825	N/A	14.42	13.37	1.05	-0.225	N/A
02/24/82	16.94	16.196	16.50	0.744	0.44	13.92	12.56	1.36	-0.616	-0.92
03/03/82	16.625	16.125	16.25	0.50	0.375	13.70	12.27	1.43	-0.93	-1.055
03/10/82	16.61	16.05	16.30	0.56	0.31	13.80	12.30	1.50	-0.94	-1.19
03/17/82	16.635	16.36	16.61	0.275	0.025	13.90	12.58	1.32	-1.045	-1.295
03/24/82	16.40	16.155	N/A	0.245	N/A	13.86	12.50	1.36	-1.115	N/A
03/31/82	16.56	N/A	16.61	N/A	-0.05	14.15	12.76	1.39	N/A	-1.44
04/09/82	16.66	N/A	N/A	N/A	N/A	14.13	12.69	1.44	N/A	N/A
04/16/82	16.48	16.80	N/A	-0.32	N/A	13.85	12.59	1.26	-1.58	N/A
04/23/82	16.38	16.80	N/A	-0.42	N/A	13.69	12.38	1.31	-1.73	N/A
04/30/82	16.34	N/A	N/A	N/A	N/A	13.78	12.30	1.48	N/A	N/A
05/07/82	16.53	16.75	17.05	-0.22	-0.52	13.73	12.29	1.44	-1.66	-1.96
05/14/82	16.31	16.82	N/A	-0.51	N/A	13.53	12.11	1.42	-1.93	N/A
05/21/82	16.36	16.75	N/A	-0.39	N/A	13.57	11.83	1.74	-2.13	N/A
05/28/82	16.31	N/A	N/A	N/A	N/A	13.66	11.71	1.95	N/A	N/A
06/04/82	16.41	17.02	N/A	-0.61	N/A	13.92	12.09	1.83	-2.44	N/A
06/11/82	16.54	17.22	N/A	-0.68	N/A	13.97	12.20	1.77	-2.45	N/A
06/18/82	16.72	N/A	N/A	N/A	N/A	14.36	12.68	1.68	N/A	N/A
06/25/82	17.08	N/A	N/A	N/A	N/A	14.70	13.00	1.70	N/A	N/A
07/02/82	17.17	N/A	N/A	N/A	N/A	14.54	12.86	1.68	N/A	N/A
07/09/82	17.08	N/A	N/A	N/A	N/A	14.30	12.50	1.80	N/A	N/A
07/16/82	16.58	16.89	N/A	-0.31	N/A	13.93	12.06	1.87	-2.18	N/A
07/23/82	16.45	N/A	N/A	N/A	N/A	13.58	11.29	2.29	N/A	N/A
07/30/82	16.14	N/A	N/A	N/A	N/A	13.85	11.50	2.35	N/A	N/A
08/06/82	16.09	16.56	N/A	-0.47	N/A	13.63	11.13	2.50	-2.97	N/A
08/13/82	15.75	16.03	N/A	-0.28	N/A	13.57	11.06	2.51	-2.79	N/A
08/20/82	14.81	15.25	N/A	-0.44	N/A	12.60	9.71	2.89	-3.33	N/A
08/27/82	15.18	15.61	N/A	-0.43	N/A	12.51	9.68	2.83	-3.26	N/A
09/03/82	14.85	15.15	N/A	-0.30	N/A	12.69	10.12	2.57	-2.87	N/A
09/10/82	14.88	15.30	N/A	-0.42	N/A	12.58	10.09	2.49	-2.91	N/A
09/17/82	14.83	15.30	N/A	-0.47	N/A	12.58	10.12	2.46	-2.93	N/A
09/24/82	14.63	15.00	N/A	-0.37	N/A	12.14	9.77	2.37	-2.74	N/A

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				(2-3)	(2-4)			(7-8)	(5-9)	(6-9)
	FRM	ARM	ARM	No Cap	2% Cap	Ten Yr	One Yr	Int Rate	No Cap	2% Cap
Week	Yield	No Cap	2% Cap	Diff	Diff	Bond	Bond	Risk	Tot Diff	Tot Diff
10/01/82	14.48	N/A	N/A	N/A	N/A	11.78	9.51	2.27	N/A	N/A
10/08/82	13.61	13.25	N/A	0.36	N/A	11.33	9.24	2.09	-1.73	N/A
10/15/82	13.29	13.10	N/A	0.19	N/A	10.57	8.19	2.38	-2.19	N/A
10/22/82	13.47	13.50	N/A	-0.03	N/A	10.67	8.28	-2.39	2.36	N/A
10/29/82	13.35	10.10	N/A	0.25	N/A	10.87	8.58	2.29	-2.04	N/A
11/05/82	13.23	12.85	N/A	0.38	N/A	10.48	8.36	2.12	-1.74	N/A
11/12/82	13.39	13.10	13.35	0.29	0.04	10.53	8.47	2.06	-1.77	-2.02
11/19/82	13.20	13.00	13.25	0.20	-0.05	10.56	8.49	1.07	-0.87	-1.12
11/26/82	13.48	N/A	13.60	N/A	-0.12	10.52	8.35	2.17	N/A	-2.29
12/03/82	13.33	N/A	13.35	N/A	-0.02	10.69	8.53	2.16	N/A	-2.18
12/10/82	13.19	12.00	N/A	1.19	N/A	10.56	8.36	2.20	-1.01	N/A
12/17/82	13.31	12.24	N/A	1.07	N/A	10.56	8.15	2.41	-1.34	N/A
12/24/82	12.92	11.83	12.08	1.09	0.84	10.56	8.14	2.42	-1.33	-1.58
12/31/82	12.82	11.75	12.00	1.07	0.82	10.43	8.11	2.32	-1.25	-1.50
01/07/83	12.78	11.75	N/A	1.03	N/A	10.36	8.02	2.34	-1.31	N/A
01/14/83	12.48	11.46	11.70	1.02	0.78	10.32	7.82	2.50	-1.48	-1.72
01/21/83	13.13	N/A	12.35	N/A	0.78	10.41	7.96	2.45	N/A	-1.67
01/28/83	13.08	N/A	12.50	N/A	0.58	10.68	8.19	2.49	N/A	-1.91
02/04/83	13.06	N/A	12.50	N/A	0.56	10.88	8.34	2.54	N/A	-1.98
02/11/83	12.96	N/A	12.50	N/A	0.66	10.92	8.41	2.51	N/A	-1.85
02/18/83	12.63	N/A	12.30	N/A	0.43	10.75	8.33	2.42	N/A	-1.99
02/25/83	12.51	11.75	12.20	0.76	N/A	10.40	8.06	2.34	-1.58	N/A
03/04/83	12.70	12.16	N/A	0.54	N/A	10.25	7.98	2.27	-1.73	N/A
03/11/83	12.85	12.35	N/A	0.50	N/A	10.51	8.27	2.24	-1.74	N/A
03/18/83	12.73	N/A	N/A	N/A	N/A	10.52	8.37	2.15	N/A	N/A
03/25/83	12.85	N/A	N/A	N/A	N/A	10.60	8.55	2.05	N/A	N/A
04/01/83	12.61	12.15	N/A	0.46	N/A	10.62	8.60	2.02	-1.56	N/A
04/08/83	12.60	11.58	N/A	1.02	N/A	10.52	8.46	2.15	-1.13	N/A
04/15/83	12.42	11.51	N/A	0.91	N/A	10.37	8.26	2.11	-1.20	N/A
04/22/83	12.32	11.76	N/A	0.56	N/A	10.38	8.29	2.09	-1.53	N/A
04/29/83	12.25	11.58	N/A	0.67	N/A	10.33	8.16	2.17	-1.50	N/A
05/06/83	11.97	11.41	N/A	0.56	N/A	10.19	8.00	2.19	-1.63	N/A
05/13/83	12.16	11.22	N/A	0.94	N/A	10.21	8.04	2.17	-1.23	N/A
05/20/83	12.55	11.46	N/A	1.09	N/A	10.45	8.24	2.21	-1.12	N/A
05/27/83	12.71	11.80	N/A	0.91	N/A	10.59	8.51	2.08	-1.17	N/A
06/03/83	12.79	11.92	N/A	0.87	N/A	10.79	8.68	2.11	-1.24	N/A
06/10/83	12.65	12.00	N/A	0.65	N/A	10.87	8.85	2.02	-1.37	N/A
06/17/83	12.80	11.97	N/A	0.83	N/A	10.71	8.77	1.94	-1.11	N/A
06/24/83	13.18	12.07	N/A	1.11	N/A	10.81	9.02	1.85	-0.74	N/A
07/01/83	13.28	12.19	N/A	1.09	N/A	11.01	8.98	2.03	-0.94	N/A
07/08/83	13.47	12.19	N/A	1.28	N/A	11.25	9.27	1.98	-0.70	N/A
07/15/83	13.02	12.44	N/A	0.58	N/A	11.40	9.39	2.01	-1.43	N/A
07/22/83	13.60	12.52	N/A	1.08	N/A	11.36	9.33	2.03	-0.95	N/A
07/29/83	13.80	12.58	N/A	1.22	N/A	11.57	9.44	2.13	-0.91	N/A
08/05/83	14.00	13.03	N/A	0.97	N/A	11.95	9.71	2.24	-1.27	N/A
08/12/83	13.65	12.93	ARM	0.72	N/A	12.10	9.80	2.30	-1.58	N/A
08/19/83	13.43	12.69	N/A	0.74	N/A	11.71	9.50	2.21	-1.47	N/A
08/26/83	13.68	12.55	N/A	1.13	N/A	11.58	9.37	2.21	-1.08	N/A
09/02/83	13.68	12.55	N/A	1.13	N/A	11.58	9.37	2.21	-1.08	N/A
09/09/83	13.50	12.71	N/A	0.79	N/A	11.76	9.47	2.29	-1.50	N/A
09/16/83	13.56	12.71	N/A	0.98	N/A	11.69	9.33	2.36	-1.38	N/A
09/23/83	13.52	12.45	N/A	1.07	N/A	11.59	9.15	2.44	-1.37	N/A
09/30/83	13.31	12.50	N/A	0.81	N/A	11.46	9.04	2.42	-1.61	N/A
10/07/83	13.25	12.33	N/A	0.92	N/A	11.38	8.93	2.45	-1.53	N/A
10/14/83	13.31	12.04	N/A	1.27	N/A	11.60	9.10	2.50	-1.23	N/A
10/21/83	13.24	12.06	N/A	1.18	N/A	11.47	8.89	2.58	-1.40	N/A
10/28/83	13.24	12.36	N/A	0.88	N/A	11.68	9.02	2.66	-1.78	N/A
11/04/83	13.23	12.06	N/A	1.17	N/A	11.75	9.05	2.70	-1.53	N/A
11/11/83	13.26	12.25	N/A	1.01	N/A	11.80	9.09	2.71	-1.70	N/A
11/18/83	13.32	12.23	N/A	1.09	N/A	11.70	9.08	2.62	-1.53	N/A
11/25/83	13.21	12.18	N/A	1.03	N/A	11.59	9.06	2.53	-1.50	N/A
12/02/83	13.23	12.08	N/A	1.15	N/A	11.64	9.15	2.49	-1.34	N/A
12/09/83	13.24	12.18	N/A	1.06	N/A	11.82	9.23	2.59	-1.53	N/A
12/16/83	13.44	12.33	N/A	1.11	N/A	11.93	9.28	2.65	-1.54	N/A
12/23/83	13.39	12.44	N/A	0.95	N/A	11.82	9.25	2.57	-1.62	N/A
12/30/83	13.26	12.40	N/A	0.86	N/A	11.79	9.22	2.57	-1.71	N/A
01/06/84	13.16	12.32	N/A	0.84	N/A	11.79	9.19	2.60	-1.76	N/A
01/13/84	13.16	12.31	N/A	0.85	N/A	11.71	9.09	2.62	-1.77	N/A

(1)	(2)	(3)	(4)	(5) (2-3)	(6) (2-4)	(7)	(8)	(9) (7-8)	(10) (5-9)	(11) (6-9)
Week	FRM Yield	ARM No Cap	ARM 2% Cap	No Cap Diff	2% Cap Diff	Ten Yr Bond	One Yr Bond	Int Rate Risk	No Cap Tot Diff	2% Cap Tot Diff
01/20/84	13.06	12.27	N/A	0.79	N/A	11.59	0.02	2.57	-1.78	N/A
01/27/84	13.00	12.10	N/A	0.90	N/A	11.63	9.04	2.59	-1.69	N/A
02/03/84	12.85	11.72	N/A	1.13	N/A	11.63	9.00	2.63	-1.50	N/A
02/10/84	13.03	11.46	N/A	1.57	N/A	11.74	9.10	2.64	-1.07	N/A
02/17/84	13.07	11.77	N/A	1.30	N/A	11.85	9.21	2.64	-1.34	N/A
02/24/84	13.19	11.85	N/A	1.34	N/A	11.97	9.35	2.62	-1.28	N/A
03/02/84	13.06	11.80	N/A	1.26	N/A	12.05	9.37	2.68	-1.42	N/A
03/09/84	13.33	11.90	N/A	1.43	N/A	12.18	9.45	2.73	-1.30	N/A
03/16/84	13.43	12.16	N/A	1.27	N/A	12.29	9.60	2.69	-1.42	N/A
03/23/84	13.65	12.11	N/A	1.54	N/A	12.46	9.60	2.56	-1.02	N/A
03/30/84	13.62	12.57	N/A	1.05	N/A	12.46	9.86	2.60	-1.55	N/A
04/06/84	13.74	12.46	N/A	1.28	N/A	12.61	9.96	2.65	-1.37	N/A
04/13/84	13.60	12.43	N/A	1.17	N/A	12.49	9.82	2.67	-1.50	N/A
04/20/84	13.88	12.53	N/A	1.35	N/A	12.66	9.98	2.68	-1.33	N/A
04/27/84	13.73	12.71	N/A	1.02	N/A	12.74	10.00	2.74	-1.72	N/A
05/04/84	13.87	12.80	N/A	1.07	N/A	12.89	10.18	2.71	-1.64	N/A
05/11/84	14.26	12.72	N/A	1.54	N/A	12.23	10.46	1.77	-0.23	N/A
05/18/84	14.41	13.30	N/A	1.11	N/A	13.49	10.59	2.90	-1.79	N/A
05/25/84	14.57	13.38	N/A	1.19	N/A	13.59	10.73	2.86	-1.67	N/A
06/01/84	14.82	13.49	N/A	1.33	N/A	13.86	10.94	2.92	-1.59	N/A
06/08/84	14.49	13.39	N/A	1.10	N/A	13.47	10.80	2.67	-1.57	N/A
06/15/84	14.46	13.68	N/A	0.78	N/A	13.43	10.87	2.56	-1.78	N/A
06/22/84	14.58	13.49	N/A	1.09	N/A	13.55	10.97	2.58	-1.49	N/A
06/29/84	14.73	13.95	N/A	0.78	N/A	13.79	11.09	2.70	-1.92	N/A
07/06/84	14.74	13.81	N/A	0.93	N/A	13.80	11.01	2.79	-1.86	N/A
07/13/84	14.46	13.92	N/A	0.54	N/A	13.46	10.94	2.52	-1.98	N/A
07/20/84	14.51	13.86	N/A	0.65	N/A	13.32	10.89	2.43	-1.78	N/A
07/27/84	14.39	13.70	N/A	0.69	N/A	13.11	10.79	2.32	-1.63	N/A
08/03/84	14.10	13.48	N/A	0.62	N/A	12.82	10.73	2.09	-1.47	N/A
08/10/84	14.09	13.25	N/A	0.84	N/A	12.67	10.69	1.98	-1.14	N/A
08/17/84	14.21	13.15	N/A	1.06	N/A	12.71	10.64	2.07	-1.01	N/A
08/24/84	14.10	13.38	N/A	0.72	N/A	12.66	10.68	1.98	-1.26	N/A
08/31/84	14.13	13.13	N/A	1.00	N/A	12.82	10.84	1.98	-0.98	N/A
09/07/84	13.20	13.26	N/A	-0.06	N/A	12.83	10.82	2.01	-2.07	N/A
09/14/84	13.96	13.30	N/A	0.66	N/A	12.51	10.54	1.97	-1.31	N/A
09/21/84	13.56	13.01	N/A	0.55	N/A	12.35	10.37	1.98	-1.43	N/A
09/28/84	13.84	12.81	N/A	1.03	N/A	12.46	10.38	2.08	-1.05	N/A
10/05/84	13.96	12.95	N/A	1.01	N/A	12.51	10.35	2.16	-1.15	N/A
10/12/84	13.82	12.82	N/A	1.00	N/A	12.33	10.15	2.18	-1.18	N/A
10/19/84	13.63	12.94	N/A	0.69	N/A	12.19	9.96	2.23	-1.54	N/A
10/26/84	13.36	12.66	N/A	0.70	N/A	11.85	9.56	2.29	-1.59	N/A
11/02/84	13.23	12.07	N/A	1.16	N/A	11.76	9.43	2.33	-1.17	N/A
11/09/84	13.22	11.94	N/A	1.28	N/A	11.71	9.15	2.56	-1.28	N/A
11/16/84	13.21	11.73	N/A	1.48	N/A	11.75	9.15	2.60	-1.12	N/A
11/23/84	13.06	11.47	N/A	1.59	N/A	11.44	8.85	2.59	-1.00	N/A
11/30/84	12.82	11.38	N/A	1.44	N/A	11.39	8.78	2.61	-1.17	N/A
12/07/84	13.04	11.44	N/A	1.60	N/A	11.58	8.86	2.72	-1.12	N/A
12/14/84	13.02	11.36	N/A	1.66	N/A	11.61	8.73	2.88	-1.22	N/A
12/21/84	12.85	11.06	N/A	1.79	N/A	11.37	8.37	3.00	-1.21	N/A
12/28/84	12.84	10.87	N/A	1.97	N/A	11.42	8.40	3.02	-1.05	N/A
01/04/85	13.10	10.65	N/A	2.45	N/A	11.64	8.48	3.16	-0.71	N/A
01/11/85	12.94	10.94	N/A	2.00	N/A	11.50	8.34	3.16	-1.16	N/A
01/18/85	12.93	10.92	N/A	2.01	N/A	11.49	8.33	3.16	-1.15	N/A
01/25/85	12.67	11.19	N/A	1.48	N/A	11.16	8.22	2.94	-1.46	N/A
02/01/85	12.63	10.69	N/A	1.94	N/A	11.15	8.35	2.80	-0.86	N/A
02/08/85	12.86	10.51	N/A	2.35	N/A	11.37	8.47	2.90	-0.55	N/A
02/15/85	12.84	10.50	N/A	1.94	N/A	11.37	8.47	2.90	-0.96	N/A
02/21/85	12.78	10.67	N/A	2.11	N/A	11.57	8.58	2.99	-0.88	N/A
03/01/85	13.35	11.03	N/A	2.32	N/A	11.83	8.84	2.99	-0.67	N/A
03/08/85	13.39	11.09	N/A	2.30	N/A	11.87	9.09	2.78	-0.48	N/A
03/15/85	13.26	11.54	N/A	1.72	N/A	11.85	9.09	2.76	-1.04	N/A
03/22/85	13.30	11.41	N/A	1.89	N/A	11.92	8.15	3.77	-1.88	N/A
03/29/85	13.15	11.47	N/A	1.68	N/A	11.77	8.90	2.87	-1.19	N/A
04/05/85	13.16	11.47	N/A	1.69	N/A	11.71	8.79	2.92	-1.23	N/A
04/12/85	12.98	11.59	N/A	1.39	N/A	11.57	8.60	2.97	-1.58	N/A
04/19/85	12.76	10.90	N/A	1.86	N/A	11.24	8.27	2.97	-1.11	N/A
04/26/85	12.81	11.23	N/A	1.58	N/A	11.27	8.22	3.05	-1.47	N/A
05/03/85	12.93	10.70	N/A	2.23	N/A	11.33	8.25	3.08	-0.85	N/A

(1) Week	(2) FRM Yield	(3) ARM No Cap	(4) ARM 2% Cap	(5) (2-3) No Cap Diff	(6) (2-4) 2% Cap Diff	(7) Ten Yr Bond	(8) One Yr Bond	(9) (7-8) Int Rate Risk	(10) (5-9) No Cap Tot Diff	(11) (6-9) 2% Cap Tot Diff
05/10/85	12.70	10.71	N/A	1.99	N/A	11.17	8.09	3.08	-1.09	N/A
05/17/85	12.50	10.52	N/A	1.98	N/A	10.89	7.90	2.99	-1.01	N/A
05/24/85	12.20	10.07	N/A	2.13	N/A	10.60	7.63	2.97	-0.84	N/A
05/31/85	12.03	9.93	N/A	2.10	N/A	10.39	7.53	2.86	-0.76	N/A
Mean	14.42	13.33	15.49	1.01	.63	12.38	10.17	2.21	-1.23	-1.01
Std. Dev.	1.85	2.07	1.95	.69	.52	1.44	1.89	.63	.85	1.12

1985. Using Ibbotson and Sinquefield's technique, the difference, column 9, is the interest rate risk premium. During the period studied, the average interest rate risk premium is 2.21%.

FRMs sold in the secondary mortgage market are priced with an average life of 12 years; ARMs bought by the FHLMC allow for interest rate changes only once a year. Therefore, the interest rate risk premium between a FRM and an ARM would be approximately the same as the premium between the 10-year Treasury Bond and the one-year Treasury Bill.

If the interest rate risk premium (column 9) is subtracted from the no cap ARM difference (column 5) and the 2% cap ARM difference (column 6), the premium associated with default, maturity and other options is observed (columns 10 and 11). The average difference for the various premiums is –1.16% on the no cap ARMs and –1.01% on the 2% cap ARMs. These results suggest the total yield difference between a FRM and ARM is reduced by larger premiums, such as default and maturity, on FRMs over ARMs.

However, for the period April to October 1982, the yield on the no cap ARM is larger than that of the FRM. The result is the opposite of why the ARM program was formed. A possible explanation is that during this period the yield curve was relatively flat. If ARMs are being priced on a short-term basis and FRMs on long-term, then the yield on the ARM may be higher than that of the FRM.

Summary

ARMs are a worthwhile investment for pension funds. They can be purchased directly in the secondary mortgage market or indirectly by buying participation in a pool of mortgages through a secondary mortgage market agency. Understanding the reasons for the yield differences will result in more informed decision making.

Results indicate the market may be unsure how to price ARMs. If they are to be the wave of the future, their pricing needs to be more sensitive to declining interest rates.

The average interest rate risk premium during the period studied is 2.21%. When this premium is subtracted from the yield difference between FRMs and ARMs, the difference becomes negative. This implies that the total yield differences between them are being reduced by larger default and maturity premiums on ARMs.

TABLE 2

Paired-Difference Test

Pairs	t-Statistics*	Significance Level
FRMs & No cap ARMs	28.47	.001
FRMs & 2% cap ARMs	15.63	.001
No cap ARMs & 2% cap ARMs	36.93	.001

*Calculated as follows:

$$t = \frac{\overline{d}}{s_d/\sqrt{n}}, \quad n - 1 \text{ degrees of freedom}$$

Where: $\overline{d}$ = mean difference

s = sample variance of the differences, and

n = sample size

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THE DIVESTITURE OF REAL ESTATE ASSETS BY SELL-OFF

A study of restructuring asset holdings to improve the performance of firms is compared with other recent findings and indicates significant increases in value for both the selling and buying companies.

by James E. Owers and Ronald C. Rogers

There has been an increase in the rate of restructuring asset holdings that includes a continuation of merger activity. Much of the increase has resulted from reverse mergers—transactions in which firms divest operations. Recently, 35% of all restructuring has been related to divestitures; and the formation of master limited partnerships, trusts and going-private transactions all reflect this trend.[1]

There are several reasons why firms choose to divest part of their operations, and no one explanation applies in all cases. This is similar to the explanations for mergers—several motivations exist but each needs to be evaluated separately. Reasons for restructuring include possible synergy (positive gives rise to mergers, negative, or bad fit to divestiture), tax motivation, asymmetric information, the goals pursued by managers of firms and the impact of regulatory constraints.

In addition to the general economic explanations for restructuring, there are circumstances applicable to particular industries, and this is especially true for real estate. The market frequently underestimates the contribution of the real estate assets to the value of the firm having extensive holdings. Consequently, the stocks of such firms trade at prices lower than justified by their intrinsic worth. While the discrepancy between accounting and current values is widely acknowledged and applicable in many industries, it is particularly true with firms having extensive real estate assets. Palmon and Seidler (1978) note the lower of cost or market valuation basis. They report a depreciated historical cost for

James E. Owers, Ph.D., is associate professor of finance at the University of Massachusetts, Amherst. His work focuses on the restructuring of business organizations to increase asset values, and he has published numerous articles on this subject.

Ronald C. Rogers, Ph.D., is a visiting scholar at the Federal Home Loan Bank Board in Washington, D.C. In this position, he has co-authored a seminar on real estate lending and asset classification for the board's Office of Education. Rogers has an extensive background as a lecturer, teacher and writer on a myriad of real estate subjects.

real estate assets which "combines to mislead investors in the opinion of the managements, and causes share prices to be unduly depressed". If stocks derive part of their value from real estate assets, then to further stock maximization it would be necessary to divest those real estate holdings. The market value of the assets will be disclosed at the time of the transaction, and if this has

been underestimated then the stock price will change (increase) when the assets are divested.

The central issue is whether the market accurately incorporates the value of real estate assets in pricing stocks. To the extent that all public (accounting and non-accounting) information does not enable the market to accurately price real estate values, there may be a market reaction at the time of divestiture even with semi-strong efficient markets.

This paper examines the stock price reaction to announcements by publicly traded firms that they are involved in realignment deals involving real estate assets. By examining 85 such transactions, value adjustments are identified.

Sell-offs

The divestiture of operations can be accomplished by sell-off or spin-off transactions. Although both result in the separation of the divested operations from the firm, they are two distinct types with different procedural, legal and economic characteristics.

The sell-off is the most frequently employed, and the mechanics are straightforward. A deal is negotiated, and the selling/divesting firm transfers ownership and control to the buying/acquiring firm. The consideration is typically cash or debt securities and negotiations can extend over a protracted period with several potential acquirers negotiating before a sale is finalized.

A spin-off is a separation where ownership of a unit of the divesting (parent) firm is transferred to a separate company and becomes directly owned by stockholders of the parent corporation. The majority of spin-offs are pro rata distributions, with ownership rights in the spun firm distributed to stockholders of the parent corporation as a dividend. There is no negotiation with another firm, although IRS ruling on the tax status of the transaction is typically sought. The newly separated firm is a corporation in the majority of cases, but recent real estate spin-offs have distributed ownership in the forms of trusts (e.g., Dillingham Corp.), and master limited partnerships (e.g. Newhall Land and Farming Co.).

While the term liquidation is most frequently used in the context of financial distress, there is an important restructuring strategy termed a voluntary liquidation. This is where the management of a firm decides to liquidate all or part of the firm by selling the assets and distributing the proceeds to stockholders. The decision to distribute the sale proceeds is the feature that distinguishes a liquidation from a sell-off. In the later case, the proceeds are kept by the firm and presumably redeployed into other investments. A voluntary liquidation can be total (the firm ceases to exist) or partial. A voluntary liquidation can be regarded as the extreme form of sell-off.

As previously indicated, value change from the sell-off divestiture of real estate assets may occur for a number of reasons. For example, generally accepted accounting practices may mislead investors to the intrinsic worth of real estate assets, and if other information does not

compensate, then the disclosure of a market value at the time of the transaction may result in a price revision. Another reason relates to tax benefits. If the tax basis of real estate assets is low, it gives rise to minimal tax shields. Yet if the value of the assets is high, it provides an extensive tax shield to a buyer at current market values. Depending on characteristics of the market for real estate assets and their associated tax shields, the selling firm may derive some of the value of the increased tax shields resulting from the sale. The tax code is such that there are several potential tax benefits associated with voluntary liquidations.

The synergy that results from combining different types of operations may be positive, negative or zero. Negative synergy can be undone by getting back to basics (what a firm does best) and specializing. For example, a firm that combines manufacturing with real estate holdings may not optimize the value of its real estate assets, and the company would increase in value if it sold its real estate assets (to a firm able to maximize the value associated with their use) and concentrated on manufacturing. The perspective of a firm, as set of contracts gives rise to further insights, relate to observations of this nature.[2] If the optimal set of contracts is a function of the type of assets (in place and future) of a firm, then there may be a value increase associated with a realignment of the assets and associated investment opportunity set, owned by a given corporation.[3]

Sample

The sample for this study includes corporations that were parties to transactions involving the realignment of ownership of real estate assets. The returns data employed were from the CRSP[4] daily files, and the analysis restricted to firms listed on the New York or American Stock Exchanges. The sell-off subsample was identified by examining transactions reported in the Sell-off

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TABLE 1

Distribution of the 88 Real Estate Asset Sell-off Transactions Over the Period Examined.

Year*	Number of Transactions
1968	2
1969	2
1970	9
1971	20
1972	14
1973	3
1974	5
1975	2
1976	3
1977	3
1978	7
1979	5
1980	10
1981	3
	88

*Year in which the transaction press announcement was made.

Column in *Mergers & Acquisitions* for the period 1968-1981, and identifying those relating to real estate. This gave a preliminary sample of 88 transactions, but sample selection criteria and data requirements resulted in the exclusion of 17 from the analysis. Table 1 provides the distribution of the transactions over the interval covered by this study. The 71 remaining transactions included sellers in 55 cases, and acquirers in 16 cases.

For each transaction identified from *Mergers & Acquisitions*, further details of the transaction were sought from the *Wall Street Journal* and *Funk & Scott*. Since daily returns are employed in the analysis, a requirement was that the day of first public disclosure (the press date) relating to the transaction could be identified. For some transactions, a separate date when the transaction was finalized (completion date) could be identified, but this was not a requirement for inclusion in the sample. When a transaction was announced as a completed deal, then the press and completion dates were simultaneous. When other material events occurred around the real estate realignment event, that transaction was excluded from the sample. Our sample only includes completed transactions. When negotiations were disclosed, but later terminated without a deal being finalized, the transaction was excluded from the analysis.

Methodology

The details of the methodology are provided in the appendix, and what follows here is an outline of the techniques used. The research employs an event study perspective to identify the stock price reaction associated with the disclosure that a firm is involved in a transaction involving the realignment of real estate assets. For each transaction, the press date is denoted day 0, and the analysis for each transaction is centered around this event. Abnormal stock price reactions around the event date are generated for each transaction, aligned in event time (i.e., relative to day 0, regardless of the calendar dispersions of the dates), averaged across transactions in the sample and tested to see if they are statistically different from zero. Abnormal returns are identified over an event window surrounding the event. This extends from 50 trading days before the event to 10 trading days after, and is denoted as $(-50,10)$. This 61 trading day interval covers approximately three calendar months.

The abnormal stock price reactions are stock price changes after the general movement of the market has been controlled, and they are measured as abnormal rates of return. For each day in the event window, this is the actual rate of return minus the predicted return day, given the market change that occurred. Given the clean of other events criterion used in sample selection, any non-zero abnormal returns are interpreted to be associated with the real estate asset realignment transaction. The predicted rates of return are generated by the market model. Using this framework, the relative volatilities (betas) and overall market movements are used in estimating the normal return for each day in the absence of firm-specific events such as the sell-off.

TABLE 2

Daily Average Prediction Errors (PE) and the Cumulative Sum of the Daily Average Prediction Errors (CPE). n is the size of each subsample

Day	Sellers (n = 55) PE	CPE	Buyers (n = 16) PE	CPE
−50	0.004	0.004	−0.005	−0.005
−40	0.001	0.011	0.006	0.002
−30	0.005	0.011	−0.002	0.021
−20	0.000	0.019	0.004	0.026
−10	0.001	0.002	−0.000	0.045
−9	0.007	0.009	0.014	0.059
−8	0.002	0.011	−0.013	0.046
−7	−0.004	0.007	0.004	0.050
−6	0.006	0.013	−0.000	0.050
−5	−0.003	0.010	−0.014	0.036
−4	0.000	0.010	0.004	0.040
−3	−0.000	0.010	−0.004	0.036
−2	0.010	0.020	−0.004	0.032
−1	0.005	0.025	0.017	0.049
0	0.003	0.028	−0.005	0.044
1	0.010	0.038	0.009	0.053
2	−0.003	0.035	−0.022	0.030
3	−0.001	0.034	−0.004	0.027
4	0.005	0.039	0.007	0.034
5	−0.001	0.038	−0.007	0.027
6	−0.006	0.032	0.006	0.033
7	0.004	0.036	−0.013	0.020
8	−0.002	0.035	0.003	0.023
9	−0.002	0.033	−0.008	0.015
10	−0.001	0.032	−0.012	0.003

Results

The results for sell-off transactions incorporate the analysis of 71 transactions. On average, sell-offs were associated with statistically significant positive abnormal returns. Over the 71 transactions, the average abnormal return accumulation over the interval starting at day −5 and ending with the press day (−5,0), was 1.00% (.010), and over the two-day event interval (−1,0) 0.8%.[5] Given the overall positive valuation changes associated with the real estate restructuring, the analysis now examines the partition of this incremental value between selling and acquiring firms.

Sellers

The average day by day abnormal returns (prediction errors) for selling firms, and their cumulation beginning at day −50, are presented in columns two and three of Table 2. Cumulation over specified intervals is reported in column two of Table 3.

For sellers in these 55 transactions, the average increase in market value, after market movements are taken into account, is 1.4% in the week ending with the press announcement relating to the transaction. Over the two-day event interval, the controlled market value increases

by 0.7%, which is statistically significant at the 5% level. By day 0, the cumulative abnormal return from day -50 is 2.8%, and in general this is maintained, the CPE at day 10 being 3.2%.

Acquirers

Details of the average abnormal return performance of acquirers are provided in columns 4 and 5 of Table 2, and column three of Table 3.

TABLE 3

Mean Cumulative Prediction Error (CPE) for Specified Intervals Relative to Press Date. Test statistics are in parenthesis. n is the size of each subsample.

Days in Interval	Seller Subsample (n = 55)	Acquirer Subsample (n = 16)
-50 to 0	0.027 (1.17)	0.044 (1.16)
-5 to 0	0.014 (1.43)	-0.005 (-0.17)
-1 to 0	0.007 (1.75)*	0.012 (1.93)*
$+1$ to $+5$	0.011 (1.00)	-0.017 (-0.87)

*Significant at 5% level

As in the case of sellers, on average, acquirers experience increases in value around the time of the transaction. However, the small subsample size (16) means that these results must be interpreted with caution. For example, when examining reasons for the decline in post event CPE (from 4.4% at day 0, to 0.30% at day $+10$), it was found that this is primarily the result of the post event return patterns of two companies in the sample. These lost 44% and 22% of their value (respectively) in the interval between press and completion dates, and in neither case did this appear to be related to the sell-off transaction.

Interpretation

We identified significant upward revision of values associated with the sell-off of real estate assets, and this incremental value was shared by both sellers and acquirers. In the case of the latter, the small subsample size resulted in cautiously interpreting the findings.

These value increases associated with real estate asset restructuring are consistent with the hypothesis that firm values increase when real estate asset ownership is realigned and information provided about their separable values. However, the findings cannot be interpreted as supporting the notion that real estate assets (in place) are undervalued to a greater extent than other types of assets. When examining a general sample of sell-offs, Hite and Owers (1984) found average two-day ($-1,0$) abnormal returns for seller firms of 1.40% and for acquirer firms of 0.90%

In an analysis of the separation/divestiture of real estate assets by spin-off, Hite, Owers, and Rogers (1984) identified two-day event interval average abnormal returns of 5.7% (test statistic 10.27). This is materially larger than the overall 1.0% two-day event interval for all sell-off transactions. With a spin-off, there is not an arms length, market determination of asset values, but rather a value is placed on the separate pieces of the parent for purposes of partitioning the tax basis. Thus, it could be claimed that a sell-off and the associated market bargaining process would provide more new information about the separate value of real estate assets than the partitioning of value associated with a spin-off. Our findings are not consistent with this, but drawing conclusions regarding the relative disclosure of information with the two types of restructuring is complicated by the differing tax implications.

Spin-off transactions frequently have tax motivations associated with them.[6] For example, in May 1971 The Prudential Real Estate Trust transferred its oil and gas properties to a subsidiary (Petrox Industries) as part of a plan to requalify as a real estate investment trust (REIT). In July 1982, Masonite Corp. spun off its timber and sawmill properties in the form of a master limited partnership. Depository receipts were distributed to stockholders and became publicly traded. The overall effect was to reduce the total tax burden on the sell-off/ liquidation of the timber properties. In contrast to a spin-off, a sell-off realignment will frequently result in a realized gain on which taxes will be payable. While the higher basis will provide higher depreciation tax shields for the acquirer in sell-off transactions, the net tax benefit from the transaction will be reduced by taxes on gains payable by the seller, and will be bounded by the fact that the acquirer will not pay a higher price simply because of tax shields—the acquisition must be a viable investment project.

Consequently, as a result of the different tax consequences, we are unable to draw conclusions regarding the relative information disclosure associated with real estate asset realignment by sell-off and spin-off. The smaller magnitude of valuation revisions associated with sell-offs suggests that spin-offs may result in more disclosure, despite the lack of market negotiations. Or the incremental information disclosure may be equivalent for both types of transactions, but the disadvantageous relative tax status of sell-offs may result in the smaller valuation revisions observed.[7]

Conclusion

This paper reviewed the issues relating to the undervaluation of real estate assets when incorporated along with other assets, and outlined the potential sell-off transactions to give rise to upward revision of real estate asset values.

Within the valuation context, a sample of 71 sell-off transactions were examined and upward revision of stock values were identified for both sellers and acquirers in sell-off transactions. However, after relating the

findings of this paper to general samples of sell-off transactions, we do not interpret our sell-off results as supporting the hypothesis that real estate assets are undervalued when in place to any greater extent than other types of assets. The findings of this study also were contrasted with those from the examination of real estate asset realignment by spin-off, and identified the different tax implications of the two types of restructuring. The smaller stock price changes in the case of sell-offs may result from differences in tax effects, information disclosure or relative sizes of transactions.

NOTES

1. See The Midland Corporate Finance Journal, Vol. 2 for an examination of restructuring activity in recent years.

2. See Jensen and Mechling (1976), Myers (1977) and Smith and Warner (1977) for the original formalization of the concepts.

3. See Hite, Owers, and Rogers (1984) for an analysis of these concepts in the context of real estate operations.

4. Center for Research in Security Prices, University of Chicago.

5. The press day is when a report on a transaction first appears in the Wall Street Journal. Thus the immediate event related impact on security prices can occur on day -1 or day 0, depending on the time of day when the press release was made. If before 4 pm on day before press date (i.e. day -1), the immediate price reaction will be reflected in changes in stock price on day -1. If the press release is after 4 pm on day -1, the market will be closed, and the immediate impact will be reflected in trading on the day after the release — i.e., day 0.

6. Tax motivations are not typically cited as major incentives for spin-off transactions because that would assist the IRS in having the transaction classified as a tax device rather than a restructuring motivated by business reasons.

7. We recognize the differences in magnitudes also may be a function of the relative sizes of the transactions. A complete analysis of this is complicated by the different disclosure requirements relating to these transactions. With spin-offs, relative sizes of the separated pieces are disclosed in required capital-changes filings, whereas with a sell-off transaction, the price of the assets transferred always is not disclosed.

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APPENDIX
Methodological Details

The series of abnormal returns (prediction errors) over the 61 trading day interval from 50 before the press day to 10 trading days after $(-50, +10)$ is derived and analyzed.

It is assumed that the one-factor market model (1) is a valid representation of the return generating process.

$$\bar{R}_{jt} = \alpha_j + \beta_j \bar{R}_{mt} + \bar{\epsilon}_{jt} \tag{1}$$

where:

$\bar{R}_{jt}$ = The rate of return on security j over the period t, the unit being one trading day.

$\bar{R}_{mt}$ = The rate of return on the value weighted market portfolio over day t.

β_j = Covariance $(\bar{R}_{jt}, \bar{R}_{mt})$/Variance $(\bar{R}_{mt})$

α_j = $E(R_j) - \beta_j E(R_{mt})$

ϵ_{jt} = The residual return on security j in period t. The assumptions relating to $\bar{\epsilon}$ are:
$E(\bar{\epsilon}_{jt}) = 0$, $Var(\bar{\epsilon}_{jt}) = \sigma^2(\bar{\epsilon}_j)$, $Cov(\bar{\epsilon}_{jt}, \bar{R}_{mt}) = 0$

Use of the model is based on the bivariate normality of security and portfolio returns.

The parameters of the market model were estimated over the interval $(-200, -51)$. For each trading day in $(-50, +10)$, the prediction error for firm j is:

$$\epsilon_{jt} = PE_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{mt}) \tag{2}$$

where $\hat{\alpha}$ and $\hat{\beta}$ are estimated over $(-200, -51)$.

For each trading day t, $t \in (-50, 10)$, the average prediction error is defined as:

$$APE = (1/N_t) \sum_{j=1}^{N_t} PE_{jt} \qquad (3)$$

where:

N_t = the number of firms with an abnormal return defined in day t.

The cumulate average prediction error is defined as:

$$CAPE_T = \sum_{t=-50}^{T} APE_t \qquad (4)$$

The cumulative average prediction error over the interval t_1 to t_2 inclusive is

$$CAPE_{t_1}^{t_2} = \sum_{t=t_1}^{t_2} APE_t \qquad (5)$$

and the interval has length $L = t_2 - t_1 + 1$.

To test the null hypothesis of zero abnormal returns in event day t, the following t-statistic is calculated:

$$t = APE_t / \sigma_t \qquad (6)$$

where:

$$\sigma_t = (1/60) \left\{ \sum_{\substack{i=-50 \\ \neq t}}^{10} (APE_i - (\sum_{\substack{i=-50 \\ \neq t}}^{10} APE_i/60))^2 \right\}^{1/2}$$

To test the null hypothesis of zero abnormal return accumulation over specified intervals (t_1, t_2), the Z test statistic of the following derivation is employed. The standardized abnormal return for the firm j in period t is defined as:

$$SPE_{jt} = PE_{jt} / \sigma(PE_{jt}) \qquad (7)$$

where:

$$\sigma^2(PE_{jt}) = \sigma_\epsilon^2 \left(1 + (1/n) + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{\tau=1}^{n}(R_{m\tau} - \bar{R}_m)^2} \right)$$

σ_ϵ^2 = estimated variance of the disturbance term from the OLS estimation of the market model for security j.

$\bar{R}_m$ = the mean return on the value weighted market portfolio over the parameter estimation interval for security j.

n = The number of observations (length of the interval) over which the parameters are estimated (n = 100).

The average standardized prediction error over N firms in day t is defined as:

$$ASPE = (1/N) \sum_{j=1}^{N} SPE_{jt} \qquad (8)$$

and the average standardized prediction error over the interval I (with trading day extreme t_1 and t_2), is:

$$ASPE = (1/L) \sum_{t=t_1}^{t_2} ASPE_t \qquad (9)$$

where $L = t_2 - t_1 + 1$.

The cumulation of average standardized prediction errors over the interval I is:

$$CASPE_I = \sum_{t=t_1}^{t_2} ASPE_t \qquad (10)$$

When the number of firms (N) is sufficiently large, the statistic defined in (11) and (12) has a distribution that approximates the standard normal. This statistic is employed to test the null hypotheses of zero abnormal accumulation of returns over a specified interval relative to the event.

$$Z = \frac{ASPE_L}{\left[\frac{(n-2)}{(n-4)}\right]^{1/2}(NL)^{1/2}} \quad (11)$$

$$= \left[\frac{N}{\frac{L(n-4)}{(n-2)}}\right]^{1/2}(CASPE_I) \quad (12)$$

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VARIANCE IN HOUSING STARTS—
A SUPPLYSIDE PHENOMENON

A model is developed to understand the impact of changes in the term structure of interest rates on housing starts.

by Daniel M. Cashdan, Jr.

The economic literature on housing consumption and production is rich from the microanalysis of the elasticity of demand for housing to the macro analysis studying the impact of national monetary and fiscal policies on the general home building industry. Economists and politicians are aware of the role the housing industry holds as the leading economic indicator. As President Reagan said at the National Association of Realtors® Convention in March 1982, "We will work to restore health to our ailing housing industry and in so doing help to restore health to our national economy."[1]

The purpose of this article is to develop a model that describes the impact of changes in the term structure of interest rates on housing starts. The model is then empirically tested paying particular attention to its sensitivity towards changes in short-term rates. A framework is presented that illustrates the variance in housing starts is in part a short-run phenomena of changes in the term structure of interest rates. The article concludes with a discussion, from the supply side, of the home builders' sensitivity to short, medium and long-term interest rates as independent aspects of the cost function. (The results of the empirical tests are based on quarterly data as reported in the BCD.)

There are two caveats of results which should be mentioned. First, highly correlated series of data such as short and long-term interest rates can create statistical problems when included on the right hand side of a multi-variate regression equation. However, these problems of autocorrelation can be avoided by using the levels and absolute and percent differences done for
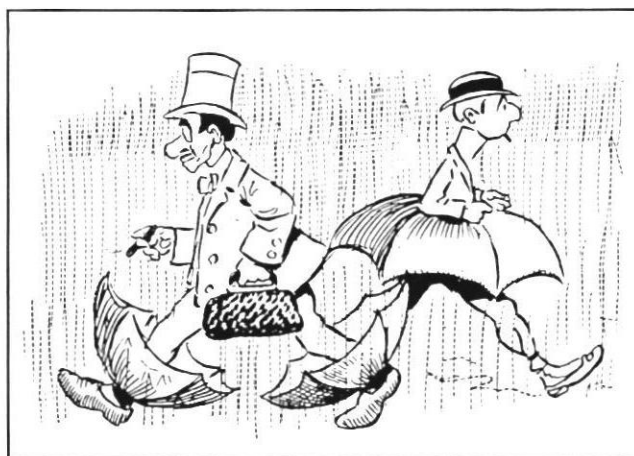
these tests. The second caveat deals with the results of the correlation between housing starts and FHA secondary market mortgage yields found to be positive. This result disputes DRI estimates that a 100-basis point increase in effective rates reduces the volume of housing starts by 225,000 units within 12 months. Thus, a 1% mortgage rate increase would lead to a 12% decline in annual housing starts in today's market.[2] Several points serve to reduce the discrepancy of the results.

First, Brady found a similar result when disaggregating housing starts by type of mortgage—FHA, VA and conventional. Specifically, Brady found conventional construction varies inversely with the cost of mortgage credit, but that FHA housing is relatively unaffected by FHA mortgage yields.[3] Second, "the effective mortgage market interest rate, which is the relevant cost of capital in the housing market, links the mortgage market to the demand for real estate production. Requests for mortgage credit are derived from the demand for real estate production and existing real estate assets. Any increase in the demand for real estate production resulting from more requirements for housing services, causes a boost in the need for mortgage credit."[4] In other words, there

Daniel M. Cashdan *is a market researcher and president of the Chilar Development Consultants. He is a student at the University of Chicago where he will receive an M.B.A. in Finance/Economics in June 1986.*

are two factors affecting the demand curve: a strong rightward shift due to increased household formation and real income and a leftward shift due to increased mortgage rates. The results from 1950-1980, show the first effect to be greater than the second.

According to Reid, the elasticity of housing appears to be between 1.5 and 2.0 for the period 1918-1960[5], and the relationship has not changed in any significant manner. This reinforces the statement that increases in real household income have led to a rightward shift in the demand curve.

One final explanation to consider is that a multidimensional relationship exists between the total available supply of credit, its rate of change and the rate of change in the demand for credit from the various economic sectors of the economy, the housing industry being one of many users.

Review Of Housing Theory

The economic literature concerning housing is abundant including the publication of *Housing and Income* in 1962 by Margaret Reid of The University of Chicago. The relationship of housing demand and supply, as affected by changes in normal income, interest rates, inflation and population, often have been studied.

Housing Demand

Housing demand is elastic with respect to the cost of credit. "The ultimate demand for additional housing units must come either through net household formation or the more rapid replacement of existing stock".[6] This basic demographic factor, coupled with the high post World War II population shift towards the West and Sun Belt regions and a rising national and personal income, explains the overall strength of the home building industry.

Housing, as any durable good, is a function of planned consumer consumption in a given period. With a rigorous analytical proof and basic intuitive consideration, one is lead to accept that "the overall impact of interest rates on the demand for consumer durables to be unambigously negative".[7] Thus, as real interest rates rise, the expectation is not for a reduction in quantity demanded, but a shift towards a less expensively produced product. Evidence of this change is seen in the decreased size of new homes and lot sizes over the past 30 years.

Finally, on the demand side the effects of inflation must be considered. Many authors view inflation as a major factor causing the increase in aggregate demand and consumption of home ownership[8]. However, according to Fama and Schwert the relationship between interest rates and inflation is a component effect where CPI reflects the mean price change across all goods. They argue that changes in the price of goods are not equivalent but relative. However, "as one looks at unexpected inflation rates of the longer differencing intervals, a noticeable tendency towards increased similarity of

behavior is observed".[9] People buy homes in inflationary times to lock in lower interest rates since inflation will increase the value of the property.

But to the home buyer, housing does not represent a speculative investment as does a common stock or commodity. Rather, the housing investment is made for the purpose of utilizing the home over a long period of time, (owners of second homes are not considered to represent a significant portion of the market). Therefore, by relying on the argument of Fama and Schwert, the price of all shelter will rise so the consumer will be unable to profit from the inflated value of the home while maintaining equivalent housing in a similar location.

Housing exhibits the classic income and substitution effects associated with normal or superior goods. This means that as the price of housing rises, people will seek to economize on their consumption of other goods in an effort to maintain their current level. This is obvious in the case of a tenant whose rent has been raised. The tenant typically will begin to give up purchases such as eating out, movies, etc., in order to meet the new higher cost of housing.

This example also can be applied to the new home buyer. As long-term interest rates rise, the would be buyer must economize on costs charged in a similar manner, i.e., paid over an extended period of time (this argument is consistent with the Permanent Income Hypothesis). These items are the least expensive complements of the home. Buyers can still satisfy demand quantitatively with an effectively reduced real income by compromising qualitatively. Thus, in the long run demand tends to vary with respect to quality not quantity and is independent of inflation.

In summary, housing demand is essentially elastic with the highest degree of correlation, 96%[10], being between demand and net new household formations. Interest rates have a negative effect on consumption creating downward pressure on such characteristics as lot size and actual square footage. Housing consumption and income have an asymptotic relationship where all but the very highest income brackets have a housing to income ratio greater than one. And finally, the effect of unanticipated inflation tends to have similar long-term effects across all markets, and does not affect the quantity of housing demand, only the nominal price.

Housing Supply

The importance of the home building industry, as a leading economic indicator, is widely accepted. This industry employs a large percentage of the contruction trades plus, there is a tremendous multiplier effect on other producers of durable goods such as, household appliances, carpeting and furniture.

If housing demand equals supply and the format can be estimated with relative certainty, how is the volatility in housing starts explained? The consensus is that in the short-run home builders are extremely sensitive to credit

availability. As Maisel points out, "many people seem to have assumed that movements in credit have caused starts to fluctuate by altering the underlying demand for dwellings."[11] Maisel argues that the volatility in housing starts should be viewed as an inventory phenomenon where builders are sensitive to the increase in inventory and will halt production until inventory levels are reduced. He sees changes in inventory due mainly to the tightening of mortgage markets and the resulting slowdown in home purchases.

Review graphs 1A and 1B, where D1 represents long run demand for housing and D2 represents short run deviations from the overall housing demand. Graph 1A shows supply sensitivity to changes in short and intermediate term interest rates. As short-term rates rise the supply curve will shift from S1 to S2, home builders must decide to raise price to P2 or to adjust supply to D2. Given that incomes are fixed in the short run, point (P2, D1) is unobtainable for buyers, therefore home builders immediately shift to point (P1, D2). The gap between D1, D2 is what is often referred to as excess, or pent-up demand. In order to return to point (P1, D1), builders must economize in other cost items thus returning to supply curve S1. If this process were instantaneous, supply would not be interrupted. But, it takes considerable time to find less expensive materials and designs.

Graph 1B shows the demand sensitivity to changes in long-term rates. A rise in such rates causes the demand curve to shift from D1 to D2. This demonstrates a temporary drop in quantity demanded similar to that in 1A, and a drop in price which reflects a decrease in affordability which corresponds to a prior discussion of income and substitution effect. As builders economize on cost, equilibrium will be reached at point (P2, D1) along supply curve S2. This represents a cheaper product which meets the consumer's new budget constraint and satisfies long run demand.

An Interest Rate Yield Curve Explanation Of Housing Start Volatility

A strong relationship should exist between the variance of short and long-term interest rates and housing starts. Builders, like other producers in the economy, face a term structure of interest rates where long-term rates are more stable than short-term, the latter representing the current cost of capital for construction, and the former reflecting the cost of capital to home buyers. Theoretically the difference between short, medium and long-term rates represents costs or expectations priced out relative to each other in the financial markets. A clear delineation between rates is examined to determine their relationship with housing starts.

Short-term interest rates change with the prime rate. This component of the term structure has the greatest variance and represents a direct cost to home builders. The interest costs of a construction project are charged at a floating rate typically prime plus 200 basis points. This loan will be charged on the outstanding balance of the construction loan. As nominal interest rates rise, this

Demand Sensitivity to Changes in Short (1A) and Long Term Interest Rates (1B).

P = Nominal cost of housing where the cost of financing is the independent variable

component of construction costs increases faster than any other component of the development. While other costs rise due to inflation, there is a need to finance more nominal dollars for a given project. At the same time nominal interest rates have risen as well. Consequently, an inflated nominal interest rate is financing the purchase of inflated material and labor prices! This is a dramatic change and should certainly support the assertion that home builders are particularly sensitive to changes in short-term interest rates.

Medium-term forward rates represent the cost of financing inventories, in this case being unsold homes. While the actual sensitivity of home builders to forward rates will not be discussed, there is agreement that they are highly sensitive to these future rates.

In Figure 2A short-term rates are expected to rise above long-term rates. The home builder sees the possibility of high interest and inventory costs. In this situation, builders will reduce production considerably while slowly depleting inventory levels.
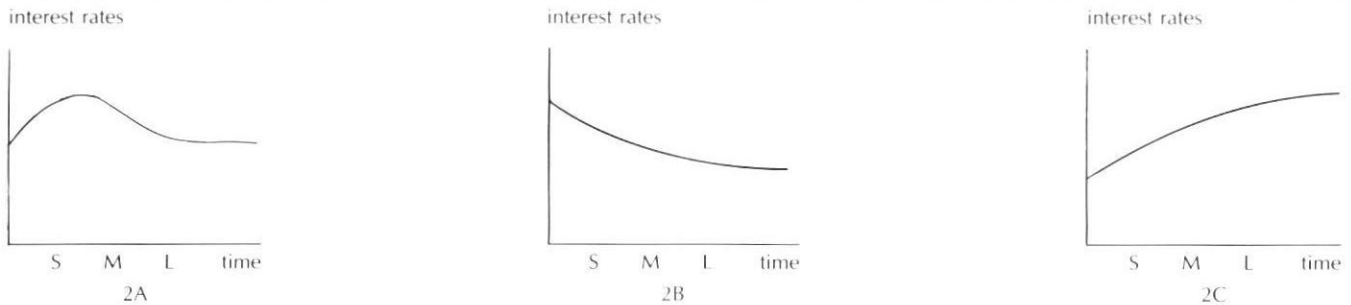
In Figure 2B, rates are expected to decline. This represents the most desirable market to enter as the actual cost of capital and inventory will be declining over the life of the project. Thus, builders can be expected to seek permits, begin construction and exhibit a willingness to expand inventories.

In Figure 2C, rates are expected to rise over time, and this is often thought to be the normal shape of the term structure. (See Sharpe)[11]. Depending on the slope of the curve, this situation should not be unsettling to home builders, although inventories will be kept to a minimum (here again, Maisel's argument holds).

Due to the development of financial futures' markets, like the Chicago Board of Trade, much of the uncertainty associated with future spot rates is eliminated through appropriate interest rate hedging strategies. This only reduces cost uncertainty and does not serve to reduce cost.

2A

2B

2C

Mortgage rate changes, or variances on long-term rates, represent a demand constraint as opposed to a direct cost of production. In general, a rise in interest rates of any long-term debt instrument has a substantial affect on the associated coupon or payment. In the case of home mortgages, even a small variance in mortgage rates induces a relatively large change in monthly mortgage payments. Thus, the hypothesis is formulated that a rise in long-term rates dampens the demand for debt in general, and decreases the supply of credit available for mortgage financing causing a northwest shift of the supply curve.

Tests And Results

To test the previously stated hypothesis the following series found in the BCD are included: Quarterly Housing Starts, Prime Lending Rate, Secondary Market Yield on FHA Mortgages and the CPI from 1950-51 through 1983-84.

As stated at the beginning of this article, regression tests were performed using ordinary least squares, utilizing the minitab statistical package on the DEC 20 at The University of Chicago. The results of these tests are presented in Tables A-F.

Table A sets the level of housing starts as the independent variable. Three separate regressions are tested by altering the right hand side variables. Test #1 finds the concurrent and once lagged levels of prime rate to be both statistically significant and negative with coefficients of $-.5583$ and -1.1629, respectively. This regression also yields an important test statistic for CPI, in the current quarter, with a positive coefficient of .6828. FHA yields were not found to be significant.

Test #2 is of interest since in examining an equation which included both nominal and real long and short-term interest rates, the computer rejected the series as being too highly correlated. To overcome this problem nominal rates were excluded and real rates and CPI were tested. The resulting R^2 and D.W. were identical to Test #1. And again, the resulting significant variables were real short-term rates with a 1 period lag and CPI. [Real rates are defined as the nominal rate minus the CPI.]

Test #3 used the same right hand side variables as Test #1 with the addition of two variables, the level of housing starts lag 1 and the level of housing starts lag 2. Not surprisingly, the R^2 went from a fairly low .362 to a fairly high .881. There were only two significant variables, start lag 1 and the prime rate in the current quarter. The strength of the level of starts overwhelms the other variables.

Considering the variables in Table A, the prime rate in the current quarter was significant in three out of three cases (including the test for prime real rate) and prime lag 1 in two out of three cases. CPI in the current quarter was significant in two out of three cases with starts lag 1 as being the most significant variable measured.

Table A

Prediction of Level of Housing Starts Coefficient
(T-Ratio)

Variable	Test #1	Test #2	Test #3
Prime	−.5583		−.5134
	(2.02)		(4.30)
Prime$_{-1}$	−1.1629		.0362
	(4.13)		(.26)
FHA Yield	.9077		.2304
	(1.34)		(.73)
FHA Yield$_{-1}$	.7273		.3327
	(1.20)	(1.25)	
CPI	.6828	1.0321	.06499
	(4.00)	(1.85)	(.81)
CPI$_{-1}$	−.2230	−.6586	−.07249
	(1.25)	(1.18)	(.91)
Real/Short		−.5583	
		(2.02)	
Real/Short$_{-1}$		−1.1629	
		(4.13)	
Real FHA		.9077	
		(1.34)	
Real/FHA$_{-1}$		.7272	
		(1.20)	
Starts$_{-1}$			1.0154
			(11.14)
Starts$_{-2}$			−.12313
			(1.38)
R^2	.362	.362	.881
D.W.	.44	.44	2.08

Table B

Prediction of Change in Housing Starts Coefficient
(T-Ratio)

Variable	Test #4	Test #5	Test #6
Change in Prime	−.3740	−.3399	−.45
	(3.09)	(1.46)	(3.83)
Change in Prime$_1$	−.2815	−.2815	−.3574
	(2.12)	(2.12)	(2.70)
Change in Prime$_2$	−.2025	−.5217	−.1254
	(1.74)	(1.93)	(1.08)
Change in FHA	−.0747		−.173
	(.27)		(.65)
Change in FHA$_1$	.7053	7053	5593
	(2.32)	(2.32)	(1.90)
Change in FHA$_2$	.1382		−.0293
	(.46)		(.10)
Change in CPI	−.04429		−.08178
	(.54)		(1.03)
Change in CPI$_1$	.03192		.02153
	(.42)		(.24)
Change in CPI$_2$	−.181		−.20843
	(2.38)		(2.84)
Change in Real Prime		.0304	
		(.11)	
Change in Real Prime$_1$		−.3192	
		(1.03)	
Change in Real FHA		−.0747	
		(.27)	
Change in Real FHA$_1$		.1382	
		(.46)	
Change Starts Last Period			.00691
			(.08)
Change Starts Two Periods			.27125
			(3.48)
R^2	.403	.403	.458
D.W.	2.00	2.00	1.98

Table B tests the change in the level of housing starts as a dependent variable against the change in various right hand side variables. Test #4 finds the change in prime rate, the change in prime rate lag 1 and the change in prime rate lag 2 as all significant with coefficients of −.3704, −.2815, and −.2025. The change in yields on FHA mortgages, with a 1 period lag, was found to be significant with a coefficient of .7053, and the change in CPI with a 2 period lag was found significant with a coefficient of −.181. Note that the R^{2}s are somewhat better than in Table A for similar variables, and that in Tables B, C and D, the D.W. are at very acceptable levels.

Test #5 encountered similar results as Test #2 with regard to correlations. In this case, CPI was excluded with the results being identical to those of Test #4.

Test #6 included the same variables as Test #4 with the addition of two variables, the changes in starts lag 1 and lag 2. These results are somewhat different from the similar Test #3 on the levels.

In this case the increase in R^2 is relatively small — .403 to .458. And it is the housing start 2 period lag variable which is significant not the 1 period lag variable. Again, the change in prime rate and the change in prime rate lag 1 are significant. The yield on FHA mortgages lag 1

and the change in CPI lag 2 also are found to be noteworthy.

The interesting result of this table is that, in all cases, change in prime rate is found to be statistically significant and negative. The change in yield on FHA mortgage was found to be positive and significant with a 1 period lag. CPI was significant and negative with a 2 period lag. The most interesting aspect of Table B is in Test #6 where the first difference of housing starts was found to be insignificant and the 2 period lag difference generated a much smaller benefit to the equation than the test level of starts in Test #3.

Table C

Prediction of Percent Change in Housing Starts

Variable	Test #7	Test #8
% Change in Prime	−.22678	−.24629
	(2.63)	(2.89)
% Change in Prime$_1$	−.21244	−.16684
	(2.64)	(2.04)
% Change in FHA	.2712	.2394
	(1.34)	(1.22)
% Change in FHA$_1$	.7355	.6178
	(3.57)	(2.96)
Change in CPI	−.007662	.005734
	(1.55)	(1.16)
Change in CPI$_1$	−.000150	−.00160
	(.03)	(.33)
% Change Starts		.18136
		(2.29)
R^2	.379	.404
D.W.	1.84	2.25

Table C examines the role of percent changes in various right hand side variables as determinants of the percent change in housing starts. Test #7 yields a significant statistic for the percent change in prime rate and in prime rate lag 1 (again both coefficients are negative). The one period lag value for yields on FHA mortgages is both significant and positive. In this case, the R^2 of .379 is lower for absolute differences but higher for levels.

Test #8 is identical to Test #7 with the additional variable of percent change in housing starts being significant and similar to Test #5.

These two models indicate there is no real benefit to

Table D

Simple One Variable Regression to Compare
Prediction Level to Prediction of Change

Variable	Test #9	Level
Level$_1$	.90679	
	(25.41)	
Change$_1$		.26299
		(3.14)
R^2	.829	.069
D.W.	1.41	2.08

Table E

Correlation of Selected Variables

Correlation % in Change	Short	Long	Correlation	Changes in Short	Changes in Starts
Long	− .423		Change in Starts	− .355	
Starts	− .366	.327	Change in Long₋₁	− .386	.492
	Correlation Nominal Short₋₁ Long .961			Correlation Real Short₋₁ Long .911	

using percent change as opposed to absolute difference in predicting quarterly housing start changes.

Table D points out the striking difference between testing for levels of housing starts as opposed to changes using only starts or changes as the independent variable, using housing starts in the current period as the dependent variable.

Table E is designed to highlight some of the interesting correlations found in this data. Note the negative correlation between starts and short-term interest rates and the positive correlation between starts and long-term interest rates. Also interesting is the relationship between the change in short and long-term interest rates which is negative and the extremely high correlation between the level of long-term and short-term rates with a 1 period lag.

Table F

Standard Deviation of Various Quarterly Series 1950 through 1983

Housing Shifts (H.S)	3.2607
Change in H.S	1.3794
Prime Rate (P.R.)	3.9449
Change in P.R.	1.0826
FHA Mortgage Yield (M.Y)	3.1762
Change in FHA M.Y	0.4505

Table F gives the standard deviation for housing starts, prime rate and FHA mortgage yields as levels and first differences. As expected, short-term rates are far more volatile than long-term especially when the standard deviation of the differences are compared.

Summary and Conclusion

The housing industry is important to the country because shelter is its output, and it is vital to economists because historically this enterprise has provided advance warning of changes in the direction of business cycles. Generally, housing is a leading indicator out of recessions. By a multiplier effect of increasing the demand for other durable goods such as appliances and furniture, housing production and consumption have beneficial economic effects.

While many economists have studied the demand for housing in great detail, few have considered the components of housing supply preferring to view home builders as profit seekers who supply housing until the marginal profit is zero, without examining the economic components of cost.

This article examined the builder's decision-making process in two steps. First, by asserting that the volatility of the home building industry, or of housing starts, is a phenomenon tied directly to changes in the term structure of interest rates; secondly, by arguing that short-term rates, represented by the prime rate, are a cost of production; that medium-term rates (excluded from the empirical testing) represent the cost of carrying inventory; and that long-term rates represent a constraint on demand not directly on supply.

This argument was tested empirically with the result that in all cases the prime rate is negatively correlated with housing starts. Thus, the hypothesis was supported. Long-term rates were only significant with a 1 period lag, and shown to be correlated positively with housing starts. Finally, while the average R^2 for these tests ranged from .3 to .45, the high R^2 from Test #3 was .881. In that test, which included levels of housing starts with a one period lag, the only other significant variable was the prime rate. Therefore, in the prediction of housing starts, while other variables such as nominal income must be considered, the argument presented here is supported by the data.

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THE MARKET FOR SELF-SERVICE STORAGE FACILITIES: A REVIEW AND REVISED OUTLOOK

An update on the new developments and expanding markets occurring within this young, burgeoning industry.

by John Hysom

The self-service storage industry in the United States is 20 years old, and as the industry emerges, new construction techniques have been developed, materials adopted, services tried and new markets probed. Yet most facilities still closely resemble the original structures described as a multi-door, long and low concrete-block building with a poured-concrete floor and corrugated steel deck roof. Each of the units has one electric light bulb, a separate door and little else.

Recently, several fundamental changes have occurred, and many owners now provide a variety of services not before available. Managers of projects in busy commercial areas deliver boxes of records or other items to the customer and offer pay phones, car washes, photo services, keymaking, gasoline, vending machines and postal centers.[1] Some developers and owners have pioneered the concept of providing climate controlled space for storage of microfilm, computer records and other sensitive materials. While construction costs of these advanced facilities are expensive, the rents also are higher. But they are attracting a new market of businesses that can afford to protect their valuable items and materials.

Today planning for and constructing self-service storage facilities is becoming increasingly complex. Competition has become a problem in some places, and will continue to increase in nearly every metropolitan area. The level of customer sophistication, their changing needs and the newer facility designs and services offered, have changed the face of the industry, and careful market research and financial feasibility analyses now are required.

John Hysom, Ph.D., is an associate professor in charge of the Real Estate and Urban Development Program and director of the Center for Real Estate and Land Use Analysis in the School of Business Administration at George Mason University, Fairfax, Virginia. His Ph.D. was awarded by the American University in Washington, D.C. Dr. Hysom has written a book, numerous articles and research monographs in the fields of appraisal, land development, market analysis, real estate finance, real estate investment and land use control.
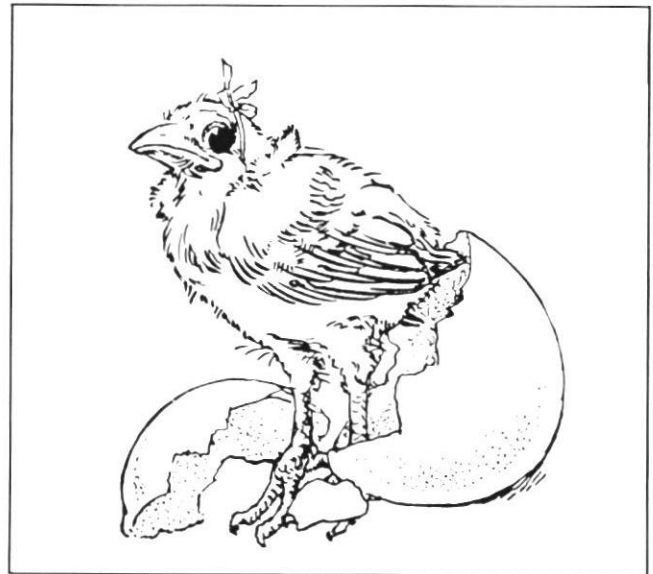
This article describes a project that offered three vital lessons to learn regarding self-service storage facilities as an emerging income producing real estate investment (formerly called mini-warehouses[2]). The three lessons are: (1) market demand often can be more than an investor expects; (2) what might be considered high land costs are not really excessive after careful cash flow analyses are made and (3) people will pay more to get more in the 80s.

Also presented is a current perspective on the use of market analysis and its importance in helping to define or redefine client development goals while examining the obvious changes in market behavior.

Specifically, the focus is on two areas of analysis. The first is the importance and use of primary or first hand market data, rather than a review of something collected by someone else. In this case the primary data was a direct mail questionnaire survey used to evaluate the strength of the market for storing materials which require

expensive climate control. The study was undertaken to help decide whether or not to construct a traditional facility without climate controlled space, or a more expensive multi-story building which would appeal to a more sophisticated, demanding market segment.

The second area of study is the marriage of traditional market analysis techniques with financial feasibility and location analyses to reduce the number of potential sites. This approach was used to help select the most attractive submarket area. The key issue under study was whether it was better to build close in to the center of activity where land costs were high, or further out where costs were less. The relationships among land and construction costs, type of building, market demand and potential rents were all factors that influenced this market-type of decision. The analysis demonstrated that no clear line should be drawn between market and financial feasibility analysis which appear as two stages in the same decision-making process.

Self-service Storage Facilities In One Of The 10 Top Metro Areas

The first mini-warehouse facility was built in Texas. As recent history has shown, it was an inspired change to the old concept of selling space for people and businesses to store personal and business items. For the first time, upscale households as well as businesses could rent small areas to store their ever increasing possessions. These areas could be entered at almost any time without having to obtain permission or assistance, and they could be locked up and left. The initial mini-storage facilities were pretty crude and had only one light hanging from a cord in the middle of the space, were not climate controlled and not especially attractive. But they were functional, and became popular when they were first constructed in the South, Southwest and West. A few years later, mini-warehouses were being built throughout the United States.

Ten years ago, the mini-warehouse came to a major metropolitan area and was built by a large California based firm nearly 40 miles from the center of activity. During the intervening years, between 40 and 50 additional facilities were constructed, and several nationwide firms entered the market specializing in self-service storage facilities.

Fears of Market Saturation

New facilities were being added every few weeks in some metropolitan areas during 1983-84 and some owners became concerned about market saturation. Other developers and owners coming into the market also were worried about where to locate, and what would happen to their customers if more projects were built.

A market research effort was executed to seek and find answers to those questions regarding the demand for self-service storage facilities in one of the strongest real estate markets in the nation. The case study to be presented describes an effort to select a site and develop a

marketing strategy for a sophisticated, experienced group of real estate investors and developers who were attracted to self-service storage facilities by increasing reports of builders who had succeeded in other markets. The problem or challenge, however, was that they had never built such a facility, and tended to be conservative in their investment approach.

The Case Study

A number of unusual fundamental questions exist in this industry. One of the most basic and perhaps most critical concerns is how to measure the demand for space. Almost every month we read articles about new houses, townhouses and apartments with smaller and smaller square footage. Developers save space by offering less storage area. This means for all the pack rats or squirrels of yesteryear who kept everything, someone has to provide a place to store these treasured artifacts. This is an emotionally oriented marketplace where costs may not be the primary consideration.

Because it is a new market, a whole host of new questions need answering. Is there a logical limit? Is that limit one square foot per person living in a community, as Richard Cornwell and Robert Siegel have said?[3] Do some factors tend to increase the demand to more than one square foot per person as Robert Siegel maintains?[4] What is the saturation point for personal storage space? How can it be measured? Does total demand increase as people learn about the advantages of personal storage facilities? Can a developer or owner do anything to assure his or her facility will remain full?

The Purpose of the Market Analysis

The research objective addressed four major areas of consideration. Is the demand for self-storage facilities sufficiently strong to sustain existing and additional facilities for at least the next 10 years? What type of facility should be built? Where should it be located? How profitable will it be?

Very few real estate market research studies are this specific or this demanding. In this case, however, the experienced principals were determined to devote their time and resources to build a project that was sound and profitable. Almost no market research projects include a series of sites with different ranges of profit estimates. Most all look at one, maybe two sites and want to know if there is a market for the space. Here the principals asked which site and design would make the most profit over the long run. This entered the realm of financial feasibility analysis for different sites with totally different attributes. Many builders/developers/investors conduct this analysis themselves or hire financial specialists to perform this task. Rarely do they include a set of multiple sites and most do not include the question about profitability although this is happening more in recent years.

To complete this broad assignment, the market research/financial analysis team approached the problem from a nontraditional viewpoint. Having studied the market for self-service storage facilities in the metropolitan area on

several occasions over the past decade, they were confident about the financial strength of the households, the steady growth of population, employment and income and the need for personal storage space.

However, the team had never examined the market to learn about such things as the changing perceptions of people regarding personal storage space, the demand for more sophisticated facilities (climate controlled space or single building design) or where to locate mini-warehouses. This project called for a new approach, one that included gathering primary data from potential customers for the space; it also included a preliminary financial feasibility analysis.

The following discussion describes some of the methodology employed in the study and reviews different perceptions regarding personal storage facilities. The results provide some very encouraging prospects for future development.

The Analysis

Market Analysis Summary

Our traditional market analysis performed five basic tasks:

- estimated the growth potential in terms of population, households, income and employment for the market or trade area;
- estimated the existing and projected demand for personal storage space in some degree of detail;
- inventoried the supply of competing facilities, now and in the immediate future;
- computed net demand, and
- offered design recommendations.

Growth Potential

The first step was an examination of the growth in population, households, income and employment. This confirmed the belief that the market is and will probably continue to be healthy in the foreseeable future. The population of the metropolitan area had increased by only 150,000 people between 1970 and 1980, barely 17% over the previous decade. But the number of households had increased by more than 200,000 during the 70s and is expected to grow by nearly 170,000 households in the 80s. Two of the highest median family income urban counties in the nation, Jackson and Fulton, were among the fastest growing sections in the metro area. Jackson County had added over 50,000 households during the 70s, and Fulton County had increased by more than 80,000 households. The employment base is large and growing. Total employment in the metro area in 1980 was 1,725,000, and this is projected to increase to more than 2,000,000 by 1990.

Demand for Personal Storage Space

The second step was to study the market demand in some detail. This involved examining the numbers of existing and planned pipeline (projects being approved by local government) single and multi-family housing units around the potential sites and the type of storage space in each type of housing, an inventory of the existing and planned pipeline commercial and industrial space users around each potential site by type and size and the mobility of each potential user. These are all factors Robert Siegel specifies can markedly increase the demand for storage space. His formula for estimating the amount of storage needed is to, "expect a demand of one square foot of mini-warehouse leasable area for every person living in a trade area," plus an increase of one-third square feet for areas where "households living in multi-family units account for more than 25% of all households, the mobility rate is 25% or more or commercial establishments account for 25% or more of all telephone listings."[5]

Since the areas around the close-in sites consist of apartments, considerable commercial development and a very mobile population, the Siegel formula for demand rose from one square foot per person living in the area to two. Even though this formula was designed for use in estimating demand for specific sites and not for entire market areas, sufficiently large areas of these two counties possessed the characteristics that call for a higher ratio. Thus, the demand for personal storage space in Fulton County in 1980 was more than 2.2 million sq. ft. (1.1 million people times a factor of two). Each year another 18,000 people increase this demand by 36,000 sq. ft. (See Table 1)

The 1980 population of Jackson County was 580,000. With a fairly large proportion of multi-family housing, a high mobility rate and a concentration of commercial development, the personal storage ratio of 2.0 times the number of people produces a total demand of 1.16 million sq. ft. of storage space.

TABLE 1

Population And Demand For Personal Storage Space
In Fulton And Jackson Counties
1980 to 1992

| Year | Fulton County | | Jackson County | |
	Popul. (000)	Pers. Storage (000 sq. ft.)	Popul. (000)	Pers. Stor. (000 sq. ft.)
1980	1105	2,200	580	1,160
1984	1175	2,350	602	1,204
1985	1195	2,390	607	1,214
1986	1213	2,426	613	1,226
1987	1230	2,460	618	1,236
1988	1250	2,500	624	1,248
1989	1267	2,534	630	1,260
1990	1285	2,570	635	1,270
1991	1303	2,606	641	1,282
1992	1321	2,642	646	1,292

Note: Space demand projections assume a demand of 2.0 square feet per person in the population, a higher rate than would apply to the urban fringe areas, but one that can be considered realistic based on characteristics of the county as a whole.

Inventory Existing and Planned Supply

The third step in the market analysis was to inventory the existing and planned personal storage facilities in the metropolitan area. Information was gathered about their rent levels, vacancy rates, number of storage units by size and the mix of customers. This step involved visiting the facilities' sites and talking with the managers and the city and county planning and land use control officials about the projects in the approval pipeline. It was essential to learn what new projects would be coming into the market in order to complete the picture of the present and future competing facilities.

The research for this step revealed an interesting trend. The recent construction of competing facilities occurred in Fulton County, the fastest growing of the counties in the metro area. The other attractive county, Jackson, however, had only a few facilities, and very little land zoned for more. In Fulton County, supply could well exceed demand, but in Jackson County, demand would probably always exceed supply unless a dramatic change occurred in the zoning of vacant industrial land. The remaining cities and counties were rejected for various reasons. The remaining analysis focused on these two counties.

An important fact learned in the supply analysis was that while nearly 20 facilities were up and operating in Fulton County, the vacancy rates approached zero in all but a few troubled projects. Saturation had not been reached in any part of the metro area.

Net Demand

Comparing demand and supply to compute net demand was the fourth step in the analysis, and after narrowing the market areas down to Fulton and Jackson, this step was relatively simple.

The inventory of existing mini-warehouse space in Fulton County was just over one million sq. ft. A demand of 2.2 million sq. ft., more than two times the available space, was very encouraging. At the rate the population was increasing by 18,000 each year during the 80s, the need for additional space rises by 36,000 sq. ft. per year. The supply of new personal storage space was being completed at the rate of 200,000 sq. ft. per year. At this rate, if the demand does not change per person, the saturation would be reached in 1992. (See Table 2)

In Jackson County, the picture was even more encouraging. With a 1980 population of 580,000 and a demand factor of 2.0, the total demand was estimated to be 1.16 million sq. ft. in 1984. With an inventory of less than 200,000 sq. ft. and an estimate of little new development, the market was judged to be very safe and attractive with nearly one million sq. ft. of excess demand over the next eight to ten year period.

Project Design

The fifth step of the market demand analysis was to select design criteria for the facility. The task of our market analysis/feasibility team was to specify the kind of building or buildings that would best meet market demand for the next 10 years. The analysis for this step involved evaluating existing and competing projects, reviewing the literature about what was in demand and being built in other parts of the country and conducting a consumer survey.

Collecting Primary Data—The Consumer Survey

While a number of articles and books describing market analysis techniques urge the analyst to conduct consumer surveys to discover preferences, most analyses do not include them. While describing the shortcomings of most market and feasibility analyses in his book, *How to Conduct and Analyze Real Estate Market and Feasibility Studies*, Vincent Barrett said, "An internal weakness in most real estate market analysis is the lack of consumer surveys. Most studies will employ the use of macroeconomic and microeconomic tools of analysis. These tools, for the most part, are necessary and appropriate and provide essential information. However, in most market studies it is necessary to address the question of consumer preferences. These preferences may relate to questions concerning specific types of dwelling units desired, size requirements, location preferences, amenities desired and ownership patterns. The present methods of economic analysis are only poorly suited to this important area of study."[6] Dr. Barrett continues, "The determination of consumer preferences with respect to the development of real estate resources is an area of study that is still in its infancy. There are a few firms that are active in the area of surveying consumer preferences and attitudes with respect to real estate, but this type of analysis is sorely lacking in the typical market study being produced today."[7]

TABLE 2

Net Demand For Personal Storage Space
In Two Counties
1984 to 1992
(Million Square Feet)

	Fulton County			Jackson County		
Year	Demand	Supply	Net	Demand	Supply	Net
1980[1]	2.20	0.50	1.70	1.16	0.16	1.00
1984	2.35	1.00	1.35	1.20	0.20	1.00
1985	2.39	1.20	1.19	1.21	0.20	1.01
1986	2.43	1.40	1.03	1.23	0.25	0.98
1987	2.46	1.60	0.86	1.24	0.25	0.99
1988	2.50	1.80	0.70	1.25	0.25	1.00
1989	2.53	2.00	0.53	1.26	0.30	0.96
1990	2.57	2.20	0.37	1.27	0.30	0.97
1991	2.61	2.40	0.21	1.28	0.30	0.98
1992	2.64	2.60	0.04	1.29	0.35	0.94

1/ Inventories of personal storage space for 1980 are estimates.

Note: Demand estimated to be 2.0 square feet per person in the population, a higher rate than would apply to the urban fringe areas.

Source: Population data for 1980 and 1990 from Metropolitan Council of Governments Forecasts.

The consumer survey was a valuable tool of analysis in the exploration of personal storage facilities in the metropolitan area. It consisted of a questionnaire survey mailed to the residential units and businesses in the areas around the most attractive potential sites. The purpose of the survey was to learn from the potential consumers if they were aware of the availability of self-service storage facilities; if they needed personal storage space, how much, for what use, and what would they be willing to pay; would they like access to the space, how far would they be willing to travel to the facility, and most important, if they wanted climate control, a 24-hour security guard, night access, or a pick-up and delivery service.

The survey was conducted among several hundred randomly selected phone book addresses of households and local businesses. The mailing included various incentives for response, and it produced a 35% return rate. It should be noted that in market surveys of this nature, every response is valid as opposed to other surveys to which statistically valid formulae must be applied. We were simply gathering information. Answers to these and other questions provided much of the information we needed to formulate our recommendations about facility design. Our decisions to make were: should it be the traditional low-cost no frills design, the newer more expensive second generation design with climate control and should it include tighter security?

When the business manager was asked on the questionnaire if his or her company "would be interested in a personal storage facility that was climate controlled," 63% answered yes. When asked if he/she "would pay 10 to 20% extra to store computer tapes or disks, microfilm, valuable papers or other sensitive items in a climate controlled room," 26% answered yes. The response to the same question on the survey sent to households was 42% in favor of climate controlled space. When asked if "a 24-hour security guard would be helpful," 63% of the business managers and 63% of the households answered positively. In addition, 68% of both businesses and households would prefer to have night access. On the other hand, only 21% of the business managers said that pick-up and delivery service would help their companies, and only 26% of the households said it would help to offer a safety deposit vault.

The responses, together with answers to the other questions—information from the survey of competing facilities and a literature search—provided the data required to make design recommendations to the architect and builder. We were sufficiently encouraged about the need for climate controlled space to recommend a multi-storied building with some, if not all, temperature controlled space. Since no other project in the trade area offered this second generation sophistication, the project would enjoy a monopoly on this portion of the market until other similar facilities were built.

The wholly enclosed, multi-storied building meets another market demand, a need for tighter, 24-hour security. With access to the building restricted to only one entrance, and with a 24-hour guard for protection, the security would be considerably better than the traditional chain-link fenced enclosure around several one and two story buildings with external doors to the storage spaces. Even with guard dogs at night and a resident manager, the traditional facility is more vulnerable to break-in than the totally enclosed multi-story building. The need for a safety storage vault is sufficient to include a limited amount of space initially with the flexibility to expand later.

Finally, the policy of providing a pick-up and delivery service for a modest fee is popular enough for serious consideration by the developers and owners. It is, however, a policy that need not affect the building design and can be implemented after the project is under construction.

Final Site Selection

The final step of the market/feasibility analysis was to rank the profit potential of the proposed sites, and this required a preliminary feasibility analysis. The rates of return were computed for three or four more attractive sites to determine how much could be paid for land. Although the market analysis strongly urged constructing the newer multi-story structure, the final decision would depend on how much the additional construction

TABLE 3
Four Test Sites For Sensitivity Analysis
October, 1983

Project	Location	Visibility	Size (SF)	Cost	
				Per SF	Total
Jackson County	Close	Good	90,000	$4.50	$405,000
Fulton County					
Cardinal Park	Close	Good	65,000	5.00	325,000
Robin Park	Close	Excellent	87,000	8.00	695,000
Bluebird Park	Semi	Weak	130,800	2.50	325,000

Source: Plats and conversations with owners and Realtors®.

TABLE 4

Comparison of Multi-Story Designs
On Three Close-in Sites
(In Thousands of Dollars)
October 1983

	Fulton County		
Item	Cardinal	Robin Pk.	Jack. Co.
Land Area	65,000 SF	87,000 SF	90,000 SF
Building Area	90,000 SF	90,000 SF	90,000 SF
Net Rentable Area	75,750 SF	75,750 SF	75,750
Rent/SF	$11.00	$11.00	$11.00
Total Costs			
Land	$ 325	$ 695	$ 405
Construction	2,340	2,340	2,340
Total	2,665	3,035	2,745
Permanent Financing			
Mortgage	2,000	2,275	2,060
Equity	665	760	685
Pro-Forma Inc. Statement			
Sched. Gross Income	833	833	833
Less Vacant/Loss	42	42	42
Effect. Gross Income	791	791	791
Less Opr. Expense	237	237	237
Net Oper. Income	554	554	554
Less Debt. Svc.	320	364	329
Annual Cash Flow			
Before Taxes	234	190	225
Rate of Return			
Cash on Cash	35.2%	25.0%	32.9%
Capitalized Value			
(cap. rate — .11)	$5,036	$5,036	$5,036

costs would affect profit ratios against investment. Consequently, the preliminary financial feasibility analysis would have to include a sensitivity analysis testing such factors as type of structure, land cost, rent level and market demand. Our findings would answer the remaining questions of whether it is better to build close in where land costs more with higher rents and stronger demand, compared to building on less expensive land; and the question of whether it is feasible to construct the more attractive multi-storied building?

A dynamic cash flow model was used to test these and other variables in preliminary sensitivity analysis. Further sensitivity testing was planned for subsequent project planning stages after site selection. The conservative assumptions for the cash flow model were the following:

1. A five percent vacancy rate for multi-story building, 10% for traditionally designed projects.
2. Borrow 75% of total land and construction costs.
3. Long-term financing for 15 years at 14%.
4. Rents similar to existing nearby operating projects on comparable sites. This was $6.50 per sq. ft. for the traditional design at the Bluebird Park site and $8.70 per sq. ft. on the close-in sites. A 25% premium was added for the multi-story design (all on the close-in sites). The difference in rent levels between the Bluebird Park site and the close-in sites was due to the higher rents charged by existing traditionally designed close-in projects.
5. A 30% expense ratio.
6. Construction and development costs of $18 per sq. ft. for the traditionally designed building, and $26 per sq. ft. for the newer multi-story structure.
7. Multi-story structure would be a 90,000 sq. ft. building constructed only on close-in sites near concentrations of commercial establishments and high-tech.
8. The traditional design would be built on all of the sites, including a second story where appropriate.

Four sites were selected for the sensitivity analysis. Three sites were in Fulton County and one was in Jackson County. (See Table 3)

The cash flow sensitivity tests were conducted for both the traditional and multi-story structures on the three close-in sites and only the traditional design on the more remote site in Bluebird Park, because the consumer survey showed the market for climate controlled space was

TABLE 5

Comparison Of Traditional
Designs On Four Sites
(In Thousands Of Dollars)
October 1983

	Fulton County			
Item	Card.Pk.	Robin Pk.	Blue.Pk.	Jack. Co.
Land Area	65,000 SF	87,000 SF	130,000 SF	90,000 SF
Bldg. Area	58,000 SF	78,000 SF	82,000 SF	67,000 SF
Net Rentable	46,700 SF	64,000 SF	76,000 SF	55,000 SF
Rent/SF	$ 8.70	$ 8.70	$ 6.50	$ 8.70
Total Costs				
Land	$ 325	$ 695	$ 325	$ 405
Construction	1,045	1,405	1,475	1,205
Total	1,370	2,100	1,800	1,610
Permanent Financing				
Mortgage	1,030	1,575	1,350	1,210
Equity	340	525	450	400
Pro-Forma Inc. Statmt				
Sched. Gross Inc.	406	557	494	478
Less Vac/Loss	41	56	49	48
Effect. Gross Inc.	365	501	445	430
Less Opr. Exp.	110	150	134	138
Net Oper. Income	255	351	311	292
Less Debt Svc.	165	251	216	193
Annual Cash Flow				
Before Taxes	90	100	95	99
Rate of Return				
Cash on Cash	26.5%	19.1%	21.1%	24.8%
Capitalized Value				
(cap. rate— .11)	$2,318	$3,191	$2,827	$2,655

TABLE 6

Comparison of Rates of Return
For Two Designs
October 1983

| | Facility Designs | | | |
| | Climate Control | | Traditional | |
	(Percent)	(000)	(Percent)	(000)
Fulton County				
Cardinal Park	34.4%	$5,036	26.5%	$2,318
Robin Park	25.0	5,036	19.1	3,191
Bluebird Park	—		21.1	2,827
Jackson County	32.9	5,036	24.8	2,655

Source: Based on pro-forma income statements shown in Tables 4 & 5.

only near the close-in sites. The results of the tests are shown in Tables 4 and 5 and summarized in Table 6.

Table 6 compares the rate of returns of the two different designs for three sites and the traditional design for Bluebird Park. In deciding whether to build on a more expensive location close-in or less costly farther from the center of activity, the summary of the sensitivity analysis clearly shows the higher rents achievable on the close-in sites more than compensates for the higher land costs. The rates of return are generally higher for the traditional design on the close in locations than on the farther out Bluebird Park.

The second major dilemma—which type of facility to construct—is not quite as clear. While the rates of return are higher for the climate controlled design than for the traditional design close-in, the equity investment required to build the climate controlled building is more.

However, there were two major advantages to building the climate controlled structure. First, it would provide the opportunity to dominate the market for storing sensitive goods as well as the additional protection of knowing more people preferred to store goods in a modern, secure facility. It provided the additional assurance that occupancy rates would be high should the market become saturated with personal storage facilities and it also would protect the investment against future competition. A second important advantage was that a much higher resale value would be realized. Initially, the climate controlled design was nearly two times the value of the traditional facilities. After several years of successful operation, however, the difference in values could be even more. Finally, the assumption that rents could be only $2.30 per sq. ft. higher for the more modern design may be too conservative ($11.00/SF). An increase of only $1 would increase the rate of return by more than seven percentage points making the climate controlled structure considerably more profitable than the traditional model.

The development/investment client group decided to buy the Jackson County site and construct the climate controlled facility.

Using this set of profit-making assumptions, the most

attractive combinations appear to be the close-in sites with the multi-story, climate controlled design. The rates of return and capitalized values are substantially higher for the climate controlled structures. In addition to the higher returns, the climate controlled designs provide better market penetration and long-term occupancy. The only apparent disadvantage is the higher up-front cost of land and construction which requires a larger equity investment and a larger mortgage loan. Additional sensitivity tests were made evaluating feasibility under different assumptions about rent levels, construction costs, varying sizes of facilities and sale prices. The conclusions did not change.

Conclusions

When the development team and their investors realized that the new design could be more profitable (especially on the Jackson County site) and future competition would not be a serious problem, the decision was to immediately begin negotiations to purchase that location.

Several lessons were learned from this experience—market demand often may be greater than most people believe; the market continues to expand as more households and businesses discover the personal storage concept; market segments exist in most communities yet to be tapped; it is possible to pay more for land if a location has superior advantages; considerably higher rents are possible for ideal or unique locations that are hard to duplicate; it is possible to earn a good return from a self-service storage facility that is well conceived, designed, built, multi-storied, full serviced and even partly climate controlled. A substantial market may well exist in many other up-scale communities for climate controlled personal storage space. Since most current facilities provide little more than dry secure space, little is known about the more expensive, climate controlled, more secure, newer-types.

While market saturation for the traditional personal storage facility in many communities may be reached in the next few years, we sincerely believe the market has hardly been tested for innovative approaches in most localities. A creative entrepreneur can discover a combination of market segments and go on to design a facility that has the highest occupancy rates in his or her market area.

NOTES

1. Richard E. Cornwell with Buzz Victor, *Self-Service Storage: The Handbook for Investors and Managers* (Chicago, IL: Institute of Real Estate Management, 1983), 149-151.

2. Ibid, vi.

3. Ibid, 52-53; and Robert L. Siegel & Associates, Inc., *Introduction to Mini-Warehouses* (New Orleans, LA: Robert L. Siegel & Associates, Inc., 1981).

4. Siegel, op. cit.

5. Ibid.

6. G. Vince Barrett and John P. Blair, *How to Conduct and Analyze Real Estate Market and Feasibility Studies* (New York: Van Nostrand Reinhold Company, Inc., 1982), 311.

7. Ibid.

REAL ESTATE TAX APPRAISALS: ECONOMIC REALITY vs. STATUTORY COMPLIANCE

A case study illustrates the problems that can arise from the court's interpretation of laws on the taxation of real property.

by Robert J. Shedlarz and James R. Webb

Use of market value appraisals for real estate tax purposes has a long and legal foundation in every state in the country. Tax equity, mandated by most state laws, demands such an approach. Recently, backward steps were taken regarding real estate taxation in Ohio. The case of *Columbus Board of Education* vs. *Fountain Square Associates, Ltd., et al* (9 Ohio St. 3d 220 (1984)) demonstrates a return to literal methods of valuation by the Ohio Supreme Court. This case also indicates the court's concern with valuation methods practiced by the State Board of Tax Appeals which previously had not adhered to recognized statutory and accounting guidelines as methods of resolving disputed property valuations.

Background

In Columbus, Ohio, Fountain Square Associates, Ltd. purchased seven parcels of real property together with an office building. This arms-length transaction resulted in Fountain Square paying $8,855,000 as follows:

- $1,505,000 in cash
- $3,532,906.60 financed by a first mortgage to a third-party lender
- $3,817,093.40 financed by a second mortgage to the seller.

In accordance with the law, transfer taxes were paid on the entire principal amount of $8,855,000. Following an assessment complaint filed by the Columbus Board of Education with Franklin County Board of Revision, the property was valued for property tax purposes at $8,854,970. Fountain Square appealed this assessment to the Board of Tax Appeals (BTA), claiming that the

Robert J. Shedlarz, *is a professor of Business Law at the College of Business, University of Akron, in Ohio.*

James R. Webb *is an associate professor of finance at the University of Akron in Ohio. He is a prolific writer and has published more than 50 articles on various aspects of real estate investment and income property appraisal.*

property was overvalued. Fountain Square said the value of the property should be equated with the cash equivalency value (i.e., present value) of the notes. If this claim would be successful, the property valuation would be reduced. The BTA found Fountain Square's valuation argument was persuasive and reduced the valuation to $7,435,000. The Columbus Board of Education appealed to the Ohio Supreme Court who found the BTA's valuation to be unreasonable and unlawful and reinstated the Board of Revision's valuation of $8,854,970 (see Exhibit 1).

The Issue

The question is to what extent should the present value

of cash payments and creative financing devices be equated with the market value of the real property for tax purposes? In an era of high interest rates, creative financing had become a frequent financing device. In its most common application the seller agreed to finance all or part of the sales price taking a note and a first or second mortgage for the balance due. In many instances, the seller also gave the buyer a favorable interest rate reflecting below market cost of money. In exchange the buyer was willing to increase the original principal balance as an offset for the favorable rate of interest. For example, a house with a market value of $100,000 may sell for $103,000 however, the seller took back a second mortgage at 9% interest, 10-year term and interest only payments. This was at a time when market rates for second mortgages were 15% from institutional lenders. The net result reflects a total purchase price that was above what it would have been with a third-party financing arrangement at a higher rate of interest.

The Legal Considerations

In considering this enhanced valuation, the law itself is clear in stating this entire issue should be ignored, i.e., the method by which the sales price was computed should have no bearing on the valuation:

"... (T)he auditor *shall* consider the sale price of such tract ... to be the true value for taxation purposes." (O.R.C. sec. 5713.03).

Previously the Supreme Court of Ohio had not interpreted this statute in a literal fashion:

"... (T)he *best evidence* of the true value in money of real property is an actual, recent sale of the property in an arms-length transaction". (*Conalco* vs. *Board of Revision*, 50 Ohio St. 2d 129 [1977]).

Best evidence does not mean only evidence. Thus, the court left open certain exceptions to the rote repetition of a recent, arms-length sale as the only method of computing value for tax purposes. Having given the BTA a certain amount of leeway in computing valuation for tax purposes, the court has traditionally exercised a high degree of restraint in second-guessing the BTA's decisions:

"... (T)his court will not disturb a decision of the Board of Tax Appeals with respect to such valuation unless it affirmatively appears from the record that such decision is unreasonable or unlawful." (*Board of Revision* vs. *Fodor*, 15 Ohio St. 2d 52 (1968)).

If the system created by statute and case law functions properly, then the BTA becomes the ultimate decision maker with respect to tax valuation. The BTA is given a degree of discretion in its decision-making process, with considerable restraint exercised by the judicial process in reviewing the ultimate result. If the system works as it should, the decision is left to those with the most expertise in formulating the value, and the procedures involved can include accounting standards which may reflect sophisticated analysis such as present value or cash equivalency value. In order for this process to function

effectively, it is necessary for the BTA to develop sufficient expertise in the interpretation of alternate evaluation procedures. This will ensure that the methods for making decisions are predictable and reasonably close to a recent, arms-length sale price for the property in question. A number of established accounting principles can accomplish this dual purpose e.g., a market value for tax purposes reasonably equated to a recent sale. (For present value of noncurrent assets one can use, for example, Accounting Principles Board Opinion No. 16.) Unfortunately, this demonstration of expertise, equated to a statutory set of guidelines, was not chosen by the BTA. In the late 70s and early 80s, a series of court cases demonstrated that ultimate decisions on tax value were more the product of political compromise than standard accounting procedures. The most flagrant example was shown in *Consolidated Aluminum Corp.* vs. *Board of Revision* (66 Ohio St. 2d 410 [1981]). In this case there were two competing valuations; one by the owner at $7,816,000 and the other by the Board of Revision at $15,100,000. Without specifically justifying its computations, the BTA arrived at a value of $11,950,000. A court majority upheld this appraisal, justifying the result because of the complexity of the facts. In his dissent, Judge Locher stated: "By assigning the $11,950,000 value, BTA once again splits the difference between the competing values." Finally the court has indicated its dissatisfaction with the entire program. With the Columbus Board of Education Case (supra), the Ohio Supreme Court had evolved a strict interpretation of the statute providing a literal meaning to the arms-length sale approach, and taken the discretionary approach away from the BTA.

Conclusion

The present strict statutory approach has removed the more flagrant abuses formerly practiced by the BTA. Unfortunately, a literal reading of the statute also will ignore all alternate valuation methods confining the tax value solely to the arms-length sale price. Those potential purchasers who engage in various financing arrangements should be aware of this strict approach to value for property tax purposes. It may be that the money saved from creative financing may be spent eventually for property tax bills which reflect the purchase price shown on the auditor's transfer statement, rather than the present value of the creative financing arrangement. For the seller, this strict approach has the tendency to make the property less marketable given a convenient but unrealistic tax valuation when it is transferred.

This strict interpretation is particularly illogical in light of the massive empirical research in real estate which indicates that creative financing does inflate the state purchase price.[1] In addition, many types of financing can be considered creative[2] although the full effect of various kinds of financing is still not settled.[3] Estimates vary from 100% to less than 40% of present value of the difference between standard financing and creative financing. This amount would then be subtracted from the purchase

price to obtain market value. Clearly the statutes discussed here need a more liberal and economically realistic interpretation.

What if someone bought a property using 100 gold double eagles ($2000 face value) as the legal coin of the U.S.? Could they then claim the transaction and therefore the tax base was merely $2000? This would seem to be a distinct possibility under current interpretations. Of course, dougle eagles ($20 gold pieces) cost $1000 each or more, depending on condition, etc. These happenings clearly would not represent the intent of the statute just as those of the current strict interpretation do not reflect the meaning of the law.

NOTES

1. Clauretie, T. Mike, "Capitalization of Seller-Supplied Financing: Implications for Assessment," *Property Tax Journal* (December 1984), pp. 229-238; Edgren, John A. and Hayworth, Steven C., "The Implications of Land Contracts for Property Tax Assessment Practices," *Housing Finance Review* (April 1984), pp. 177-190; Friedman, Jack P. and Lindeman, J. Bruce, "Seller Financing and Cash Equivalence," *The Real Estate Appraiser and Analyst* (May/June 1979), pp. 46-50; Jaffee, Dwight M., "House-Price Capitalization of Creative Finance: An Introduction," *Housing Finance Review* (April 1984), pp. 107-118; Rosen, Kenneth T., "Creative Financing and House Prices: A Study of Capitalization Effects," *Housing Finance Review* (April 1984), pp. 119-128; Schwartz, Arthur L., Jr., "Cash Equivalency: Does It Really Adjust to Market?" *The Real Estate Appraiser and Analyst* (Fall 1983), pp. 38-41; Smith, Halbert C. and Corgel, John B., "Adjusting for Nonmarket Financing: A Quick and Easy Method," *Appraisal Journal* (January 1984), pp. 75-83.

2. Case, Fred E., "Creative Financing Instruments," *The Real Estate Appraiser and Analyst* (Spring 1982), pp. 45-58.

3. Schwartz, Arthur L., Jr. and Kapplin, Steven D., "Economic Implications of Alternative Home Financing," *Housing Finance Review* (April 1984), pp. 165-176.

EXHIBIT 1

Columbus Board of Education vs. Fountain Square Associates, Ltd., *et al*

Cite as 9 OBR 529 or 9 Ohio St. 3d 220.

9 Ohio St. 3d 218.

COLUMBUS BOARD OF EDUCATION, APPELLANT, v. Fountain Square Associates, Ltd. et al., Appellees.

Taxation—property valuation: Board of Tax Appeals errs in finding real property's "true value in money" to be other than recent sales price, when, R.C. 5713.03.

(No. 83-1061—Decided February 22, 1984.)

APPEAL from the Board of Tax Appeals.

On December 4, 1980, appellee, Fountain Square Associates, Ltd., purchased, in an arms-length transaction, seven parcels of real property improved with an office building complex located in the city of Columbus.

Appellee paid a total consideration for the property of $8,855,000 consisting of $1,505,000 in cash, the assumption of a promissory note secured by a first mortgage with a principal balance of $3,532,906.60, and a new promissory note secured by a second mortgage executed by appellee to the seller in the principal amount of $3,817,093.40. Transfer taxes to Franklin County were paid on the amount of $8,855,000.

On January 29, 1981, appellant, Columbus Board of Education, filed a "Complaint as to the Assessment of Real Property" with appellee, the Franklin County Board of Revision, seeking to increase the appraised value of the subject property to $8,855,000 to reflect the recent sale price. On July 23, 1981, the board of revision entered its orders valuing the property at $8,854,970.

[219] Upon appeal to the Board of Tax Appeals, appellee submitted an appraisal which determined the value of the property by reducing the sales price to reflect the cash equivalency value of the notes, that is, the price for which the notes could have been sold on the date the property was purchased. The Board of Tax Appeals accepted appellee's appraisal and, by order dated June 17, 1983, found that the fair market value of appellee's property was $7,435,000, determined by adding the cash paid to the cash equivalency value of the notes.

The case is now before the court upon an appeal as of right.

Messrs. Teaford, Rich & Dorsey, Mr. Jeffrey A. Rich and *Mr.*

Matthew T. Fitzsimmons, for appellant.

Schottenstein, Zox & Dunn Co., L.P.A., Mr. Robert H. Schottenstein and *Mr. Daniel J. Kayne,* for appellee Fountain Square Associates, Ltd.

Per Curiam. Appellant argues that the valuation of appellees' property set by the Board of Tax Appeals is unreasonable and unlawful for the reason that it ignores the recent sales price.

R. C. 5713.03 provides, in part:

> "*** In determining the true value of any tract, lot, or parcel of real estate under this section, if such tract, lot, or parcel has been the subject of an arms-length sale between a willing seller and a willing buyer within a reasonable length of time, either before or after the tax lien date, *the auditor shall consider the sale price of such tract, lot, or parcel to be the true value for taxation purposes.***" (Emphasis added.)

We have consistently adhered to the rule that "(t)he best evidence of the 'true value in money' of real property is an actual, recent sale of the property in an arms-length transaction.***" *Conalco v. Bd. of Revision* (1977), 50 Ohio St. 2d 129 [4 O.O. 3d 309], paragraph one of the syllabus. See, also, *Consolidated Aluminum Corp. v. Bd. of Revision* (1981), 66 Ohio St. 2d 410 [20 O.O. 3d 357]; *Meyer v. Bd. of Revision* (1979), 58 Ohio St. 2d 328, 333 [12 O.O. 3d 305].

Appraisals based upon factors other than sales price are appropriate for use in determining value only when no arms-length sale has taken place (*id.* at 333), or where it is shown that the sales price is not reflective of true value (*Consolidated Aluminum Corp. v. Bd. of Revision, supra,* at 414).

The fact that appellee obtained favorable financing does not render the sales price unrepresentative of true value. Thus, it was unreasonable and unlawful for the board to accept appellees' appraisal rather than the recent sales price in valuing the subject property.

Accordingly, the decision of the Board of Tax Appeals is reversed and the valuation as determined by the board of revision is reinstated.

Decision reversed.

CELEBREZZE, C. J., W. BROWN, SWEENEY, LOCHER, HOLMES, C. BROWN and J. P. CELEBREZZE, JJ., concur.