Multifamily Housing: A Review of Theory and Evidence

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Abstract

The growing importance of multifamily housing as a viable choice of residence is evidenced by the number of empirical and theoretical studies in the real estate literature. Researchers have investigated the role of this sector of the real estate market for decades. This survey article examines more than one hundred studies and categorizes them into five groups: economic and market efficiency issues; property valuation and appraisal issues; regulatory, zoning and clustering of multifamily complexes; costs, returns and rental income issues; and demand, vacancy and occupancy issues. This study seeks to provide a concise, categorical presentation of findings on issues related to the environment and performance of multifamily housing.

Introduction

Multifamily housing serves a vital role in the real estate marketplace as one in four households in the United States live in multifamily homes (www.nahb.com, 2002). Many desirable features of multifamily housing as well as changing demographics have exacerbated the popularity of multifamily housing as a housing choice. The busy lifestyles of many Americans who desire freedom from the responsibility of maintenance costs and repair time, the mobility of the workforce and the convenient locations of most multifamily complexes have caused many households to elect multifamily complexes as their residences. The avoidance of property taxes and other homeowner costs is another incentive to seek multifamily housing. The National Association of Home Builders (NAHB) reports that the 26 million multifamily residents in the U.S. are similar in education and work status to all U.S. households, but they typically have fewer children to send to public schools and similarly make smaller demands of the roads and water systems (www.nahb.com, 2002). The decline of married couple households has an obvious impact on residential choice, both in terms of location such as the suburbs and tenure choice (DeLisle, 2001). For example, unmarried households may be more likely to rent rather than to own. The significance of multifamily housing as a viable housing choice is evidenced by the emphasis placed on it in the real estate and economics literature.

The definition of a multifamily house varies by organization. A multifamily home is considered by NAHB as a building containing two or more units (NAHB.com, 2002). The NAHB further estimates that today the average multifamily unit has 1,115 square feet and includes more amenities than in the past. Most new multifamily units (55%) have two or more bathrooms and 68% more have bedrooms than older properties. Congress defines multifamily housing as ''any project with four or more units that includes condominiums, apartments, and single-story'' (www.fairhousing.vipnet.org). This definition is used for legislative and regulatory purposes in enforcing requirements for multifamily design and construction in the Fair Housing Law of 1988. The U.S. Department of Housing and Urban Development HUD) released a study defining a multifamily mortgage as a loan secured by a property with five or more residential units, including cooperatives as well as rental units (Segal and Szymanoski, 1998).

The economic impact of new multifamily construction is far-reaching. The impact affects a myriad of economic sectors from those who excavate and develop the site to those who design, finance and sell the finished complex. NAHB estimates that, in 2000, nearly 331,000 multifamily homes were produced in the U.S., generating 341,000 jobs (defined by worker-years of employment), $12.2 billion in wages and $6.5 billion in federal, state and local taxes (NAHB, 2000). The local economic community is affected positively through development and construction jobs, sales of materials and products needed for construction, and projects providing an incentive for the community of new residents to spend additional money locally. Over a 10-year period for an average city, the typical 100-unit multifamily project generates 582 jobs, $23.2 million in local income, and $3.7 million in local taxes and fees (NAHB, 2000).

Funding for developing multifamily housing projects is of great interest to many real estate and financial industry professionals. The unique involvement of federal organizations such as the Federal Housing Administration (FHA) and HUD appears to be key to the continuous existence of this sector of the real estate industry. More than 800,000 units in approximately 8,500 multifamily projects have been financed with mortgages insured by the FHA and supported by contracts for project-based Section 9 housing assistance payments (Foong, 2002). The Office of Multifamily Housing Assistance Restructuring (OMHAR) is a division of HUD that was set up to administer the Mark-to-Market program. This office works with property owners, administrative organizations, tenants, lenders and others involved in the affordable housing sector (http://170.97.67.13/offices/omhar/index.cfm, 2002).

Fannie Mae is the largest private-sector provider of multifamily financing in the U.S. (www.fanniemae.com/multifamily/index, 2002). The multifamily portfolio of this organization alone is $82 billion, which encompasses all multifamily markets and economic conditions. Fannie Mae provides financing for multifamily properties such as apartment properties, condominiums or cooperatives with five or more individual units through a network of lenders. Their goal is to provide multifamily developers, investors and other for-profit and non-profit sponsors with a reliable source of low-cost funds when financing a multifamily property.

The multifamily housing market is continuously evolving, and an overview of the transformation in this sector is found in Lynford (1994). Laws and subsequent amendments such as the Fair Housing Law of 1988 continue to change the requirements for the financing, designing and building of multifamily homes. This law added specific design and construction guidelines including requiring certain features relating to accessibility of properties (www.fairhousing.vipnet.org, 2002). The 1980s and 1990s have witnessed dramatic shifts in many aspects of the multifamily housing market, specifically the financing of these properties and the role of the U.S. government in the existence of this market. The importance of thrift institutions, which once were the major source of financing for multifamily rental properties, has declined, and commercial banks, Government Sponsored Enterprises (GSEs) and private sources have become the dominant lenders in financing this sector (Schnare, 2001). Other laws and subsequent amendments including the Multifamily Assisted Housing Reform and Affordability Act of 1997 seek to restructure the rents and mortgages of specific FHA-insured loans (Foong, 2002). Section 8 of this Act is noted often in industry literature and pertains to undergoing Mark-to-Market restructuring, a legislative effort to assist in restructuring rents and mortgage debt to enhance cash flow.

With a few localized exceptions, the multifamily housing market continues to remain strong (DeLisle, 2001). Until the early 1990s, a lack of information and data about multifamily properties prevented much research in this area (Follain, 1994). This article serves to provide an overview of the wealth of literature in a manageable and useful format by summarizing and categorizing the findings of studies examining this real estate sector. In the following sections, the literature is reviewed for the following five areas: (1) economic and market efficiency issues; (2) property valuation and appraisal issues; (3) regulatory, clustering and affordable housing issues; (4) returns, ownership costs and rental income issues; and (5) demand, vacancy and occupancy issues. A final section provides a summary of the findings.

Economic and Market Efficiency Issues

Since the early 1970s, the foundation of much research on multifamily housing has been based on economic and market efficiency theory. Summaries of this research as well as studies that examine the impact of both external and exogenous trends on the multifamily housing environment are found in Exhibit 1. Several studies have focused on specific elements of the multifamily housing market; these studies are also reported in Exhibit 1. The literature on the apartment component of the multifamily market is surveyed in a study by Jud, Benjamin and Sirmans (1996). The studies highlighted in this study contribute to an understanding of the multifamily housing market as a whole. The nature of the multifamily housing market and differences in financing options and demand determinants for multifamily housing versus single-family housing have caused many researchers to examine the unique attributes of this segment of the real estate market.

Exhibit 1 | Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
DeLeeuw & Ekanem (1971)	The Supply of Rental Housing	*American Economic Review*, 61, 806–17	Aggregate data from BLS	1967	Finds the elasticity of supply of housing with regard to rent is between 30% and 70%. Projects the elasticity of supply with regard to capital inputs to be between −.2 and −.5. Shows the elasticity of supply with regard to the number of consumer households to be between 1.0 and 1.1.
Grieson (1973)	The Supply of Rental Housing: Comment	*American Economic Review,* 63, 433–36	Data used by DeLeeuw & Ekanem (1971)	1967	Finds the supply of rental housing with respect to housing rents to be between 1.8 and 2.2.
Goetz (1978)	Avoiding Both Disinvestment and Speculation in Private Multifamily Housing	*AREUEA Journal*, 6, 175–85	Two apartment buildings (30 units in each)	1964–1976	Examines how neighborhood may respond to intervening tools such as HUD subsidized loans and FAIR plan insurance. Suggests that neighborhoods combat forces that lead to disinvestments or speculation, rather than accept deterioration and obsolescence as inevitable.
Fredland & MacRae (1979)	FHA Multifamily Financial Failure: A Review of Empirical Studies	*AREUEA Journal*, 7, 95–122	Previous empirical studies	N/A	Examines the effectiveness and obstacles of FHA assistance in rental housing needs of low- and middle-income households through multifamily project mortgage insurance programs. Reviews prior empirical studies that suggest that characteristics of project owners, the quality of project management, the adequacy of HUD screening and similar characteristics impact the financial viability of multifamily housing projects.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
Kawaller (1979)	Macroeconomic Determinants of Multifamily Housing Starts: A Descriptive Analysis	*AREUEA Journal*, 7, 45–62	Descriptive analysis	1979 (pub)	Discusses how specific macroeconomic effects and funding mechanisms such as changing attitudes toward condominiums and cooperatives, expanding federal rental assistance, and changing lifestyle preferences have led to a greater demand for multifamily housing and thus residential construction in this sector.
Rosen (1979)	A Regional Model of Multifamily Housing Starts	*AREUEA Journal*, 7, 63–76	Housing starts	1965–1977	Presents a regional time series model of multifamily housing activity and finds that new housing construction is highly responsive to profit potential, with elasticity between 5 and 14. Further concludes that there is significant variance between regions in terms of parameter estimates.
Stegman (1979)	Multifamily Distress: A Case for National Action	*AREUEA Journal*, 7, 77–94	Renter-occupied dwellings and renter households	1975	Considers financial distress and failure rates in the multifamily environment caused by neighborhood destabilizing effects of partially occupied and vacant buildings and thus lending cutbacks. Examines the attributes of renter households and renter-occupied households as well as FHA and non-FHA insured mortgage insurance. Develops the case for added national concern for lower income and minority housing.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
Rosen (1989)	The Apartment Market: A Changing Demographic and Economic Environment	*Housing Finance Review*, 8, 63–80	U.S. Census, BLS and Annual Housing Survey data	1910–1987	Examines basic factors and demographic characteristics that explain the wide variance in multifamily housing demand across regions and within certain cities. Discusses the impact of full implementation of the 1986 tax structure on the internal rates of returns of the multifamily housing market.
DiPasquale & Cummings (1992)	Financing Multifamily Rental Housing: The Changing Role of Lenders and Investors	*Housing Policy Debate*, 3:1, 77–116	No empirical data	N/A	Discusses the changes in the expanding secondary market for multifamily mortgage loans. Reviews the barriers to accessing capital markets for multifamily rental housing, noting that this market targets low- and moderate-income households. Suggests that drastically improved data collection methods are needed to better evaluate the performance of the multifamily housing mortgage market.
Follain, Hendershott & Ling (1992)	Real Estate Markets Since 1980: What Role Have Tax Changes Played?	*National Tax Journal*, 45, 253–66	No empirical data	N/A	Evaluates the impact of the economy and the Tax Reform Act of 1986 on real estate markets.
DeLeeuw (1993)	A Price Index for New Multifamily Housing	*Survey of Current Business*, 73:2, 33–42	Bureau of Economic Analysis multifamily price index	1978–1989	Uses an index of multifamily housing prices and compares multiple regressions of structure prices with structure characteristics to determine actual prices.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
Follain (1994)	Some Possible Directions for Research on Multifamily Housing	*Housing Policy Debate*, 5:4, 533–68	No empirical data	N/A	Reviews the environment of the multifamily housing mortgage market and notes the dearth of research in this area relative to the single-family housing market. Highlights possible research questions that need to be addressed in the literature.
Lynford (1994)	The Transformation of Multifamily Housing Ownership in the U.S.	*Real Estate Finance*, 10: 4, 38–45	No empirical data	N/A	Provides a synopsis of trends in the general ownership of multifamily housing
Bogdon & Follain (1996)	Multifamily Housing: An Exploratory Analysis Using the 1991 Residential Finance Survey	*Journal of Housing Research*, 7:1, 79–116	Residential Finance Survey and the American Housing Survey	1991	Finds that typically multifamily properties are more likely to be located in neighborhoods with lower than average incomes, but that larger properties tend to be located in somewhat higher income areas than smaller complexes. Rent-to-value ratios vary significantly by property characteristics, ownership type, region, property size, and, to a lesser extent, neighborhood characteristics
Jud, Benjamin, & Sirmans (1996)	What Do We Know About Apartments and Their Markets?	*Journal of Real Estate Research*, 11, 243–57	Housing starts	1959–1994	Provides a thorough overview of the academic literature on the apartment market. Discusses apartments and business cycles and influences on rents.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
Liang, Chatrath & McIntosh (1996)	Apartment REITs and Apartment Real Estate	*Journal of Real Estate Research*, 11, 277–89	REDIT data from NAREIT and CRSP	1992–1993	Uses a "hedged" apartment REIT index to evaluate the performance of apartment real estate in mixed-asset portfolios of stocks, bonds and real estate. Finds that the hedged index captures a large amount of the volatility unique to apartments and does not suffer from the appraisal-smoothing problem and the seasonality of appraisal-based indices. Concludes that, thus, this hedged index should more accurately be used as a proxy for apartment real estate in portfolio allocation decisions.
Rosen (1996)	The Economics of the Apartment Market in the 1990s	*Journal of Real Estate Research*, 11, 215–41	Census data, NAREIF, and various real estate investment data sources	1970–90 1970–96	Examines fundamental and investment demand for rental apartments given demographic and economic trends. Notes that apartments represent one of the few real estate product classes for which demand will likely exceed supply in the 1990s.
Londerville (1998)	A Test of a Buying Rule for "Underpriced" Apartment Buildings	*Real Estate Economics*, 26, 537–53	Apartment building sales in Vancouver, Canada	1971–1985	Tests market efficiency by using repeat sales data and examining whether properties sell above or below a projected property value. Finds the "undervalued" properties have higher capital returns, but after adjusting for risk, the differences in returns are not significant. Suggests a method for comparing the performance of real estate portfolios on a risk-adjusted basis.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
Segal & Szymanoski (1998)	Fannie Mae, Freddie Mac, and the Multifamily Mortgage Market	*Cityscape: A Journal of Policy Development and Research*, 4, 59–91	HUD Analysis of GSE loan-level data	Through 1996	Discusses the role that the two primary government sponsored enterprises (GSEs) play in the mortgage markets of multifamily housing. Examines the extent to which GSEs have attempted to address credit gaps in the demand for mortgage credit.
Galster, Tatian & Wilson (1999)	Measures for the Financial Condition of the Multifamily Stock	*Housing Policy Debate*, 19, 59–73	U.S. Bureau of Census Residential Finance Survey	1991	Survey the use of five ratios for evaluating the financial condition of multifamily housing stock: loan-to-value, debt coverage, rent-to-value, net operating income-to-value and vacancy loss ratios. finds that different correlation methodologies reporting these measures independently do not conclusively describe the performance of multifamily housing projects and single-dimensional measures of financial condition should not be used exclusively.
Lee, Myers & Park (2000)	An Econometric Model of Homeownership: Single-family and Multifamily Housing Option	*Environment and Planning*, 32, 1959–76	Housing and demographic data from census	1980, 1990	Finds that, while the investment potential for multifamily housing was basically equal to that of single-family housing in 1980, the multifamily units lost their potential in 1990, primarily because of the decline of investment in multifamily housing in the1980s. Finds that individual households choose multifamily housing when housing prices are high and when they cannot afford high-value housing.

Exhibit 1 | (continued)

Economic and Market Efficiency Issues

Paper	Title	Citation	Data	Years	Findings
DeLisle (2001)	Real Estate Capital Markets: Transitional Economic Turmoil Amidst Demographic Change	*Appraisal Journal,* 69:4, 365–79	No empirical data	N/A	Provides a review of the economic and demographic environment in which multifamily housing and other real estate capital markets operate. Discusses how real estate markets must adapt to such factors as changes in economic growth, changes in employment levels, interest and inflation rates, demographic profiles and consumer confidence.
Malpezzi, Shilling & Yang (2001)	The Stock of Private Real Estate Capital in U.S. Metropolitan Areas	*Journal of Real Estate Research*, 22, 243–70	Stock of private real estate in 242 MSAs	1982–1994	Describes and suggests determinants and models to estimate the stock of private real estate capital and separate data into three series: (1) total private real estate capital (residential and nonresidential); (2) private single-family residential capital; and (3) private income property capital (multifamily housing plus nonresidential real estate, or (1) minus (2).
Foong (2002)	OMHAR Gradually Irons Out Wrinkles, Gains Momentum	*Multi-Housing News*, 37:1, 1–2	No empirical data	N/A	Discusses the role of the Office of Multifamily Housing Assistance Restructuring (OMHAR) and the continuation of market-to-market restructuring.

Rosen (1996) surveys the fundamental and investment demand for rental apartments given demographic and economic trends. Using U.S. Census Bureau data, the author notes that demographic and economic factors such as the tendency of younger consumers to move as well as the high cost of home ownership in many regions of the U.S. fuel the overall demand for multifamily housing. When demand exceeds supply as it did in the 1990s, there will be substantial increases in real rents and investment values in specific apartment markets. Bogdon and Follain (1996) further explore the multifamily housing market by comparing data from the 1991 Residential Finance Survey (RFS) with data from the American Housing Survey. These authors find that multifamily complexes are disproportionately located in low-income neighborhoods and that larger complexes are typically built in slightly higher income tracts than where smaller complexes are built. The RFS data also indicate the rent-to-value ratios vary greatly by region in the U.S., ownership type and property size.

Two of the earliest studies addressing the multifamily component of residential construction are published in the *American Economic Review*. These studies address the supply of rental housing (DeLeeuw and Ekanem, 1971; and Grieson, 1973). Housing supply has often been thought to be elastic with regard to price. This fact implies that an increase in the demand for housing is not likely to result in an increase in housing prices. This elasticity is tested using BLS data by DeLeeuw and Ekanem, Grieson, and later by Rosen (1979). These studies report varying degrees of elasticity. DeLeeuw and Ekanem find that elasticities with regard to rent are less than perfect, and between 30% and 70%. Grieson finds the elasticities to be much higher and projects them to range between 1.8 and 2.2. Rosen introduces a regional time series model based on a profit-maximizing motive of the investor using housing starts for four Census regions and the U.S. as a whole for 1965–1977. While results vary somewhat by region and the number of variables included, Rosen finds that new housing construction is highly elastic with profit potential, with the elasticities falling between 5 and 14.

Lee, Myers and Park (2000) consider the distinction between the single-family and multifamily residential markets and examine the utility of the multifamily housing sector with models of household tenure choices. They find that although the investment potential for multifamily housing was almost the same as that for single-family housing in 1980, multifamily complexes lost their investment potential in that decade. Thus, individual households select multifamily housing as a shelter in a market in which prices are rising.

Market efficiency and the impact of the sale of undervalued buildings are tested in a study using apartment building repeat-sales data (Londerville, 1998). This study examines whether a property sold for a price above or below a computed property value and finds the ''undervalued'' properties have higher capital returns. After adjusting for risk, however, the differences in returns are not significant. This study suggests a method for comparing the performance of real estate portfolios on a risk-adjusted basis. Other methods of multifamily housing stock analysis are discussed by Galster, Tatian and Wilson (1999). Examining the

strength of the multifamily industry and accurate ratios to use in measuring the condition of multifamily stock is the focus of this study. Five specific financial ratios are examined individually as measures of financial condition. Findings indicate that none of the five measures independently is a sufficient performance measure and that a single-dimensional measure should not be used in isolation.

Price indices and feasibility are underlying foci of several studies. A price index for evaluating new multifamily housing structures is examined by DeLeeuw (1993). This study compares multiple regressions of multifamily complex prices with characteristics of the complex to estimate actual prices. Liang, Chatrath and McIntosh (1996) find that the hedged index captures a large amount of the volatility unique to apartments and does not suffer from the appraisal-smoothing problem and the seasonality of appraisal-based indices. A hedged index should be used as a proxy for apartment real estate in portfolio allocation decisions.

A common area in economic literature is the efficiency and impact of both microeconomic and macroeconomic influences on the multifamily housing markets. An early study by Kawaller (1979) examines the impact of macroeconomic determinants such as a growing acceptance of condominiums and cooperative housing choices, expanding federal rental assistance and changing lifestyle preferences on multifamily housing starts. Later, Rosen (1989) examines the changing demographic demand for apartments as well as the changing economic environment that influences the apartment market. Using U.S. Census data, he also forecasts future activity and occupancy levels in this sector.

Unique financing opportunities available to multifamily housing provide another interesting area of exploration. The performance of two principle government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, is examined by Segal and Szymanoski (1998). This study discusses the role that these agencies play in the mortgage markets of multifamily housing and specifically examines the extent to which they have been successful in filling credit gaps in the demand for mortgage credit. Fredland and MacRae (1979) provide a thorough review of the earlier literature on factors that impede the financial viability of FHA multifamily housing projects. This study notes that many FHA mortgage insurance programs geared toward low- and middle-income households are hindered by such factors as the characteristics of project owners, the quality of project management, the adequacy of HUD screening, project construction and project location. Stegman (1979) examines FHA versus non-FHA insured mortgages and building and tenant characteristics to explain failing rental projects.

Another area of interest deals with the impact of intervening forces such as urban renewal, FHA mortgages and HUD subsidized loans. Goetz (1978) compares financial data on two ownership scenarios and focuses on how property owners and neighborhoods may address these intervening tools to strengthen and stabilize the neighborhood rather than accepting continual deterioration. The role that tax changes have played in the multifamily housing market is examined by Follain, Hendershott and Ling (1992). This study specifically examines the impact of the

Tax Reform Act of 1986 (TRA 96) and other externalities such as a fall in inflation and a rise in interest rates. Smith and Woodard (1996) also examine the effect of TRA 86 on apartment values and find that after controlling for general national economic conditions and regional effects, this Act had a negative impact on apartment values. This impact was more robust in regions with slow economic growth as these areas incurred the high vacancy rates, while areas with strong economic growth and low vacancy rates were not affected.

In summary, some of the common results obtained in examining general economic and multifamily market efficiency issues are:

- The basic demand for multifamily housing is highly contingent on demographic and economic trends;
- The supply of multifamily housing is elastic with regard to rent, capital inputs and profit potential;
- Tenure choice in multifamily housing is often based on an effort to circumvent a market downturn;
- Unique participants in the multifamily housing market, such as the FHA and HUD, which offer mortgage credits and mortgage insurance, contribute to the viability of the multifamily housing market;
- Macroeconomic variables as well as factors such as lifestyle preferences and neighborhood effects are useful in estimating future demand for multifamily housing;
- There is no consensus on the correct price index to use when evaluating the feasibility of multifamily housing structures; and
- The vitality of multifamily housing markets is continuously influenced by changes in tax laws and other regulatory mandates.

Property Valuation and Appraisal Issues

Research on multifamily property valuation and appraisal is reported in Exhibit 2. An overview of the evolution of appraisal reform and regulation in the U.S. is published in the *Appraisal Journal* (Seas, 1994). This study discusses the impact that regulation has had on the appraisal industry.

Recognizing the importance of apartment valuation to appraisers, investors, tax assessors and other real estate professionals, many academic studies seek to identify determinants of multifamily property values. Chinloy (1996) focuses on the cyclicality of real estate markets. Noting how cycles affect output and absorption of units, which in turn influence prices and rents of new and existing properties, he finds that cycles are characterized by upside and downside lengths of three years. Two studies by Hutchinson (1990, 1991) examine whether it is correct to calculate elasticities of substitution using the three input variables (land, labor and materials) aggregately. He finds that the value of the multifamily housing structure should not be aggregated with the input for land. Specifically he notes

Exhibit 2 | Property Valuation and Appraisal Issues

Paper	Title	Citation	Data	Years	Findings
Bible & Grablowsky (1984)	Restorative Zoning Effects on the Valuation of Multi-family Income Property	*Real Estate Appraiser and Analyst*, 51:2, 32–6	Multifamily residential sales in Norfolk, VA	1970–1980	Finds that multifamily housing complexes located within restorative zoning neighborhoods increase in value at a higher rate than comparable complexes in neighborhoods that are not subject to restorative zoning codes.
Smith (1985)	Rental Apartment Valuation: The Applicability of Rules of Thumb	*Appraisal Journal*, 53, 541–52	No empirical data	N/A	Acknowledging that discounted cash flow analysis is the theoretically correct method for valuing income-producing real estate, examines other techniques such as the overall capitalization rate, the gross income multiplier, and basic capital budgeting methods.
Hutchinson (1990)	Input Substitutability in Multifamily Housing Construction	*Regional Science and Urban Economics*, 20, 111–24	BLS data of 78 "randomly chosen" multifamily housing projects	1970–1971	Derives a translog cost function using three inputs (land, labor and material) to estimate elasticities of substitution. Finds that material and labor (not significantly) are inelastically substituted for land and that material and labor are elastically substituted for each other. Finds that land for material and land for labor elasticities of substitution are sufficiently similar, assuming standard errors, to accept the theory of an aggregation index for structural inputs.

Exhibit 2 | (continued)

Property Valuation and Appraisal Issues

Paper	Title	Citation	Data	Years	Findings
Hutchinson (1991)	A Note on Input Separability in Multifamily Housing	*Journal of Housing Economics,* 1, 384–94	Construction data on 78 multifamily units	1970–1971	Tests for the separation of labor and material inputs from land in the construction of new multifamily projects. Finds that results do not support the aggregation of housing inputs into a structures input separate from the land.
Graham & Bible (1992)	Classifications for Commercial Real Estate	*Appraisal Journal,* 60, 237–46	Apartments and commercial properties in Shreveport, LA	1991	Presents a useful method for systematic classification of apartments, office buildings, retail centers and warehouse buildings. Finds that these classifications are sensitive to local market conditions and may be applied by appraisers and other real estate professionals across all regions in the U.S.
Seas (1994)	Evolution of Appraisal Reform and Regulation in the U.S.	*Appraisal Journal,* 62:1, 26–46	No empirical data	N/A	Noting the increase in appraisal regulation over the past several years, provides a brief chronology of the appraisal profession and significant regulation in the U.S. since the 1930s.
Nahas (1994)	Appraising Affordable Multifamily Housing	*Appraisal Journal,* 62, 455–64	No empirical data	N/A	Examines the differences in appraising affordable multifamily housing versus traditional market-rate properties. Concludes that differences in features such as ownership, revenue, expenses, fees and taxes should be reflected in the appraisal report.

Exhibit 2 | (continued)

Property Valuation and Appraisal Issues

Paper	Title	Citation	Data	Years	Findings
Outhred (1995)	Reserves for Replacement in Apartment Properties	*Appraisal Journal,* 63, 69–80	Hypothetical cash flow analysis	N/A	Examines considerations in allowing for reserves for replacement in appraising apartment properties. Develops a model for estimating appropriate replacement reserves for apartment unit interior items.
Asabere & Huffman (1996)	Thoroughfares and Apartment Values	*Journal of Real Estate Research*, 12, 9–16	Apartment sales transactions in Philadelphia, PA	1980–1991	Examines whether major transportation arteries such as turnpikes, thoroughfares, and commuter rails have influenced apartment values. Finds that apartment values decline by approximately 2.2% and 3.8% per block from the major thoroughfares, although distance to the central business district has the dominant influence,
Hardin & Wolverton (1996)	The Relationship Between Foreclosure Status and Apartment Price	*Journal of Real Estate Research*, 12, 101–09	Apartment sales in Phoenix, AZ	1993–1994	Finds that foreclosed apartments sell at a 22% discount when compared to non-foreclosure apartment sales.
Smith & Woodward (1996)	The Effect of the Tax Reform Act of 1986 and Regional Economies on Apartment Values	*Journal of Real Estate Research*, 11, 259–75	Apartment values from NCREIF and Frank Russell Co.	1980–1992	Examines the effects of the Tax Reform Act of 1986 on apartment values and finds that, after controlling for general national economic conditions and regional effects, this act had a negative impact on apartment values. Finds that the effect was strongest in regions with slow economic growth, as these areas incurred the high vacancy rates while areas with strong economic growth and low vacancy rates were not affected.

Exhibit 2 | (continued)

Property Valuation and Appraisal Issues

Paper	Title	Citation	Data	Years	Findings
Allen (1997)	Measuring the Effects of "Adults Only" Age Restrictions on Condominium Prices	*Journal of Real Estate Research*, 14, 339–46	Condominium sales transactions in Broward County, FL	1995–1996	Examines whether restrictions against younger residents, children and pregnant women have a significant effect on housing prices finds age restrictions have a positive effect on the price of condominiums.
Goodman & Scott (1997)	Rating the Quality of Multifamily Housing	*Real Estate Finance*, 14:2, 38–48	Interviews with apartment executives and apartment characteristics	Pre-1950–1993	Differentiates between "Class A" and "Class B" apartment properties, suggesting the quality of apartment characteristics and amenities. Finds that market participants, such as investors buying or selling, consider many of the same factors in rating apartments, but are not consistent in assigning weights to each factor.
Diaz & Wolverton (1998)	A Longitudinal Examination of the Appraisal Smoothing Hypotheses	*Real Estate Economics*, 26, 349–58	Survey of appraisers from Atlanta valuing a hypothetical apartment in Phoenix	1995–1996	Examines whether real estate appraisers routinely and unknowingly "smooth" appraisals by being influenced by their own previous value estimates by asking one group of appraisers to update their original appraisals given certain market and property changes and a second group of appraisers to make an original appraisal given those market conditions. Finds there is some smoothing taking place in appraisals as insufficient adjustments were made to previous appraisals by the group appraising the properties twice.

Exhibit 2 | (continued)

Property Valuation and Appraisal Issues

Paper	Title	Citation	Data	Years	Findings
Hoyt & Aalberts (1998)	Implications for Appraisers in Multifamily Housing for the Disabled	*Appraisal Journal*, 66, 282–89	No empirical data	N/A	Examines the effect of the 1988 Fair Housing Act amendment, which prohibits discriminatory housing practices against a handicapped person, on the value and ownership of covered multifamily dwellings.
Lai & Wang (1998)	Appraisal Smoothing: The Other Side of the Story	*Real Estate Economics*, 26, 511–35	Theoretical	N/A	Suggests that the widely accepted theory of appraisal-smoothing practice is limited and shows that the use of appraisal-based data can result in a higher (not lower) variance than that of actual returns.
Chau, Ma & Ho (2001)	The Pricing of "Luckiness" in the Apartment Market	*Journal of Real Estate Literature*, 9, 31–40	Apartment sales transactions in Hong Kong	1994–1996	Finds that apartments with lucky floor numbers (*e.g.*, some cultures believe there is luck associated with the number 8) are sold at a significantly higher price during property booms than during price slumps.
Frew & Jud (2003)	Estimating the Value of Apartment Buildings	*Journal of Real Estate Research*, 25:1, 77–86	129 apartments properties sold in Portland, OR	1996–1999	Using hedonic modeling techniques, finds that apartment values decline with increasing distance from the city center. Finds that apartment values rise less than proportionally to increases in project size and numbers of units. Also finds that apartment values decline with project age, but the marginal effect of project aging is minimal. In addition, it finds that neighborhood effects on apartment value are mixed; values fall with increasing economic activity in the neighborhood and rise with resident income, but results are not significant at reasonable probability levels.

that material and labor (although not significantly) are inelastically substituted for land and that material and labor are elastically substituted for each other. However, elasticities of substitution are sufficiently close when substituting land for material and land for labor, and thus an aggregation index for these structural inputs may be correct.

Frew and Jud (2003) develop a hedonic modeling approach to estimating the value of apartments. Using data from apartments in Portland, Oregon, they find that apartment values decrease with increasing distance from a city center. Although results are not significant at reasonable probability levels, they also note that apartment values decline marginally with a project's age. However, values decline when there is more economic activity in the neighborhood and rise as income levels rise. Proximity to thoroughfares was similarly examined (Asabere and Huffman, 1996). This study examines whether major transportation arteries such as turnpikes, thoroughfares and commuter rails have influenced apartment values. Results indicate that although distance to the central business district (CBD) has the dominant effect, distance from major thoroughfares cause apartment values to decline by approximately 2.2% and 3.8% per city block.

Another article finds that the age of the apartment shows a negative influence on apartment rent, while a swimming pool and/or a fireplace results in a higher rent (Bible and Hsieh, 1996). This study incorporates regional variables generated by the Geographic Information System (GIS) into the analysis of the cross-sectional variations of apartment rents. They further conclude that the size of apartment is also negatively related to rents, indicating economies of scale of apartment operations. Bogdon and Ling (1998), however, find that smaller properties have lower rent-to-value and net operating income-to-value ratios and are less likely to be profitable than larger properties.

An interesting study tests whether location within restorative zoning neighborhoods influences values. Bible and Grablowsky (1984) examine multifamily property sales and find an increase in value at a significantly higher annual rate than multifamily properties located in neighborhoods that are not subject to special restorative zoning codes. The effect of foreclosure status on apartment prices is addressed by Hardin and Wolverton (1996). This study finds that foreclosed apartments sell at a 22% discount when compared to non-foreclosure apartment sales.

Tenant age restrictions were also examined in another study to see whether restrictions against younger residents, children and pregnant women have a significant effect on housing prices (Allen, 1997). This study finds age restrictions have a positive effect on the price of condominiums.

A useful base approach for appraising multifamily housing as well as other income-producing properties is developed by Graham and Bible (1992). The approach devised in this study classifies apartments, office buildings, retail centers and warehouse buildings and is sensitive to local market conditions. Smith (1985)

earlier elaborated on the use of rules of thumb such as the gross income multiplier, the overall capitalization rate and the cash-on-cash return in appraising multifamily properties. He questions the use of these standards in spite of the widespread acceptance of the discounted cash flow method for appraising income-producing real estate. Quality ratings for appraising multifamily properties are suggested by Goodman and Scott (1997).

Classifications for evaluating multifamily properties are suggested in two studies. Ratings are based on such property traits as age, size, architecture, location, and structural and utilities defects. Weights for valuation used in the sales comparison approach are tested and suggested by Bernes and Mitchell (1990). While gross income alone is the dominant predictor of a multifamily property's selling price, significance is found for other income-related variables, including the gross rent multiplier, effective gross income multiplier and net operating income. Malpezzi, Shilling and Yang (2001) examine the stock of private real estate capital and separate data into three series: (1) total private real estate capital (both residential and nonresidential); (2) private single-family residential capital; and (3) private income property capital [multifamily housing plus nonresidential real estate, or (1) minus (2)].

The appraisal of specific types of real estate is also addressed in research. For example, Hoyt and Aalberts (1998) investigate factors and regulatory compliance issues that should be addressed when valuing housing for the disabled. This study investigates how to incorporate the Fair Housing Amendment Act of 1988 (part of the Civil Rights Act of 1968) into appraising multifamily housing. Another study finds that appraisers should recognize that some investors place value on apartments with lucky floor numbers that are sold at a significantly higher price during property booms than during property slumps (Chau, Ma and Ho, 2001). Appraising affordable multifamily housing also requires an understanding and application of specialized assumptions. Nahas (1994) notes that appraisers should recognize the differences between an affordable housing development and a standard market-rate project and incorporate these differences when preparing an appraisal.

One study notes that the appraisal of rental apartment properties is relatively straightforward except in the area of reserves for replacement (Outhred, 1995). The nature and treatment of reserves varies on owners' financial statements and across different investors of the same market. The well-known appraisal-smoothing hypothesis is the focus of a study by Diaz and Wolverton (1998), who find that professional appraisers fail to adjust appraisals from prior appraisals of the same properties. Lai and Wang (1998) also focus on the appraisal-smoothing practice and show that the use of appraisal-based data can result in a higher (not lower) variance than that of actual returns.

In summary, research on property valuation and appraisal offers these findings:

- Determinants of multifamily property values are widespread, including factors such as age of the complex, distance from a city center, economic activity, tenant restrictions and complex amenities;

- More clearly defined classifications and ratings are needed in the appraisal process for multifamily housing properties;
- The use of rules of thumb in appraisals of multifamily properties may not always result in a correct evaluation of the property;
- The appraisal-smoothing process may results in the placement of inflated values on multifamily properties;
- The distinctive nature of the multifamily industry or specific types of properties needs to be considered when appraising this income-producing property sector; and
- Compliance issues unique to the multifamily housing sector should be incorporated into the appraisal of multifamily housing properties.

Regulatory, Clustering and Affordable Housing Issues

Numerous studies address a variety of multifamily housing regulatory issues such as rent control, zoning restrictions on clustering and affordable housing issues. These studies are summarized in Exhibit 3. These studies often focus on the effects of clustering of multifamily housing and affordable housing topics. Several studies focus on how multifamily homes are affected by specific pieces of federal legislation, rent controls or local zone-related mandates. A history of the rationale behind much of the regulatory efforts since the 1890s is presented by Baar (1992). Interestingly, much of the thinking in the early days of apartments was that multifamily housing was an ''evil'' and thus zoning mandates to curb apartment development were necessary. This practice and ideology have been challenged as permissible under in the Constitution.

Financing multifamily housing and the changing role of lenders and investors are examined in several studies. A study by DiPasquale and Cummings (1992) was among the first to point out the need for better data collection to more closely assess the performance of multifamily investments, specifically the secondary market for multifamily mortgages. Follain (1994) also highlighted the need for research into the multifamily mortgage arena as he noted that research in this sector has been quite limited relative to studies on the financing of single-family housing. The federal government's role in funding multifamily mortgages is examined by Follain and Szymanoski (1995). This study examines the framework for examining the feasibility, efficiency and need for government involvement in financing this complex and dynamic real estate sector. This study notes that the cyclical nature of the multifamily housing mortgage market and the savings and loan crisis are partially responsible for the decline of the multifamily mortgage originations of the 1980s and 1990s. Advantages and disadvantages of federal government involvement in this market are discussed in this study. Factors supporting government intervention include complex processes for structuring financing packages for multifamily housing and the lack of competitive investment return to owners. Merging of dynamic capital markets is making the need for government involvement in specific mortgage markets less necessary.

Exhibit 3 | Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Kiefer (1980)	Housing Deterioration, Housing Codes, and Rent Control	*Urban Studies*, 17, 53–62	Theoretical model	N/A	Develops an optimal control model of the housing life cycle and includes housing codes and rent control. Finds that both rent control and housing codes have undesirable effects on the rate of housing deterioration.
Marks (1984)	The Effect of Rent Control on the Price of Rental Housing: An Hedonic Approach	*Land Economics*, 60, 81–94	3,885 apartments in the city of Vancouver	1978	Uses a hedonic index to estimate the effect of rent controls on the marginal value of apartment units. Finds that rent controls lower implicit prices even though rent controls are intended to allow fair returns to owners.
Linneman (1987)	The Effect of Rent Control on the Distribution of Income among New York City Renters	*Journal of Urban Economics*, 22, 14–34	New York City Housing and Vacancy Survey	1984	Provides an overview of the history of New York City's "temporary" rent controls, which began during World War II. Finds that the only significant rent subsidies occurred in the old style rent control sector, while the housing sector subject to the new style of rent control appears to generate no equalizing subsidies.
Moorhouse (1987)	Long-Term Rent Control and Tenant Subsidies	*Quarterly Review of Economics and Business*, 27:3, 6–26	Data on 11,075 rental units in New York City Housing and Vacancy Survey	1968	Finds that implicit tenant subsidies continued to be present 25 years after the implementation of rent control, and the magnitude of the subsidies varies significantly across neighborhoods. Finds that tenant subsidies are slightly negated by reductions in maintenance and housing quality and a requirement to include furniture in the lease.

Exhibit 3 | (continued)

Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Wolkoff (1990)	Property Rights to Rent Regulated Apartments: A Path Towards Decontrol	*Journal of Policy Analysis and Management*, 9, 260–65	No empirical data	N/A	Suggests a solution for decontrolling the rental housing market by creating negotiable occupancy rights of tenants that can be sold to owners of rent-regulated apartment buildings.
Hyde (1991)	Multifamily Communities, Multiple Approaches	*BioCycle*, 1991, 32:8, 50–4	Recycling collection rates	1989	Finds that multifamily communities are not similar to single-family communities in curbside recycling programs and practices. Reviews several recycling programs around the U.S. and finds that strict recycling laws do not ensure successful recycling.
Murray, Rydell, Barnett, Hillestad & Neels (1991)	Analyzing Rent Control: The Case of Los Angeles	*Economic Inquiry*, 29, 601–25	Los Angeles rent control ordinances and housing market	1983–1990	Finds that most of the transfers from landlords to tenants are realized early after an ordinance is passed, although most of the economic cost of rent control is incurred later. Also finds that ordinance features that focus on increasing landlords' incentives to maintain rent-controlled buildings significantly reduce the size of the transfers to tenants.
Baar (1992)	The National Movement to Halt the Spread of Multifamily Housing, 1890–1926	*Journal of the American Planning Association, 1992*, 58, 39–48	1890 Census data	1890–1926	Examines the history and early views on apartments, highlighting early ideology that multifamily housing was an "evil" cites rulings and motives for early zoning restrictions.

Exhibit 3 | (continued)
Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Thies (1993)	Rent Control with Rationing by Search Costs: A Note	*Journal of Real Estate Finance and Economics*, 7:2, 159–65	Theoretical	N/A	Develops a model to analyze the effects of rent control in the long run considering a spillover into the non-controlled apartment sector and implicit rationing of apartments via search costs in the controlled sector.
Truth (1993)	Effective Solutions to Multihousing Collection	*BioCycle*, 1993, 34:8, 46–9	No empirical data	N/A	Concludes that by allowing collection of recycling materials to the private sector, multihousing recycling in a large, diverse area may be implemented without excessive costs.
Benjamin & Sirmans (1994)	Apartment Rent: Rent Control and Other Determinants	*Journal of Property Research*, 11, 27–50	Prior empirical studies on rental markets	1972–1992	Examines the literature on factors including rent control and physical attributes that influence apartment rents. Categorizes the studies for rent-controlled markets and non-controlled markets. Finds that tenants tend to favor rent control while landlords oppose it. Finds that rent controls may benefit renters only in the short run but may hurt them in the long run, as controls make the rental markets less efficient.

Exhibit 3 | (continued)

Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Follain & Szymanoski (1995)	A Framework for Evaluating Government's Evolving Role in Multifamily Mortgage Markets	*Cityscape: A Journal of Policy Development and Research*, 1:2, 151–77	No empirical data	N/A	Discusses the feasibility and effectiveness of the federal government's involvement in the market for debt-financed multifamily housing. Notes that dynamic mortgage markets and their integration into traditional capital markets tend to weaken the need for government intervention. Finds that the responsibility to provide affordable low-income multifamily housing, which is an increasingly complex market, would fall on private or non-profit organizations if there were no government intervention.
Benjamin, Chinloy & Sirmans (2000)	Housing Vouchers, Tenant Quality and Apartment Values	*Journal of Real Estate Finance and Economics*, 20, 37–48	Rental and advertising practices to subsidized apartment tenants in Washington, DC	1992	Tests whether advertising and renting to subsidized tenants results in a number of problems for a landlord, such as a reduction in overall tenant quality and higher operating costs. Finds that landlords renting to subsidized tenants have more frequent periodic site inspections that increase capital costs and that having subsidized tenants tends to lower the average quality of the resident mix.
Haspel (2000)	HUD Mark-to-Market Restructuring	*The CPA Journal*, 70:3, 46–53	No empirical data	N/A	Examines the impact of the 1997 federal Multifamily Assisted Housing Reform and Affordability Act, which addresses the escalating costs of subsidizing project-based tenant rental assistance.

Exhibit 3 | (continued)
Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Moudon & Hess (2000)	Suburban Clusters; The Nucleation of Multifamily Housing in Suburban Areas of the Central Puget Sound	*Journal of the American Planning Association*, 2000, 66, 243–64	Suburban clusters in central Puget Sound, WA	1990s	Discusses the impact of having almost 20% of the suburban population in central Puget Sound living in 85 small clusters. Finds that these clusters are in areas of medium-density residential development and very close to retail and offices uses, and defy the traditional image of suburban housing as being decentralized, with low-density single-family tracts segregated from other land uses. Also finds that identifying these clusters provides useful information and opportunities for housing and transportation policy in suburban areas.
Carroll (2001)	Connecticut Retrenches: A Proposal to Save the Affordable Housing Appeals Procedure	*Yale Law Journal* 110, 1247–86	No empirical data	N/A	Reviews the success of the Connecticut Affordable Housing Appeals Procedure Act, which was effective October 1, 2000. Finds that this act was designed to promote the construction of housing for low- and moderate-income families by providing developers the option of judicial review of denials of applications to develop affordable housing, but has been unsuccessful because of several problems discussed. Also finds that a key problem arises when developers are allowed to build multifamily housing at reasonably high densities as in set-aside developments-the finished product is often cheaper housing.

Exhibit 3 | (continued)
Regulatory, Clustering and Affordable Housing Issues

Paper	Title	Citation	Data	Years	Findings
Netzer, Schill & Susin (2001)	Changing Water and Sewer Finance; Distributional Impacts and Effects on the Viability of Affordable Housing	*Journal of the American Planning Association*, 2001, 67, 420–36	Water consumption data in New York City	1998	Shows that the change to usage-based water and sewer charges impacts multifamily housing. Finds that universal metering would result in large increases in water and sewer charges for multifamily housing in low-income areas and might jeopardize the viability of affordable housing.

Highly debated rent controls have been in existence in many areas for decades. Opening with a quote from former New York City Mayor Ed Koch, one study highlights an example of someone advocating rent control (Moorhouse, 1987). This study reports that Koch vowed to keep his apartment that was affected by rent controls, because even though he paid the highest rental in the building, it was still a bargain. Rent controls in several cities have also been examined (Linneman, 1987; and Murray, Rydell, Barnett, Hillstad and Neels, 1991). Murray et al. analyze rent controls in Los Angeles and conclude that the economic costs and transfer benefits do not materialize at the same time. Linneman further examines rent controls and notes that there are relatively few new rental subsidy transfers and these go only to the relatively old and poor tenants.

Thies (1993) finds that rent controls in essence involve transfers from one tenant to another and provide dead-weight losses due to higher search costs borne by tenants. A key to his analysis is the condition that rent plus the cost for searching for a rent-controlled apartment should equal rent in the non-controlled sector. Wolkoff (1990) proposed turning occupancy rights of tenants into property rights that can be sold to building owners. If an apartment is occupied, no one will be selling it, and thus tenants are protected. Tenant turnover may be exacerbated with the enforcement of rent controls, and thus housing deterioration may ensue (Kiefer, 1980). This study develops an optimal control model of the housing life cycle and incorporates housing codes and rent control into the analysis. The effects of rent control are examined in another study that concludes rent controls lower implicit prices even though they are intended to allow fair returns to owners (Marks, 1984).

One very useful article in this area reviews the empirical research on how rent controls as well as how various physical attributes, amenities and services affect apartment rents (Benjamin and Sirmans, 1994). This study examines and summarizes more than forty empirical studies in these areas and displays results in a format that facilitates comparison. The nature of rent controls is discussed, noting that tenants approve of controls although the benefits tenants derive are only short-lived. Landlords, however, do not condone rent controls that, in the long run, make rental markets inefficient.

Affordable housing is the common focus of many studies on multifamily housing. One study examines a proposal to revamp affordable housing appeals procedures in Connecticut (Carroll, 2001). This study examines a 2000 amendment and describes how a problem arises when developers are allowed to build multifamily properties at reasonably high densities in set-aside developments, the finished product is often cheaper housing. Further examination of clustering is provided in several other studies. Moudon and Hess (2000) examine the clustering of multifamily housing in the suburban areas of central Puget Sound. They find that identical suburb functions are both densifying and lead to the formation of nuclei that are distributed throughout this region. Netzer, Schill and Susin (2001) report

a trend in usage-based charges for water and sewer services in the U.S. Traditionally, in areas such as New York City, residents did not pay usage-based charges.

HUD regulations are the focus of a study by Haspel (2000). This study examines the impact of the 1997 Multifamily Assisted Housing Reform and Affordability Act, which addresses the escalating costs of subsidizing project-based tenant rental assistance.

Housing vouchers and tenant quality are further addressed by Benjamin, Chinloy and Sirmans (2000). This study notes the unique concerns that landlords face when renting to subsidized tenants. The authors examined data from apartments in Washington, D.C., and found that accepting subsidized tenants increases revenues, but advertising for them lowers revenues. Ultimately, more aggressively seeking subsidized tenants leads to a crowding out risk that supercedes the risk of having lower rental income from nonsubsidized tenants.

Multifamily housing recycling initiatives have been tested in some areas and have been a relatively cost-efficient conduit for recycling (Hyde, 1991; and Truth, 1993). These studies report that recycling efforts at apartments in St. Paul, Santa Monica, New York, Seattle, Philadelphia and Hennepin County, Minnesota, have successfully taken advantage of the differences in multifamily housing and single-family housing with regard to recycling. Truth points out that some inherent differences between recycling at these two types of properties include the fact that multifamily complexes are larger in size, meaning curbside bins are not an option, and owners typically contract privately for garbage collection. Thus, multifamily housing properties are good candidates for implementing this type of environmental conservation.

The findings regarding regulatory issues of multifamily housing that are addressed in the literature could be summarized as:

- Multifamily housing traditionally was considered by many people to be ‘‘an evil’’;
- The role of the federal government in enhancing multifamily mortgage markets has changed considerably since the 1980s;
- Local zoning today often still addresses historical fears of multifamily housing;
- Tenants may feel as if they are getting a bargain on units under rent controls, but the timing of the costs versus benefits and the resulting market inefficiencies and turnovers may negate any advantages;
- Housing vouchers and the quality of multifamily tenants may result in more risk to the owner or investors of multifamily housing properties; and
- Recycling initiatives may be more easily accomplished on multifamily housing properties.

Returns, Ownership Costs and Rental Income Issues

Studies that focus on rents, costs and returns to multifamily housing owners are examined and reported in Exhibit 4. A previous literature review examines some of the earliest literature in this area (Sirmans and Benjamin, 1991). Aggregate performance data on multifamily rental housing have not been available as long as those for single-family housing. It is believed that this lack of information has increased the cost of debt and equity capital available to apartment housing and subsequently resulted in higher rents for apartment residents (Bogdon, Follain, Goodman, Manson and Brady, 1999). This study describes a new database and offers research applications for these data not previously available.

An early study in the *Journal of Finance* compares the investment performance of common stocks and apartment houses (Wendt and Wong, 1965). This study notes that after-tax returns may be the most significant criteria for evaluating the performance of these properties and further finds wide variations in returns. This study emphasized the need to examine specific properties and features when measuring the returns of apartment properties. Kim and Nelson (1996) use an artificial intelligence technique called Abductive Learning Networks to estimate rental value. Results of this study indicate that this technique predicts rents with only seven input variables.

Appropriate measurements of multifamily property returns are examined in other studies. Abraham (1996) suggests that the traditional systematic comparisons of real estate performance across geographic markets are not acceptable. Although cumbersome, using data for ''repeat sales'' (matched observation) better controls for heterogeneity when evaluating value changes across properties but does not give accurate results. This study also advocates the use of measures of cash flow and net operating income indices with ''repeat sales'' regression.

Cost efficiencies of the multifamily housing industry also are examined in the literature. Springer and Waller (1996) find maintenance cost per square foot increases with property age, tenant turnover, specific amenities, as well as for higher-rent properties. Apartments experience higher maintenance costs per square foot, with larger complexes experiencing lower per square foot maintenance costs than smaller complexes.

Hutchinson and Murray (1989) examine subsidized housing data and find that there are no significant per unit cost differences between large and small projects, so choices between these two types of projects may be made based on factors other than production efficiency. One study suggested the development of a financial structure partnership of public agencies/nonprofits with private developers/owners/managers (Miller, 1994). This study discovers this type of arrangement results in added benefits to sellers who receive a fair price, the asset is capitalized for a thorough renovation, the developer has a high yielding investment and the nonprofit agency receives positive cash flows while enhancing services to the community. Bible and Crunkleton (1983) find significantly higher

Exhibit 4 | Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Wendt & Wong (1965)	Investment Performance: Common Stocks Versus Apartment Houses	*Journal of Finance*, 20, 633–46	20 FHA-financed residential projects	1952–1962	Compares the discounted cash flow of FHA-financed residential projects with 76 randomly selected industrial stocks. Finds that, because of the special real estate tax advantages, after-tax returns on equity investment in apartment houses are twice that of stock returns, but after-tax rates of returns vary significantly over different periods of time and across different properties.
Ogur (1973)	Higher Education and Housing: The Impact of Colleges and Universities on Local Rental Housing Markets	*American Journal of Economics and Sociology*, 32, 387–94.	Census data for 62 New York State counties	1950 and 1960	Finds the presence of a university causes rents to be higher than without a university.
Bible & Crunkleton (1983)	The Effects of Financing on the Sale of Multifamily Properties	*The Real Estate Appraiser and Analyst*, 50:2, 33–7	Sales of small apartment buildings in the Tidewater area, Virginia	1979–1981	The availability of below-market financing causes excess demand and thus increases the selling price of a small apartment complex; buyers pay a premium for favorable financing of 1.77 times the average discounted loan savings.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Rosen & Smith (1983)	The Price-Adjustment Process for Rental Housing and the Natural Vacancy Rate	*American Economic Review,* 73:4, 779–86	Rents and vacancy rates in 17 U.S. cities; data from BLS and Institute of Real Estate Management	1969–1980	Using a pooled time-series, cross-section analysis, examines the relationship between rental price changes and excess supply or demand in the rental market separately for 17 large cities in the U.S. Finds that a close relationship exists between variations in rents and deviations of actual vacancy rates from normal vacancy rates.
Guntermann & Norrbin (1987)	Explaining the Variability of Apartment Rents	*AREUEA Journal*, 15, 321–430	104 Apartments (291 units) in Phoenix, AZ, metropolitan area	1984	Uses multiple regression to analyze variations in apartment rents, which differ from variations in housing project rents, although both projects produce a basically similar flow of services. Finds that a strong influence on variations in apartment rents involves common area amenities, such as swimming pools and hot tubs, which are typically not available to individual homeowners. Notes that when segmenting the multifamily market, the university submarket rent is significantly affected by common area amenities, extra bedrooms, and condition of the complex. Finds that older properties with amenities similar to newer projects remain more competitive, and those amenities are important in explaining rent variations.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Jackson (1987)	Turning Around Troubled Multifamily Properties	*Journal of Property Management*, 52:4, 6–9	No empirical data	N/A	Discusses methods of improving and stabilizing the returns on troubled multifamily properties, such as cutting costs per square foot; motivating staff; becoming automated; and seeking mortgage alternatives.
Malpezzi, Ozanne & Thibodeau (1987)	Microeconomic Estimates of Housing Depreciation	*Land Economics*, 63, 372–85	Depreciation rates and housing data from 59 metropolitan cities	1987 (pub)	Finds that the aging of a multifamily property has a negative effect on rent.
Smith & Kroll (1988)	Improving Estimates of Potential Gross Income in Multifamily Properties through Market Research	*Appraisal Journal*, 56, 118–25	Interviews with 454 residents of multifamily properties	1987	Surveys tenants regarding the value they attach to certain amenities. Finds that a difference exists in the marginal values that are placed on selected features by tenants, market surveys and research can aid appraisers, and tenants are helpful in providing useful information.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Hutchinson & Murray (1989)	A Three Factor Cost Function for Multifamily Housing: A Study in Philanthropy	*Urban Studies*, 26, 234–39	88 subsidized housing projects in Bureau of Labor Statistics	Built 1970–1971	Estimates a three-factor translog cost function for multifamily housing construction from actual land price and wage data and a city-specific index of materials' cost. Finds that the share of labor rises with the wage rate, implying minimum wages such as required by the Davis-Bacon Act raise the income of employed laborers more than lower the income of unemployed laborers. Also finds no significant per unit cost differences between large and small projects, so choices between these two types of projects may be made based on factors other than production efficiency.
Smith & Kroll (1989)	Utility Theory and Rent Optimimization: Utilizing Cluster Analysis to Segment Rental Markets	*Journal of Real Estate Research*, 4, 61–71	Surveys to 400 apartment tenants in Houston, TX	1989 (pub)	Uses cluster analysis to segment apartment residents and units into homogeneous groups in an effort to identify those segments with higher marginal utility preferences for selected project or unit amenities, ultimately optimizing rental rates. Finds that distinct clusters do exist and that price elasticity is different across clusters.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Sirmans, Sirmans & Benjamin (1989)	Determining Apartment Rent: The Value of Amenities, Services and External Factors	*Journal of Real Estate Research*, 4:2, 33–43	Apartment data in Louisiana	1986	Examines whether certain rental concessions as well as external factors influence apartment rents and presents a model to compare the costs and benefits of providing amenities and services. Finds that specific amenities, including covered parking, a modern kitchen, traffic congestion and access to public transportation, influence rent.
Bernes & Mitchell (1990)	An Analysis of Indicators of Multi-Family Complex Values	*Appraisal Journal*, 59, 379–85	Data supplied by management on 16 apartment complexes	1984–1985	Finds that the income approach is a valid measurement to use in multi-family residential property evaluation.
Frew, Jud & Winkler (1990)	Atypicalities and Apartment Rent Concessions	*Journal of Real Estate Research*, 5, 195–201	Apartment rents in the Greensboro, NC area	1988	Examines the use and equivalent price of rental concessions. Finds that the average rental concession is statistically equivalent to an increase in rents of 2.5%.
Sirmans, Sirmans & Benjamin (1990)	Examining the Variability of Apartment Rent	*Real Estate Appraiser and Analyst*, 43–8	Lafayette, Louisiana, apartment data	1986	Examines the effect of amenities, services and external factors on apartment rent. Finds that amenities including a modern kitchen, covered parking and maid service have a significant impact on rent. Also finds that services including all utilities also affect rent levels. Notes that certain amenities such as restrictions on pets, students or children do not have an impact on rent, while external factors such as traffic congestion and access to public transportation are significant in determining rent.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Jud & Winkler (1991)	Location and Amenities in Determining Apartment Rents	*Appraisal Journal*, 59, 266–75	Apartment rents in Greensboro/Winston-Salem/High Point, NC	1988	Develops a model of apartment rents to apply in apartment feasibility analysis. Maps the rent surface of the MSA examined and compares results in alternative sites.
Sirmans & Benjamin (1991)	Determinants of Market Rent	*Journal of Real Estate Research*, 6, 357–79	No empirical data	N/A	Provides a comprehensive review of the existing literature on the apartment rent determination process.
Sirmans & Sirmans (1991)	Property Manager Designations and Apartment Rent	*Journal of Real Estate Research*, 7, 91–8	Apartment rents, amenities, and managers' professional designations in Tallahassee, FL	1990	Finds that rents are significantly higher for those professional management companies whose managers have achieved professional designations.
Sirmans, Sirmans & Benjamin (1992)	Rental Concessions, Effective Rent, and Property Values	*Property Tax Journal*, 11, 247–56	544 apartments in Baton Rouge, LA	1987	Finds that apartments offering concessions return an 11.3% higher than predicted rent, while occupancy rates are 7.3% higher for properties offering concessions. Finds that contract rents that are higher than market rents do not deter occupancy rates.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Benjamin & Lusht (1993)	Search Costs and Apartment Rents	*Journal of Real Estate Finance and Economics*, 6, 189–97	156 apartment complexes in State College, PA	1988–1990	Finds that property management variables including a manager's ability to reduce search costs for renters has a positive impact on rent levels. Concludes that a property manager's fee for providing search-cost-reducing information is reflected in rents.
Hoch & Waddell (1993)	Apartment Rents: Another Challenge to the Monocentric Model	*Geographical Analysis*, 25, 20–34	Apartment and economic activity variables of Dallas County, TX	1990	Finds that a complex network of activity centers and highway axes influences apartment rents. Concludes that nodes other than the central business district (CBD) pose greater influence on rents than the CBD. Also finds that amenity variables and externalities have both positive and negative effects; suggests a reevaluation of the place normally assigned to higher-density rental housing in urban models.
Steele (1993)	Conversions, Condominiums and Capital Gains: The Transformation of the Ontario Rental Housing Market	*Urban Studies*, 30, 103–26	Conversions in Ontario	1971–1989	Examines the rental housing supply in Ontario and finds that most of the crisis of the late 1980s is attributable to conversions of new units and tenure switches that are not associated with structural change. Notes that the conversion sector of the rental market was far looser in 1989 than in 1971, suggesting that the official rental vacancy rate for large buildings is not a correct indicator of overall unit availability.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Des Rosiers & Theriault (1994)	Implicit Prices of Rental Services: Modeling the Quebec Market	*Assessment Journal*, 1:4, 47–60	Rental information on 8,500 rental units in Quebec	1991	Examines whether it is fruitful to segment rental markets based on average rent, unit size and building density to better predict rents. Finds that segmenting the market results in good explanatory and predictive power. Implicit prices of rental attributes are significantly distinct across submarkets, as unit size, building density and socioeconomic traits of tenants are significant determinants of rent fluctuations.
Miller (1994)	High Yields From Public/Private Multifamily Ventures	*Real Estate Review*, 24:2, 66–71	Hypothetical cash flows of affordable housing	N/A	Develops a financial structure partnership of public agencies/nonprofits with private developers/owners/managers. Finds that the partnership proposed results in added benefits to sellers who receive a fair price, the asset is capitalized for a thorough renovation, the developer has a high yielding investment, and the nonprofit agency receives positive cash flows while enhancing services to the community.
Sirmans, Sirmans & Benjamin (1994)	Apartment Rent, Concessions and Occupancy Rates	*Journal of Real Estate Research*, 9, 299–312	Rents and various apartment amenities	1987	Finds a positive correlation between rental concessions and monthly rent and building occupancy
Moseman (1995)	Building a Replacement Budget	*Journal of Property Management*, 60:5, 20–2	No empirical data	N/A	Discusses ways property managers and owners should plan for replacing the physical assets of older multifamily housing properties.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Abraham (1996)	On the Use of a Cash-Flow Time-Series to Measure Property Performance	*Journal of Real Estate Research*, 11, 291–308	Equity REIT Russell-NCREIF Indices, Freddie Mac data, and net operating income calculations	1963–1993	Suggests that the traditional systematic comparisons of real estate performance across geographic markets are not acceptable. Finds that regression techniques using "repeat sales" (matched observation) better control for heterogeneity when evaluating value changes across properties but do not give accurate results. Advocates using measures of cash flow and net operating income indices with "repeat sales" regression, although this is more cumbersome.
Belsky & Goodman (1996)	Explaining the Vacancy Rate—Rent Paradox of the 1980s	*Journal of Real Estate Research*, 11, 309–23	Consumer Price Indices, Census data	1958–1994	Seeks to explain why rents increased dramatically in the 1980s when vacancy rates were rising. Finds the increase in rents is caused by an increase in the natural vacancy rate, changes in the rent-setting behavior of landlords, changes in the housing search process of tenants, the nominal and real rent in the CPI, and variations in vacancy rates cause by high levels of construction. Finds only approximately 30% of the unexpected gain in rents is quantifiable with the significant variables.
Benjamin & Sirmans (1996)	Mass Transportation, Apartment Rent and Property Values	*Journal of Real Estate Research*, 12, 1–8	Apartment rents in Washington, DC	1992	Examines the effect of mass transportation accessibility on apartment rent. Finds that distance from a metro station is inversely related to apartment rent.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Bible & Hsieh (1996)	Applications of Geographic Information Systems for the Analysis of Apartment Rents	*Journal of Real Estate Research*, 12, 79–88	Nonsubsidized apartment complexes in Shreveport, LA	1993	Incorporates regional variables generated by the Geographic Information System into the analysis of the cross-sectional variations of apartment rents. Finds that the age of the apartment shows an inverse influence on apartment rent while a swimming pool and/or a fireplace results in a higher rent. The size of an apartment is inversely related to rents, indicating economies of scale of apartment operations.
Chinloy (1996)	Real Estate Cycles: Theory and Empirical Evidence	*Journal of Housing Research*, 7, 173–90	Rental housing markets in Phoenix and Tucson, AZ	1982–1991	Finds that real estate market cycles affect output and absorption of units as well as the prices and rents of existing properties and new construction. Also finds that the cycle may include upside and downside lengths of three years and the impact the cycle depends on the behavior of the cycle, which in turn affects production and prices.
Des Rosiers & Theriault (1996)	Rental Amenities and the Stability of Hedonic Prices: A Comparative Analysis of Five Market Segments	*Journal of Real Estate Research*, 12, 17–36	Prices and rental amenities of 3,300 apartment buildings in Quebec	1990–1992	Segments Quebec-area apartments into five geographic submarkets to determine consistency and stability of prices. Finds differences in implicit prices across markets and collinearity with respect to some rental amenities.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Kim & Nelson (1996)	Assessing the Rental Value of Residential Properties: An Abductive Learning Networks Approach	*Journal of Real Estate Research*, 12, 63–77	1,031 Atlanta apartment units from the American Housing Survey	1987	Uses an artificial intelligence technique called Abductive Learning Networks (ALN) to estimate rental value. Finds the ALN model predicts rents with only seven input variables.
Pagliari & Webb (1996)	On Setting Apartment Rental Rates: A Regression-Based Approach	*Journal of Real Estate Research*, 12, 37–61	Apartment data of Chicago, IL	1991	Presents a unique approach to use in setting a property's rental rate. Finds that unique features of the proposed approach are that (1) it treats vacancy as the dependent variable; (2) the generated rate is compared to the property's actual rate; and (3) each property is ranked by the difference between the generated rate and the actual rate.
Springer & Waller (1996)	Maintenance of Residential Rental Property: An Empirical Analysis	*Journal of Real Estate Research*, 12, 89–99	383 rental housing units in South Carolina	1990	Examines maintenance cost per square foot and finds that it increases with property age, tenant turnover and specific amenities as well as for higher-rent properties. Finds that apartments experience higher maintenance costs per square foot, with larger complexes experiencing lower per square foot maintenance costs than smaller complexes. Also finds that results indicate cost economy, implying added value to rental housing for larger complexes. In addition, it finds that owners of multiple properties pay higher maintenance costs and there is no significant relationship between absentee ownership and the level of property maintenance.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Berg & Skinner (1997)	Extended-Stay Lodging—a New High-Return Product	*Real Estate Review*, 27, 26–33	Revenues and expenses of extended-stay hotels	1995	Examines the growing demand and return rates of extended-stay lodging. Due to the tightly controlled development costs, fast "lease-up," high occupancy and low payroll and operating costs, finds that this market has the potential for superior financial returns.
Benjamin, Lusht & Shilling (1998)	What Do Rental Contracts Reveal About Adverse Selection and Moral Hazard in Rental Housing Markets?	*Real Estate Economics*, 26, 309–29	Rents and security deposits of apartments in Washington, DC, and State College, PA	1988–1992	Tests whether high up-front security deposits reduce the problems of asymmetric information nd moral hazard between landlords and renter households regarding the tenants' use of the premises. Compares rental rates for tenants who pay large up-front security deposits with those who offer rental contracts with low up-front deposits—in essence, allowing the landlord to lend to renter households at a rate greater than 30% per year. Finds a negative and significant relationship between rental rates and up-front security deposits, suggesting landlords earn a similar rate of return as do lenders making riskier loans at a higher interest rate.

Exhibit 4 | (continued)

Returns, Ownership Costs and Rental Income Issues

Paper	Title	Citation	Data	Years	Findings
Bogdon & Ling (1998)	The Effects of Property, Owner, Location, and Tenant Characteristics on Multifamily Profitability	*Journal of Housing Research*, 9, 285–316	Property Owners and Managers Survey and the American Housing Survey National Sample; U.S. Census	1995–1996; 1993; 1997	Finds that smaller properties have lower rent-to-value and net operating income-to-value ratios and are less likely to be profitable than larger properties. Concludes that a large majority of properties compete with non-subsidized properties, and those that compete with subsidized properties are less likely to earn a profit. Finds that properties that house mostly low-income tenants have either a negative or insignificant effect on profitability, but renting to tenants who receive Section 8 assistance or similar welfare benefits have a positive effect on earnings.
Bogdon, Follain, Goodman, Manson & Brady (1999)	Research Applications of the Multifamily Housing Institute's Apartment Database	*Journal of Real Estate Literature*, 7, 221–34	Apt*Data*™ database	1996	Describes and examines the strengths and weaknesses of the multifamily housing database Apt*Data*™ for housing market and policy research and compares this database to other sources.
Hardin & Wolverton (1999)	Equity REIT Property Acquisitions: Do Apartment REITs Pay a Premium?	*Journal of Real Estate Research*, 17, 113–26	Apartment Equity REITs	1993–1995	Finds that EREITs may pay premiums for apartment acquisitions in specific markets and under certain conditions. Using negotiation theory and implied agency cost, finds premiums in Atlanta and Phoenix, but none in Seattle.

demand and thus higher selling prices for apartments that are eligible for below market-rate financing. This study was based on ninety relatively small apartment complexes, ranging in size from two and seventeen units, in the Tidewater area of Virginia. Interestingly, the premium paid for these complexes that are eligible for below market rate funding is 1.77 times the average discounted loan savings. Other suggestions for improving the returns on multifamily properties are made by Jackson (1987).

A common underlying assumption made in many studies is that multifamily properties do not yield consistent returns or experience the same occupancy rates across properties. This phenomenon could be explained by several factors reported in the literature. Smith and Kroll (1989) find that there are differences in price elasticities across clusters of tenants.

The vacancy rate-rent paradox of the 1980s centered on why rents increased dramatically while vacancy rates were rising. Belsky and Goodman (1996) find several causal factors, including an increase in the natural vacancy rate, changes in the rent-setting behavior of landlords, changes in housing search of tenants, the nominal and real rent in the CPI and variations in vacancy rates caused by high levels of construction.

Several studies examine the effect on rents and occupancy rates that a variety of rental concessions, such as amenities and services, provides multifamily property owners or tenants. Various rental amenities or concessions are tested as predictors of rental differences while other studies have examined whether market segmentation contributes to differences in rents. Seeking to shed some light on these return differences is a common area of exploration in the literature. One study finds that differences in apartment rents may be somewhat attributed to a property manager's ability to reduce search costs (Benjamin and Lusht, 1993). Sirmans and Sirmans (1991) also find that property managers may influence rents. This study concludes that the professional designations of the landlords serve to signal to potential tenants the quality of services provided by that manager. Benjamin, Lusht and Shilling (1998) examine rental contracts and security deposits paid on apartments to see if these factors influence rental rates. They find an inverse relationship between rents and a security deposit required up-front, indicating that landlords may be earning rates of return similar to lenders that make riskier loans at higher interest rates.

Frew, Jud and Winkler (1990) also examine the use and value of rental concessions. This study notes that the practice of providing amenities implies tenants are all unique and landlords use these rental concessions to increase total profits. This study finds the average rental concession statistically equivalent to a 2.5% increase in rents (Sirmans, Sirmans and Benjamin, 1989, 1990, 1992, 1994). The first study reports that features such as modern kitchens, covered parking and maid service have a significant impact on rent. Services such as having all utilities included in the rent have an effect on rent levels, while restrictions on pets, students or children do not. These data report that external factors such as traffic

congestion and access to public transportation have a significant impact on rent. Sirmans, Sirmans and Benjamin (1992) further report that rents for apartments offering concessions return an 11.3% higher rent than predicted rent, while occupancy rates are 7.3% higher for properties offering concessions. Furthermore, contract rents that are higher than market rents do not deter occupancy rates.

Proximity to transportation outlets and similar metropolitan features are tested as determinants of multifamily rents. Benjamin and Sirmans (1996) examine the effect of mass transportation accessibility on apartment rent and find a negative relationship between distance from a metro station and apartment rent. Another study uses hedonic modeling strategy and examines the influence of a complex network of activity centers and highway access on apartment rents (Hoch and Waddell, 1993). This study finds that nodes other than the CBD influence rents more than the CBD and amenity variables, and externalities have both positive and negative effects. This paper suggests that more consideration should be given to the classification of a property as higher-density.

Rental rates for apartments are addressed by Pagliari and Webb (1996). This study presents an approach to setting a property's rental rate that (1) treats vacancy as the dependent variable; (2) compares the generated rate to the property's actual rate; and (3) ranks each property by the difference between the generated rate and the actual rate.

Another study using apartment data from Mesa and Tempe, Arizona, examined variations in rents across the entire data set and across various market segments, including older versus newer complexes and the university submarket (Guntermann and Norrbin, 1987). A notable variable that explains apartment rents involves common area amenities, including swimming pools and hot tubs, which the study notes are not as easily accessible to single-family homeowners. This study further confirms that common amenities are very helpful in explaining rent variations in newer properties, although the quality and condition of the new project also varies, and this is reflected in rents as well. Older projects whose features are more aligned to amenities of newer projects remain more competitive, and these features also help explain rent differences. Hardin and Wolverton (1999) examine Phoenix as well as Atlanta data and find that apartment real estate investment trusts pay a premium above the market prices for property acquisitions. Extended-stay multifamily lodging is also examined, and it is found that reduced payroll and supply costs contribute to favorable returns in this segment of the market (Berg and Skinner, 1997).

A study using apartment rents in the Greensboro/Winston-Salem/High Point Metropolitan Statistical Area (MSA) develops a hedonic model to map the rent surface of the MSA, compare alternative sites and provide input to an integer programming model designed to optimize the number and types of amenities to include in new multifamily projects (Jud and Winkler, 1991). Moseman (1995) notes the importance of developing a replacement budget for maintaining and replacing a property's physical assets.

Many researchers have examined market crises during specific eras such as the rental housing supply crisis in the late 1980s in Ontario, Canada. Steele (1993) shows that this area actually experienced an increase in rentals during this time period that was far greater than the number of new purpose-built rental units. This supply was provided by conversions and investor-owner condominiums, so the official rental vacancy rate for large buildings is misleading as an indicator of overall availability.

Several studies focus on whether there are differences in rent submarkets within the multifamily market. One of the first studies in this area examined the impact of a university on local rental housing markets (Ogur, 1973). This study finds that distance from the university campus influenced apartment rents. Findings by Smith and Kroll (1988) and Des Rosiers and Theriault (1994) agree that the implicit prices attached to rental attributes are different across submarkets. Des Rosiers and Theriault (1996) further conclude that the size of the apartment and building density as well as the socioeconomic profile of tenants and their relative captivity (lack of ability to move) are strongly influential in multifamily rents. The aging of a multifamily property is found to have a negative effect on rent (Malpezzi, Ozanne and Thibodeau, 1987).

In summation, the findings in the literature on multifamily property returns and cost issues note the following:

- There is a wide variation between the after-tax returns across multifamily properties, and traditional comparisons across properties and region may be inaccurate;

Data for examining multifamily housing returns have not been available for as long as data for single-family properties;

- Returns of multifamily properties differ significantly from returns of common stock;
- Maintenance costs tend to increase with property age, tenant turnover and amenities as well as for higher-rent properties;
- There are no significant cost variations between large and small multifamily properties, so investor choice may be based on factors other than production efficiency; and
- Many factors may contribute to return variations in multifamily properties, including rental concessions, the economy and specific submarket influence.

Demand, Vacancy and Occupancy Issues

While rental income is contingent on the demand and vacancy levels of multifamily properties, this survey seeks to separately classify and identify findings of studies that specifically focus on rent levels and income or the willingness of tenants to pay for certain features from issues exclusively related

to demand for units. While many of the studies presented in Exhibit 4 examine rental concessions that ultimately determine rental income levels for investors, this final section focuses on studies that have the specific mission of determining factors that motivate tenants. These tenant occupancy studies are summarized in Exhibit 5. Many of these findings shed insight into the features demanded by tenants when they select an apartment to rent. The empirical and theoretical evidence supports the premise that the demand by tenants affects vacancy rates, and these rates, frequencies and durations are not uniform across housing markets (Guasch and Marshall 1985).

Forecasting multifamily housing demand is crucial to providing the necessary concessions that have value to tenants. Nelson (1995) uses Census data from the 1993 Statistical Abstracts and predicts apartment demand for ten years based on demographics and homeownership trends. The importance of examining specific features across different types of tenants is recognized by Smith, Johnson and Hill (1991). This study surveys tenants and finds distinct differences between one demographic group and another. Brand marketing apartment housing is found as a successful way to attract tenants in another study (Wadsworth, 1997). An aging population, lifestyle and income levels are factors that tend to drive the demand for apartment properties (Nadji, 1997).

While single-family housing is by far the preferred type of housing by respondents at all income levels, Williams (1971) notes that many residents are satisfied with multifamily housing of at least moderate density if the units provide such amenities as privacy, protection, outdoor space and the option to purchase the unit. Thus, the aversion to multifamily housing is an objection to the lack of amenities rather than an objection to the multifamily aspect of the housing. Goodman and Kawai (1984, 1985) estimate the demand for rental housing and use, housing price and income as determinants. Their later study examines the length-of-residence discounts (rental price decreasing with length of residence) that perhaps cause ''turnover minimization'' by landlords and ''screening'' of good tenants, or sample truncation due to random error in setting rental prices. Additionally, Williams (1993) finds demand is dependent on the interaction of economies of scale for landlords and conflicts of interest between landlords and tenants. He further notes that the physical condition of the unit depends on both its occupant's private effort to provide care and the owner's expenditure on maintenance and repairs.

Features and locations of apartments are repeatedly tested as being influential on tenant demand, and landlords and managers are advised to use amenities to enhance demand (Rategan, 1991). Smith and Kroll (1988) find that factors such as geographic zone and tenant and property profiles influence the marginal values attached to different features by tenants. Smith and Kroll (1987) find that one-third of tenants do not want a swimming pool. This study suggests that managers should conduct cost-benefit analyses for other amenities such as fireplaces, washer-dryer connections only, covered parking, Jacuzzi spas, exercise rooms, non-covered patios, microwaves, ceiling fans and more square feet. Providing 24-hour security has a positive effect on rent and tenant demand, but having a manger

Exhibit 5 | Demand, Vacancy and Occupancy Issues

Paper	Title	Citation	Data	Years	Findings
Williams (1971)	The Multifamily Housing Solution and Housing Type Preferences	*Social Science Quarterly*, 52, 543–59	Responses to interviews regarding housing choice	1969	Finds that single-family housing is by far the most preferred type of housing by respondents at all income levels. Concludes that almost half of the respondents are satisfied with multifamily housing of at least moderate density if the units provide such amenities as privacy, protection, outdoor space, and the option to purchase the unit; thus, the aversion to multi-family housing is an objection to the lack of amenities rather than an objection to the multifamily housing aspect of the housing.
Goodman & Kawai (1984)	Estimation and Policy Implications of Rental Housing Demand	*Journal of Urban Economics*, 16, 76–90	Annual Housing Survey SMSA, which includes 19 metropolitan areas	1977	Computes the primary determinants of rental housing demand, specifically housing price and permanent/transitory income. Finds that a rent subsidy achieves a substantially larger effect than does a cash subsidy.
Goodman & Kawai (1985)	Length-of-Residence Discounts and Rental Housing Demand: Theory and Evidence	*Land Economics*, 61:2, 93–105.	Annual Housing Survey SMSA, which includes 19 metropolitan areas	1978	Develops a multi-period optimization model to integrate cross-sectional length-of-residence discounts into rental housing demand analysis. Examines the length-of-residence discounts (rental prices decreasing with length of residence) that may be caused by "turnover minimization" by landlords, "screening" of good tenants or sample truncation due to random error in setting rental prices.

Exhibit 5 | (continued)

Demand, Vacancy and Occupancy Issues

Paper	Title	Citation	Data	Years	Findings
Guasch & Marshall (1985)	An Analysis of Vacancy Patterns in the Rental Housing Market	*Journal of Urban Economics*, 17, 208–29	Housing Vacancy information in Bureau of Census data	1973–1979	Finds that the amount of housing offered for rent by a landlord influences the vacancy rate of that housing. Finds that vacancy rates, vacancy frequencies and durations will not be uniform across a housing market, but will fluctuate based on tenant mobility, size of housing unit and number of units in the complex.
Smith & Kroll (1987)	An Analysis of Tenant Demand for Amenities	*Journal of Property Management*, 52:6, 14–7	Responses to survey questionnaire to apartment tenants	1986	Finds that most amenities are cost-beneficial for at least a specific percentage of units in each apartment complex. Suggests that developers/managers may provide buildings or units with full amenity packages and others with "bare-bones" amenities only.
Reece (1988)	The Price-Adjustment Process for Rental Housing: Some Further Evidence	*AREUEA Journal*, 16, 411–18	Rents and vacancies of St. Louis, Los Angeles and six other cities	1902–1932	Finds that historical data indicate that observed vacancy rates are negatively related to a change in apartment rents.

Exhibit 5 | (continued)
Demand, Vacancy and Occupancy Issues

Paper	Title	Citation	Data	Years	Findings
Jud & Frew (1990)	Atypicality and the Natural Vacancy Rate Hypothesis	*AREUEA Journal*, 18, 294–301	Surveys of apartment projects in the Peidmont Triad in North Carolina	1988–1999	Develops a model of rent change that is based on the natural vacancy rate hypothesis and the Haurin hypothesis. Finds a 6.5% natural vacancy rate, but that rate is not consistent systematically across individual apartment units. Notes that the more atypical an apartment unit is, the higher is the natural vacancy rate. Finds that rent adjustments on specific types of apartments are inversely related to the rate of vacancy in the previous time period.
Rategan (1991)	Getting the Most from Your Amenities	*Journal of Property Management*, 56:2, 22–6	No empirical data	N/A	Surveys the demand for amenities in both commercial and office properties and residential properties.
Smith, Johnson & Hill (1991)	An Analysis of Demand for Service Amenities	*Journal of Property Management*, 56:3, 10–4	Responses to survey questionnaire to apartment tenants	1990	Finds that services and amenities such as trash or dry cleaning pickup, maid service, car wash, phone jacks in the bathroom, 24-hour guard and video rental can contribute to a prospective tenant's decision to lease a unit.

Exhibit 5 | (continued)

Demand, Vacancy and Occupancy Issues

Paper	Title	Citation	Data	Years	Findings
Wurtzebach, Mueller & Machi (1991)	The Impact of Inflation and Vacancy on Real Estate Returns	*Journal of Real Estate Research*, 6:2, 153–68	Commercial property return and vacancy data in the Russell-NCREIF Index and CPI inflation data	1977–1989	Examines the relationship between the performance of commercial real estate and high and low inflationary years. Finds that commercial real estate does provide an inflation hedge. Also finds that the relative impact of vacancy rates on the properties examined is a significant factor in explaining returns, thus impacting the inflation hedging potential.
Williams (1993)	Agency and Ownership of Housing	*Journal of Real Estate Finance and Economics*, 7:2, 83–97	American Housing Survey; Operating expenses of four garden apartment complexes in Phoenix, AZ	1987; 1990	Finds that the demand for owner-occupied housing in multifamily housing complexes is dependent on the interaction of economies of scale for landlords and conflicts of interest between landlords and tenants. Finds that the physical condition of the unit depends on both its occupant's private effort to provide care and the owner's expenditure on maintenance and repairs. Finds that tenants will naturally expend less effort on care than homeowners and landlords optimally respond with more maintenance than homeowners, and thus multifamily houses are optimally owned by their occupants.

Exhibit 5 | (continued)

Demand, Vacancy and Occupancy Issues

Paper	Title	Citation	Data	Years	Findings
Nelson (1995)	Forecasting Multifamily Housing Needs	*Commercial Investment Real Estate Journal*, 14, 30–4	Census Bureau data in Statistical Abstract	1993	Suggests various methods of estimating multifamily needs in the U.S. using Census Bureau data published in the 1993 Statistical Abstract of the U.S.
Benjamin, Sirmans & Zietz (1997)	Securities Measures and the Apartment Market	*Journal of Real Estate Research*, 14, 347–58	Rents of 1981 apartment complexes in Washington, DC	1992	Examines whether three specific security measures influence rent and occupancy rates; finds a 24-hour security guard has a significant positive effect on both rent and occupancy, but having a manager living on site or a manned front desk or restricted entry does not significantly affect rent. Finds all three security variables have a significant positive effect on occupancy.
Nadji (1997)	The Future of Multi-family Housing	*Commercial Investment Real Estate Journal*, 16:5, 26–30	No empirical data	N/A	Finds that apartment properties have provided a lucrative investment opportunity since the early 1990s, while most property types have suffered from the economic downturn and overbuilding and may continue to be the most sought-after property type among investors. Discusses demographic and financial characteristics of renters and investors who will drive the demand for apartments in the future.
Wadsworth (1997)	Brand Marketing Apartments	*Journal of Property Management*, 62:2, 44–9	No empirical data	N/A	Examines the costs and benefits of brand marketing apartment properties.

living on site or a manned front desk or restricted entry does not influence rent (Benjamin, Sirmans and Zietz, 1997).

The natural vacancy rate for multifamily housing is addressed in several studies. Based on the traditional economic theory of the close relationship between excess demand and changes in the prices of rental housing services, Rosen and Smith (1983) develop a cross-section and price-adjustment model to individually examine rents and natural vacancy rates for seventeen large U.S. cities. Findings confirm the view that rental price changes are influenced by excess supply or demand in the market. Specifically, variations in the vacancy rate (within some critical zone of occupancy) around the natural rate of vacancy influences the rate of change of the price of rental housing services. Variations in the actual vacancy rate were shown to be significant in determining the 95% of the change in rents for thirteen of the seventeen cities examined.

Atypicality and vacancy rates are the focus in a study of apartment units in the Greensboro/High Point/Winston-Salem, North Carolina MSA (Jud and Frew, 1990). This study makes a unique contribution, as it examines the natural vacancy rate hypothesis by using microdata on individual apartments. This study uses the natural vacancy rate hypothesis and tests whether vacancies for an apartment unit are a function of the unit's atypicality. This study finds that the unit's features (atypicality) are related to vacancy rates. Reece (1988) finds that vacancy rates are inversely related to a change in apartment rents. Wurtzebach, Mueller and Machi (1991) employ the Consumer Price Index and other real estate databases and find vacancy rates are a significant factor in explaining returns and thus influencing inflation hedging ability of rental property. They further find differences in the inflation hedging ability of different types of commercial properties, and thus the impact on vacancy rate variance appears to be a significant factor in explaining returns on the inflation hedging ability of these properties.

In summary, studies focusing on the demand and vacancy issues note:

- Accurately forecasting the demand for multifamily housing and understanding the reason for the aversion to multifamily housing are essential to maintaining the viability of this dynamic segment of the real estate market;
- Investor and tenant demand for multifamily properties is not fueled by factors consistent with the demand for other investment alternatives;
- Demand for multifamily housing varies within this sector, as location, demographics and desire for specific amenities are not consistent across tenants;
- Vacancy rates may be attributed to many factors including the conditions and amenities of the unit; and
- It is essential for owners and investors to understand the features (rental concessions) desired by tenants to incur the highest occupancy rates.

Conclusion

The growing importance of the multifamily housing industry as a popular choice of residence and as a viable investment opportunity is manifest in the increasing number of empirical and theoretical studies in this area. While the lack of aggregate databases made the study of this sector more difficult, current resources have facilitated a wealth of information on the performance and environment of multifamily housing. This study categorizes and summarizes more than 100 articles that deal with the multifamily market in five areas: (1) research addressing general economic and market efficiency studies; (2) property valuation and appraisal topics; (3) regulatory, clustering and affordable housing issues; (4) studies relating to returns, ownership costs and rental income issues; and (5) tenant demand, vacancy and occupancy issues.

Some notable common conclusions found in the literature include:

- Single-family housing is the preferred type of housing at all income levels;
- The decision to live in multifamily housing is not only based on budget constraints but also is based on other forces, including changing demographics and lifestyle preferences, tax requirements and macroeconomic variables;
- External government participants such as the FHA and HUD contribute to the performance of the multifamily housing market, both in the short and long run;
- Techniques used for examining the efficiency of multifamily housing markets include several market indices, computation of supply and demand elasticities with regard to capital inputs and rents, and an assortment of financial ratios;
- The use of rent controls and housing codes have mixed effects on the multifamily housing market;
- There has been an increase in appraisal regulation in recent years, and features unique to multifamily properties such as ownership, returns, expenses and tax laws should be reflected in the appraisal process;
- Rents and rental adjustments are inversely related to vacancy rates; and
- A myriad of amenities are influential in explaining vacancy rates and rents.

Multifamily housing has many unique characteristics, as participants in this market include unique regulatory and financing organizations. The influence of government organizations such as the FHA and HUD as well as the positive after-tax returns noted in the literature will likely cause this real estate segment to continue as a practical housing choice. Continued research into many of the dynamic issues addressed in the studies presented, such as how multiple housing

properties perform when new tax initiatives are in place and when economic and demographic conditions change, will be necessary to achieve a full understanding of the performance of this sector of the real estate market.

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