



What Is Real Estate Finance?

JOSEPH T. WILLIAMS

Professors Capital, 990 Highland Drive, Solana Beach, CA 92075

Abstract

How does real estate finance relate to the core of contemporary finance? What research in real estate might most interest financial economists? What research is suggested by both recurrent financial anomalies and stylized facts in real estate? Some possibilities are discussed.

Key Words: real estate finance

1. Introduction

What is academic research in real estate finance? How does it relate to the core of contemporary finance? The latter is commonly thought to include financial markets, financial institutions, and nonfinancial corporations. Among the many unsolved problems in real estate finance, which might most interest financial economists? What recurrent patterns in the data are associated with these problems? What stylized facts seem to be conventional wisdom or at least in common parlance among practicing professionals? Finally, which problems might be most amenable to analytical techniques from the core of finance?

This is not a survey of the literature in real estate finance.¹ Instead, it is the personal perspective of one financial economist. Why might a personal perspective be of interest? The organizers of this special issue hoped that it might help to motivate other financial economists to start their own research in real estate. Why might the personal account of this financial economist be of any interest? Perhaps, it is my unusual background: nearly twenty years doing both research in finance and business in real estate. The latter includes buying, rehabilitating, selling, and sometimes syndicating most classes of commercial and residential real estate.

2. Real Estate Finance versus Investments and Corporate Finance

My personal introduction to academic problems in real estate began more than ten years ago. At that time, I helped to interview a prospective assistant professor of real estate finance. The candidate, a budding urban economist, was to be grilled by ten tenured faculty of finance. As always, the financial economists were skeptical about the academic content of the rookie's research. Most telling was their very first question: what is the difference

between real estate and a steel plant? In other words, does the academic content of real estate finance differ substantively from either investments or corporate finance? Poor rookie, he mumbled something about taxes: after all, the interview preceded the Tax Reform Act of 1986. Unfortunately, his answer missed the point. Fortunately, I was not confronted by the same question. My answer, I would soon discover, would take several months to formulate.

Real estate, like other real assets, including steel plants, is traded in loosely organized, decentralized markets. These markets are characterized in part by costly, sequential search, often aided by brokers. In the case of single-family residences, local markets are commonly organized around multiple-listing services. In the case of commercial real estate, local markets are even more loosely organized around informal networks of brokers. Almost all sellers post asking prices, and trading typically takes time. Surprisingly, the average time to trade depends very much on the state of the market. In hot markets with rising prices, the average time to trade can be extremely short; in cold markets with falling prices, it is much longer.² By contrast, listed securities are traded in tightly organized, highly centralized markets. In the latter markets, trades can be executed quite quickly at much less cost, so that search is not an issue. Consequently, almost all theories in the core of finance about contingent and relative pricing of securities assume trading with neither search nor transaction costs. This focus on frictionless markets may reflect the early flood of empirical papers about returns on listed stocks, based initially on the monthly data collected by The Center for Research in Security Prices (CRSP) at the University of Chicago.

Nor are real assets completely isolated and unique. Every commercial or residential property has in its neighborhood other, similar properties. These comparable properties are not identical; they can be newer or older, smaller or larger. However, all have correlated cash flows. A steel plant also has comparables—other steel plants of other types in other locations—only fewer of them. Recent transactions of comparables can be very useful in valuing the asset in question. Consider the following common problem facing an investor in real estate. You are now preparing an offer to purchase a commercial property. If you try to value the asset by calculating its risk-adjusted, expected present value, then you must estimate its current cash flows, the average growth rate of its cash flows, and its risk-adjusted discount rate. Some of the required information relates only to the asset in question—for example, its current rent roll and physical condition. Other important information also applies to comparable assets—for example, construction of competing buildings and local growth in employment and population. Much of the latter information you can acquire from public sources, such as reports by local brokers and governments. You can combine this public information with your private information and then estimate future cash flows. However, with limited information your estimators of cash flows and hence present value are likely to be noisy. Alternatively, you can recognize that previous buyers and sellers of comparable assets also possessed much of this public information plus their own private beliefs about common and idiosyncratic factors when they negotiated their recent transactions. Thereby, prices from previous transactions can help to inform you about the value of the asset in question. With recent prices of comparables, you can then reduce the noise in your estimator of present value.

Realistically, real estate and other real assets must be priced in a noisy, sequential, rational-expectations equilibrium (REE). Several characteristics distinguish REE in decentralized markets for real assets versus centralized markets for listed securities. Most notably, real assets are heterogeneous, and sequential search is costly. In the resulting REE for real assets, recent prices of comparables reveal private information that previous investors possessed when they traded assets with correlated but not identical cash flows. This partial revelation of previous private information is sequential: previous prices are noisy public signals of previous private beliefs and even earlier prices, which are noisy signals of contemporaneous beliefs and still earlier prices, and so on. Moreover, the noise in previous prices may be reduced by relying on financial ratios—like capitalization rates and prices per square foot. Thereby, an investor can eliminate some differences due to scale between his proposed property and the previously traded imperfect substitutes. For financial economists the problem is deriving the REE and identifying its properties. What ratios are used in equilibrium and why? With financial ratios how are properties priced in equilibrium? Under what conditions do investors who rely on ratios dominate and eliminate from the market investors who calculate present values, as in textbooks? In other words, should investors who calculate only present values optimally bid for properties against investors who rely on ratios? The latter investors include not only current bidders but also potential bidders who might appear after subsequent search by sellers.

3. Categories of Real Estate Finance

Returning to the original question, what constitutes research in real estate finance, and how does it relate to the core of finance? Topics in financial economics have been categorized by the *Journal of Economic Literature (JEL)*. The *JEL* has three broad categories: general financial markets, financial institutions and services, and corporate finance and governance. Financial markets include theoretical and empirical work on portfolio choice, asset pricing, market microstructure, contingent claims, asymmetric information, event studies, and international finance. Most of these categories appear in the left column of table 1. Institutions and services include banking, insurance, pensions, investment banking, and brokerage. Finally, corporate finance covers capital budgeting, capital structure, bankruptcy, corporate control, and payout policy. As indicated by the middle column of table 1, many of these topics have close analogues in real estate finance. Collectively, the topics in the center column cover most research in real estate finance. For example, of the 190 articles published in the *Journal of Real Estate Finance and Economics (JREFE)* from 1990 to 1996, about 82% fall within these categories. Details appear in the right column of table 1. The remaining 18% of all articles can be categorized as either micro or urban economics.

In table 1 the close correspondence between the left and center columns is limited largely by the inherent differences between listed securities and real assets. For example, investors' demand for portfolios of securities differs from homeowners' demand for housing due partly to the previously mentioned issues of costly, sequential search. The latter demand also reflects the dual role of owner-occupied housing as both an asset in a

Table 1. Financial economic topics categorized by the *Journal of Economic Literature*.

Categories in <i>JEL</i> Under Financial Economics ^a	Corresponding Topics in Real Estate Finance	Articles in <i>JREFE</i> ^b
Portfolio choice	Housing demand	5%
Returns on securities	Returns on assets, indicies, and securities, hedonic models	36
Microstructure	Auctions, brokerage, search	15
Contingent claims	Mortgages and real options	7
Information and event studies	Information and event studies	6
International finance	International real estate finance	5
Corporate finance	Bankruptcy, security design, other	7
		82

a. Selected subcategories in the *Journal of Economic Literature* (*JEL*) under financial economics (Section G): general financial markets (G1), financial institutions and services (G2), and corporate finance and governance (G3).

b. Percentages of articles published in the *Journal of Real Estate Finance and Economics* (*JREFE*) from 1990 to 1996, volumes 3 to 13.

household's portfolio and its consumption of services. In turn, the dual role is due largely to the limited supply—limited both in quantity and quality—of rental, single-family residences.³ Other close connections in table 1 include infrequently traded assets that have motivated papers on estimating betas in financial economics and constructing indicies of residential returns in real estate finance.⁴ Despite their separate origins, factor-pricing models in finance have much in common with hedonic-pricing models in real estate.⁵ Finally, in both finance and real estate finance the empirical focus on listed securities, including REITs, is due largely to the common availability of data from CRSP and other sources. This applies to statistical models of efficient portfolios, present value, and announcement effects.⁶

Perhaps the closest connection between the core of finance and real estate is the large literature on mortgage-backed securities. Here, not only are analytical techniques from the core easily applied to price contingent claims in real estate, but also data are readily available for empirical tests. Most attention, including much from Wall Street, has focused on the risk from both default and prepayment on underlying residential mortgages. To date, purely analytical methods based on optimal exercise policies for the two options to default and to repay have had only limited success with the data. More eclectic methods with empirical hazard functions and heterogeneous costs better explain actual defaults and prepayments.⁷ Game-theoretic models of securities in real estate are still in their infancy.⁸ Analytical techniques for pricing contingent claims have also been applied to related issues in real estate, like leases and tax-timing options.⁹

4. Real Options

With such a close connection to the core of finance, how can real estate finance not become derivative to the core? Is it not tempting to apply techniques well known in the core to

problems on the periphery? Occasionally, we may even be tempted merely to relabel variables and to reinterpret standard results. Presumably, good research requires more than merely reporting results from one area to another. At the very least, it requires derivation of results specific to the special situation. As an example, consider the growing literature on real options. Raw land can be regarded as an option with an infinite life to build at an exercise price equal to the cost of construction.¹⁰ In fact, it is a compound option with development in stages: first zoning and preliminary permitting; next final permitting, grading, infrastructure, and last building. Once developed, the property begins to depreciate. It can then be redeveloped repeatedly with higher densities or different uses.¹¹ Real options also differ in other important details from financial options. Since developers and owners must search for matches, development cannot occur at any time but only after matches.¹² Because building takes time, real options cannot be exercised instantaneously.¹³ Once completed, new construction adds to the supply of developed assets and thereby reduces competitive rents. Also, local builders may have limited capacity, and the local market may have limited land available for development. Finally, some developers may have local market power. All these characteristics of real options affect their optimal exercise policies and thereby the market values of both developed and undeveloped real assets.¹⁴

To date, the growing literature on real options in real estate finance has contributed surprisingly little to the entirely separate, large literature on cities in urban economics. In urban economics the classic model of a city is monocentric with all employment at the center and all commuting times or distances measured from the center. Given no depreciation of buildings and no externalities within neighborhoods, all prices and rents or implicit rents of urban and suburban housing decrease monotonically with the distance from the center. In this context, the boundary of the city becomes the optimal exercise point of the option to develop rural land into suburban housing. The distance from either the boundary or the center is the metric for pricing rural land as an option to develop that is now out of the money.¹⁵ Clearly, much more can be done. Over time, buildings depreciate and the city expands. Although urban land can be redeveloped repeatedly, the option to redevelop may be exercised only infrequently because its value is limited by externalities within neighborhoods. In older areas with deteriorated, obsolete properties, improvements may add so little value that redevelopment occurs only after public condemnation of entire neighborhoods. The same externalities, combined with the demand for new housing, then make more valuable the option to develop on the periphery. In equilibrium the city then depreciates around its center and grows faster on average around its periphery. Prices and rents may no longer decrease monotonically with distance from the center because quality may increase with distance.

5. Microstructure of Markets

The microstructure of markets is another area with connections between the core of finance and applications in real estate finance. In real estate microstructure arguably includes three main areas: auctions, brokerage, and search. With auctions a major issue is

the choice of mechanisms for marketing assets: under what conditions are sellers' expected net revenues higher under auctions than sequential searches with brokers.¹⁶ In nearly all markets for all types of real estate, the major mechanism is search with brokers by both buyers and sellers. This then raises the important issue of optimal contracts with brokers. Under what conditions are common contracts optimal?¹⁷ These include exclusive listing agreements by sellers with contractual asking prices and constant percentage commissions paid upon sale and split equally between broker for buyers and sellers. Evidently, exclusive listings dominate other contracts, like single-client agreements, where sellers can eliminate listing brokers and thereby better motivate buyers' brokers with higher commissions. Also, standard contracts with proportional commissions seemingly dominate incentive contracts with progressive commissions.

Search, the remaining topic in microstructure, has been explored extensively in economics, finance, and real estate. Sequential search in steady state was studied first in labor economics and later applied to both corporate finance and real estate.¹⁸ Steady state precludes the stochastic evolution through time of a variable representing the state of the market. Such a stochastic state variable appears in all models of contingent claims. Realistically, assets must be valued with a stochastic state, complicated by costly search and bargaining between matched buyers and sellers.¹⁹ Given costly search and a stochastic state, how are assets priced and traded? How do the results relate to the pricing of contingent claims in finance? What expected returns must real assets earn to compensate their owners for the illiquidity induced by costly search?

6. Hot Topics

What is a hot topic in real estate finance? To answer this question, ask what stylized facts in real estate seem most anomalous to financial economists? Perhaps the most perplexing is the anecdotal and empirical evidence of local business cycles in all categories of commercial and residential real estate. In hot markets with rising prices, the volume of transactions is high; the inventory of unsold homes is low; and the average time to sale is low—sometimes surprisingly so—all relative to local historical averages. In cold markets with falling prices, the reverse is true.²⁰ In all markets volume leads returns, whereas in recovering markets higher quality properties lead lower quality properties. In particular, A properties in A markets appear to recover on average before either B properties in A markets or A properties in B markets, and so on. Across all categories of commercial and residential real estate, more developed properties seem to recover before less developed properties. The sequence seems to be buildings followed by fully entitled and improved land, followed by partially unentitled and unimproved land.

Focus first on cycles for single-family residences. Conventional wisdom common among residential brokers runs as follows. In cold markets many sellers have high reservation prices relative to buyers for two reasons. Psychologically, individuals seem reluctant to realize losses. Also, with their losses leveraged by conventional mortgages, sellers may have too little cash to buy replacement residences.²¹ Rather than selling at current prices, potential sellers may prefer to remain in their homes even if their

circumstances have changed after new jobs or new children. This inertia can be important empirically if rental homes are limited in supply and many owners are highly leveraged and poorly diversified with respect to the equity in their homes. In markets with limited rental housing, the latter occurs when many families consume as much housing services as they can afford. In turn, these properties of equilibrium produce sequential recovery within regional housing markets. Families buy better houses in better neighborhoods until rising prices force buyers into poorer houses in poorer neighborhoods. One challenge for financial economists is to use these stylized facts to derive a dynamic equilibrium with the above relationships between volume and return through the business cycle and across submarkets distinguished by quality. Ideally, the equilibrium should also explain the more perplexing, empirically evident, extremely short times to sale in hot markets.

Similar, intertemporal and cross-sectional patterns appear repeatedly in markets for commercial real estate. For each class of commercial real estate, including both developed and undeveloped properties, these patterns persist in both resale markets and rental markets. For example, the average time to lease large, contiguous office and industrial space appears to be low in hot markets with rising rents and high in cold markets with falling rents. Conventional wisdom among practitioners points to what academics call the fallacy of sunk costs. In hot markets many landlords seemingly sell or lease to lock in gains once their returns reach an acceptable level. Even with momentum in prices and rents, many appear unwilling to wait in hot markets for extraordinary gains. In cold markets the same owners evidently choose to defer both losses and leases even when rents remain above marginal operating costs. For managers who must report to their superiors, this behavior may reflect second-best sharing rules within hierarchical organizations owned by atomistic stockholders. For managers who are also owners, it is much more puzzling. Possible explanations fall within the purview of what has become behavioral finance.

More generally, much of the business cycle in commercial real estate may be produced by institutional investors and lenders that are plagued by agency problems between their atomistic owners and professional managers.²² Again according to conventional wisdom, institutions both enter and exit local markets on average after private investors. Moreover, institutions typically avoid both empty buildings and empty land. As a result, institutional investors apparently earn on average lower rates of return than noninstitutional investors. Do these lower average returns merely reflect greater institutional aversion to risk? If so, then institutions should separate systematic from residual risk, avoid the former, and bear in equilibrium more residual risk than small private investors with poorly diversified portfolios of real assets. In fact, institutions often do not distinguish between diversifiable and nondiversifiable risk.²³ Also, why should institutions with both well-diversified portfolios of real assets and well-diversified atomistic owners be more averse to risk than poorly diversified private investors? Alternatively, lower institutional returns could reflect the separate ownership and control that characterizes institutions but not private investors?²⁴ Realistically, distant, diverse owners cannot monitor well their managers' private efforts either to understand local markets or to identify promising properties without current cash flows. In this case, institutional investors and lenders may optimally follow private investors both into and out of markets and avoid both empty buildings and land. This second-best behavior could be induced in equilibrium by a concave

compensation schedule for institutional managers with the following realistic properties: behavior different from institutional norms would be rewarded modestly if profitable and punished severely if unprofitable. This asymmetric compensation would then induce risk-aversion among managers and give the appearance of institutional aversion to both systematic and residual risk. In turn, the equilibrium would be reinforced through self-selection in the labor market by both employees and employers.

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Notes

1. Surveys appear in the *Journal of Real Estate Literature*.
2. Dramatic empirical evidence on the relationship between residential returns and volume appears in Krashinsky and Milne (1987).
3. The limited supply of rental housing in single-family structures may reflect conflicts of interest between landlords and tenants, as argued in Williams (1993a).
4. The literature on indicies for infrequently traded real estate is lengthy. Methodological contributions include Bailey, Muth, and Norse (1963), Webb (1988), and Goetzmann (1992). Empirical applications include Case and Shiller (1987, 1988, 1989) and Kuo (1996).
5. Mei and Lee (1994) includes real estate as a factor. Hedonic pricing models started with Rosen (1974).
6. Examples of statistical models in each category are respectively Goetzmann (1993), Liu and Mei (1994), and Damodaran and Liu (1993).
7. The large literature on pricing as contingent claims mortgages and mortgage-backed securities includes Dunn and McConnell (1981), Schwartz and Torous (1989), Titman and Torous (1989), and Kau, Keenan, Muller, and Epperson (1990, 1995). Empirical tests of these models include Quigley and Van Order (1995) and Stanton (1995, 1996).
8. A notable example is Dunn and Spatt (1985).
9. Commercial leases are priced in Grenadier (1995b, 1996a). Depreciable assets are priced and optimal strategies for realizing capital gains or losses are derived in Williams (1985).
10. This observation has been attributed to Titman (1985).
11. Repeated redevelopment of real assets is the focus of Childs, Riddiough, and Triantis (1996) and Williams (1997).
12. Pricing and optimal exercise of the option to develop with infrequent matches is explored in Williams (1995).
13. An early, important paper is Majd and Pindyck (1987).
14. These issues are explored in Williams (1993b). The latter issue is also explored in Grenadier (1996b).
15. For example, see Capozza and Lee (1994) and the references cited therein.
16. A seller's choice between an auction and search is explored in Quan (1997) and the references cited therein.
17. Articles on brokerage in real estate include Yinger (1981), Anglin and Arnott (1991), Geltner, Kluger, and Miller (1991), Miceli (1991), Anglin (1994), Yavas (1995, 1996), and Williams (1998).
18. Models of search in steady-state include Baldwin and Myer (1979) for corporate finance, and Wheaton (1991) and Yavas (1992) for real estate.
19. See Williams (1995).
20. Empirical papers on cycles in real estate also include Wheaton (1987) and Abraham and Hendershott (1996).

21. Empirical evidence of the relationship between equity, leverage, and reservation prices, as reflected in average times to sale, appears in Genesove and Mayer (1997). Some conventional wisdom is discussed in Stein (1995).
22. Both conventional wisdom and some empirical evidence suggest that institutional investors and lenders affect prices, returns, and volume in both commercial and residential real estate. Conventional wisdom is discussed in Grenadier (1995a). Empirical evidence on the effect of commercial banks includes Ambrose, Benjamin, and Chinloy (1996), and Hancock and Wilcox (1997).
23. For example, institutional investors and lenders repeatedly show preferences for A over B over C properties, relative to noninstitutional investors. If older, obsolete, lower quality properties in poorer but stable neighborhoods are more risky, the incremental risk is largely residual. Its primary source is unpredictable costs from deferred maintenance.
24. A theory of institutional herds must exploit the separation of ownership and control that characterizes large, hierarchial institutions with atomistic owners. One approach is Scharfstein and Stein (1990). There, professional managers follow the herd to mimic their possibly informed competitors. However, prices of assets are exogenous in their model. Models of cycles with endogenous prices rely on switching costs: time to build, as in Kydland and Prescott (1982), or moving between markets, as in Gouge and King (1997).

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