DO BUYER AND SELLER MOTIVATIONS AFFECT TRANSACTION PRICES IN COMMERCIAL REAL ESTATE MARKETS? EVIDENCE FROM TAX-DEFERRED EXCHANGES AND OTHER CONDITIONS OF SALE

By

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This dissertation is dedicated to my parents.

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Heterogeneous buyer and seller motivations are common in real estate transactions. However, there are only a few studies limited to one property type and market that examine the effect of atypical motivations on observed selling price. I investigate several heterogeneous motivations that could have an effect on prices of apartment, office and retail properties in fifteen major metropolitan markets. In particular, I focus on analyzing transactions motivated by tax-deferred exchanges. I find a significant positive price effect related to replacement property exchanges. This result is robust across geographic markets and property types. For example, I observe a price premium for replacement tax-deferred exchanges ranging from 5% in Seattle to 18% in Denver for apartment transactions, from 19% in Seattle to 36% in Chicago for office sales, and from 12% in Seattle to 45% in Chicago for retail sales. This dissertation represents the first work that

measures the size of the exchange market nationwide, and defines conceptually and empirically the magnitude of the effect of exchanges on transaction prices in different markets across the country and across property types. The results imply that participants in tax-delayed exchanges, need to be careful because the price they pay in the form of higher replacement property price may offset, in whole or in part, the gain from deferment of taxes.

I also analyze properties purchased by out-of-state buyers, sales that are part of sale-leasebacks, portfolio transactions, or condominium conversions. I find that these special motivations are generally associated with positive price premiums. These results have important implications since they demonstrate not only that various atypical motivations of buyers and sellers have an impact on transaction prices in commercial real estate, but also that this impact is sensitive to the market, as well as to the property type.

CHAPTER 1
INTRODUCTION

I study the role that heterogeneous buyer and seller motivations play in determining sales price in commercial real estate. Generally, price models are built based on the assumptions that market participants have homogeneous motivations. In appraisal literature, homogeneous motivation is central to the concept of market value.[1] However, various conditions of sale which can be viewed as distinct motivations appear to be quite common in commercial real estate transactions. The literature documents multiple situations in which sellers have heterogeneous motivation (Geltner, Kluger and Miller (1988), Quan and Quigley (1991), Sirmans, Turnbull and Dombrow, 1995, Glower, Haurin, Hendershott (1998)). Common atypical motivations include tax-deferred exchanges, bank-foreclosed property sales, liquidation sales, eminent domain sales, purchases by real estate investment trusts, purchases by tenants, purchases by out-of-state buyers, condo conversions, sales-and-leasebacks, and portfolio sales.

Analyzing the impact of investor motivations on sales price is important for several reasons. First, the sales comparison approach, which is one of the most widely used methods for valuation in real estate, usually considers similar properties based on

[1] Market value is defined as the following: "The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby: (1) buyer and seller are typically motivated: (2) both parties are well informed advised, and each acting in what he considers his own best interest: (3) a reasonable time is allowed for exposure in the open market: (4) payment is made in terms of cash in U. S. dollars or in terms of financial arrangements comparable thereto; and (5) the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions by anyone associated with the sale." National Residential Real Estate Appraisal Institute, 2006

structural characteristics and location. However, if conditions of sale have an effect on price, then investors need to be aware of such impact and know how to adjust correspondingly.

Second, some motivations appear to have different roles in different parts of the country. For example, during the last six years tax-deferred exchanges represented approximately 19 percent of total commercial real estate sales. However, in some areas of the country, and in particular in the West Coast, exchanges represented close to 50 percent of all sales. In addition, exchanges tend to be more frequent for apartments than for other types of commercial real estate, such as office and retail. This raises questions as to whether the impact of sale conditions varies by markets, as well as property type. Therefore, while analyzing the impact of buyer and seller motivation is important, it is not sufficient to conduct the analysis based on one market and property type, which is a common feature of the existent literature. By conducting a comprehensive analysis across major metropolitan markets, as well as property types, this dissertation can be used as an important reference by appraisers for the adjustment of prices when the sales comparison approach is used.

Finally, although there is a large body of literature devoted to examining the influence of structural characteristics and location on sales price, only a few papers examine the impact of atypical motivations on price. Slade (2004) in a review article provides a summary of possible conditions that influence motivation. He discusses four major conditions that cause atypical motivations:

- Tax-Deferred Exchanges
- Bank-Foreclosed Properties
- Acquisitions by REITs
- Out-of-State Buyers

He also mentions two other conditions that may influence transactions price: reduced marketing period (liquidation) and eminent domain.

In his review, Slade (2004) identifies one study on tax-deferred exchanges (Holmes and Slade, 2001), seven papers on bank-foreclosed properties (Shilling et al., 1990, Forgey et al., 1994, Hardin and Wolverton, 1996, Lambson, McQueen and Slade, 2004, Downs and Slade, 1999, and Munneke and Slade, 2000, 2001), two published studies involving sales by REITs (Hardin and Wolverton, 1999, and Lambson, McQueen and Slade, 2004), and two published papers examining the influence out-of-state buyers (Lambson, McQueen and Slade, 2004, and Turnbull and Sirmans, 1993).

Holmes and Slade's analysis (2001) shows that in the Phoenix market, tax-deferred exchanges are associated with a 7.9 percent price premium. Bank-foreclosed apartments are associated with a 22 – 23 percent price discount (Hardin and Wolverton, 1996; Lambson, McQueen and Slade, 2004). In bank-foreclosed offices, Munneke and Slade (2000, 2001) find discounts ranging from 11 percent to 31 percent. In apartment acquisitions by REITs, different studies find premiums ranging from zero to 28 percent (Hardin and Wolverton, 1996, Lambson, McQueen and Slade, 2004). In properties sold to out-of-state buyers, Lambson, McQueen and Slade (2004) observe a 5 to 7 percent premium for apartments.

A related stream of literature analyzes the impact of seller's motivation on selling time. For example, in a home sellers survey, Glower, Haurin and Hendershott (1998) find that a seller, who at the time of listing has a planned time to move, sells more quickly than one that does not.

The majority of these studies are based on either homes or residential real estate. Only Downs and Slade (1999) and Munneke and Slade (2000, 2001) study property types that are different from residential in this case offices. All of the previous studies, with the exception of one, focus on one market and one property type. The study by Hardin and Wolverton (1999) analyses REIT purchases in three markets – Atlanta, Phoenix and Seattle.

I examine several conditions of sale which represent distinct motivations that are frequently seen in comparable sales data and could influence sales price. In particular, I focus attention on the use of tax-deferred exchanges nationwide and their effect on observed transaction prices.

Tax-deferred exchanges are transactions in which a taxpayer is able to defer payment of some, or all, of the federal income taxes associated with the disposition of real property by acquiring another property of "like kind." Although Section 1031 of the Internal Revenue Code (IRC) dates back to the 1920's, exchanges under the original restrictions could only be completed as a simultaneous swap of properties among two or more parties. The required simultaneous exchange of property severely limited the usefulness of Section 1031 exchanges as a tax deferral tool because of the difficulty of synchronizing the close of two or more complex transactions.

Only in 1984, in response to an earlier court decision related to the "Starker" case (Starker vs. United States, 602 F. 2d 1341 (9th cir., 1979)), did Congress amend the original regulations to allow taxpayers more time to complete the transaction. More specifically, a taxpayer who initiates a Section 1031 tax-deferred exchange has up to 45 days after the disposition of the "relinquished" property to identify a replacement

property and 180 days (135 beyond the 45-day period) to complete the delayed exchange by acquiring the replacement property (Internal Revenue Code Section, Title 26, Section 1031). Nevertheless, the Section 1031 exchange market did not fully evolve until 1991 when the Internal Revenue Service (IRS) issued final regulations for initiating and completing delayed Section 1031 exchanges.

The use of tax-deferred exchanges has grown significantly during the last decade. For example, in 2004, an estimated 80 percent of all commercial real estate transactions on the West Coast involved the use of an exchange (McLinden, 2004).

Many real estate practitioners argue that taxpayers should use exchanges whenever possible, despite higher average transaction/selling costs than "regular" fully taxable sales. However, such advice may not fully account for the potential price discount associated with the sale of the relinquished property in an exchange or the price premium that may be required to obtain the replacement property. Separately or together, these price effects may fully or partially offset the tax deferral benefits of an exchange.

Since most tax-deferred exchanges are negotiated and closed in private markets, quantification of the size and scope of the real estate Section 1031 exchange market has not been possible. In addition, very little is known about the effects of tax-deferred exchanges on observed transaction prices and whether the effects have varied over time, across geographic markets, or across property types. In fact, only a handful of papers have investigated the pricing of Section 1031 exchanges (Holmes and Slade, 2001; Lambson, McQueen and Slade, 2004). As discussed above, a major weakness of the prior studies is that they examine just one market and one property type (the Phoenix apartment market); therefore the results are difficult to generalize.

This dissertation represents the first work that defines conceptually and empirically the magnitude of the effect of exchanges on transaction prices in different markets across the country and across property types. I also examine possible price effects associated with properties that are purchased by out-of-state buyers, as well as sales that are part of condo conversions, portfolio transactions, or sale-leaseback transactions.

The remainder of the dissertation is organized as follows. Chapter 2 presents an overview of tax-deferred exchanges and discusses their potential advantages and disadvantages. Chapter 3 discusses out-of-state buyer motivations, condo conversions, sale-leasebacks and portfolio sales. Chapter 4 reviews the theoretical background for observing price effects associated with atypical motivations, develops a conceptual framework for quantifying the benefits of Section 1031 exchanges, and simulates a range of possible transaction price effects. Chapter 5 presents a simulation analysis of the theoretical benefits from using an exchange. In Chapter 6, I present the empirical data set and research methodology. Chapter 7 contains the results of the empirical analysis for residential real estate. Chapters 8 and 9 present the results of the empirical analysis for office and retail properties, correspondingly. Finally, in Chapter 10, I summarize the results and offer some concluding comments.

CHAPTER 2
TAX-DEFERRED EXCHANGES

Tax-Deferred Exchanges Overview

Realized gains from the sale or exchange of real property must generally be recognized for federal income purposes (Internal Revenue Code Section 1001(c)). In general, the realized gain is equal to the net selling price of the property minus the adjusted tax basis.[1] However, under Section 1031 of the IRC, real estate owners who dispose of their investment, rental, or vacation property and reinvest the net proceeds in other "like kind" property are able to defer recognition of the capital gain realized on the sale of the relinquished property.

It is important to note that a Section 1031 exchange is, strictly speaking, a tax deferral technique. The taxpayer's basis in the replacement property is set equal to the transaction price of the replacement property, minus the gain deferred on the disposition of the relinquished property. Therefore, when (if) the replacement property is subsequently disposed of in a fully taxable sale, the realized gain will equal the deferred gain plus any additional taxable gain realized since the acquisition of the replacement property. However, if the subsequent disposition of the replacement property is also structured in the form of a Section 1031 exchange, the realized gain can again be deferred.[2]

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[1] The adjusted tax basis is equal to the original cost basis (including the value of the land), plus the cost of any capital improvements undertaken since acquisition of the property, minus cumulative depreciation.

[2] Tax deferral turns into permanent tax savings upon the death of the taxpayer because the basis of the property is "stepped-up" to its current fair market value. Thus, the taxpayer's heirs can dispose of the

In order for the exchanging taxpayer to avoid completely the recognition of the accrued taxable gain, he or she must acquire a property of equal or greater value than the relinquished property. In addition, the taxpayer must use all of the net cash proceeds generated from the sale of the relinquished property to purchase the replacement property. The transaction is taxable to the extent that (1) the value of the replacement property is less than the value of the relinquished property and (2) there is cash left over after the purchase of the replacement property.

Types of Tax-Deferred Exchanges

There are a number of ways in which a Section 1031 exchange can be structured involving two or more of the following parties:

- *Taxpayer*: elects to relinquish his property via a Section 1031 exchange.
- *Seller*: owns the real estate that the taxpayer acquires as the replacement property.
- *Buyer*: purchaser of the taxpayer's relinquished property.
- *Qualified Intermediary*: independent agent who facilitates the exchange. The qualified intermediary (QI) takes an assignment of rights in the sale of the relinquished property and the purchase contract for the replacement property. In short, the QI buys and then resells the properties for a fee.

Although rare, the two-party exchange is the purest form of exchange. The transaction involves two parties who simultaneously exchange ("swap") properties. Title to the relinquished property is conveyed by the taxpayer to the seller and title to the replacement property is conveyed by the seller to the taxpayer. The two party exchange in depicted in Figure 1.

Since the swapped properties are rarely of equal value, the party with the least valuable position will have to pay cash (or its equivalent) to the other party in order to balance the equity positions. Cash received as part of the transaction must be recognized

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property in a fully taxable sale and not have to pay taxes on gains deferred through one or more Section 1031 exchanges.

as a taxable gain in the year of the exchange. Thus, taxpayers exchanging into less valuable properties lose a portion of the tax deferral benefits associated with like-kind exchanges.[3]

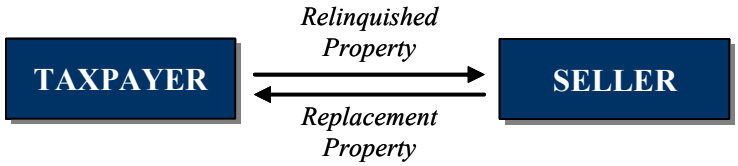

Figure 1. Direct Exchange (Swap)

Most Section 1031 transactions are "delayed" exchanges that involve the use of a qualified intermediary. In a delayed exchange, ownership of the relinquished property is transferred to the buyer. However, the buyer of the relinquished property transfers the agreed-upon cash amount to the QI, not the taxpayer. This first phase of the delayed exchange, often referred to as the taxpayer's "down-leg," is depicted in the top portion of Figure 2.

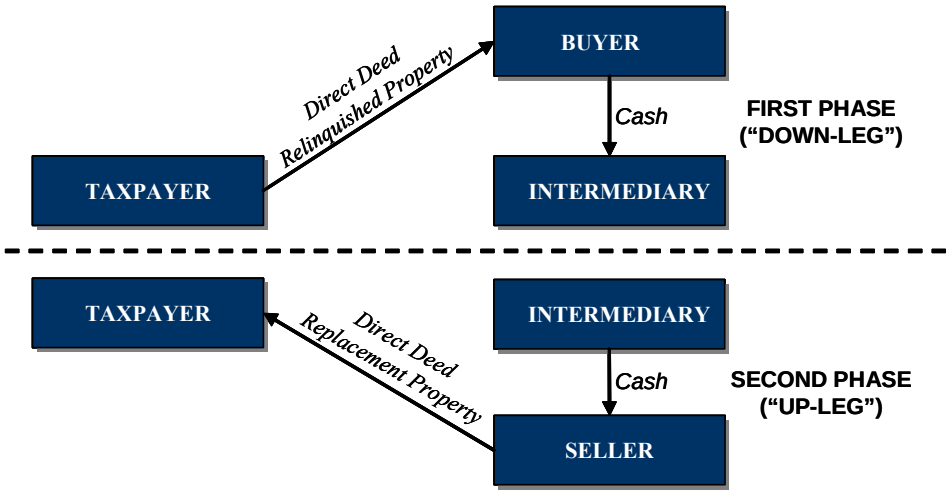

Figure 2. Delayed Exchange with Intermediary

[3] To the extent an exchanging taxpayer must recognize a portion of the realized gain because of the receipt of cash, the taxpayer's basis in the replacement property is higher and, therefore, any subsequent realized gain from the sale of the replacement property will be lower.

The cash paid by the buyer is "parked" with the QI until the taxpayer is able to identify and close on the replacement property.

Within 45 days of sale of the relinquished property, the taxpayer must "identify" the replacement property. The identification must be specific, such as the address of the property to be acquired. To allow for the possibility that the taxpayer may not be able to come to terms with the owner of the potential replacement property, the taxpayer may designate more than one replacement property.[4]

The taxpayer must acquire one or more of the identified replacement properties within 180 days of the date of the closing of the relinquished property; that is, the 45 and 180 day periods run concurrently. There are no exceptions to these time limits and failure to comply will convert the transaction to a fully taxable sale. At the closing of the replacement property, the QI transfers cash to the seller of the replacement property and the seller transfers ownership to the taxpayer. This second phase of the delayed exchange, often referred to as the taxpayer's "up-leg," is depicted in the bottom portion of Figure 2.[5]

Basic Requirements of a Valid Section 1031 Exchange

In general, both real and personal property can qualify for tax-deferred treatment. However, some types of property are specifically disqualified; for example, stocks, bonds, notes, and ownership interests in a limited partnership or multi-member limited

[4] More specifically, the taxpayer can (1) identify up to three properties of any value or (2) identify more than three properties so long as their combined values do not exceed 200 percent of the value of the relinquished property.

[5] If the taxpayer closes on the replacement property *prior* to the sale of the relinquished property, the transaction becomes a "reverse" exchange. This dataset does not include a large enough sample of reverse exchanges to examine empirically how the pricing of such exchanges varies from delayed exchanges and fully taxable sales. I therefore do not discuss reverse exchanges here.

liability company.[6] Both the relinquished property and the replacement property must be held for productive use in trade or business or held as a "long-term investment." Thus, personal residences and property held for sale to consumers (i.e., "dealer" property) cannot be part of a Section 1031 exchange.[7] A holding period equal to or greater than one year is commonly assumed to qualify the relinquished property as a long-term investment for the purposes of implementing a tax-deferred exchange; however, the one year rule of thumb has no basis in statutory or case law.

For a transaction to qualify as a Section 1031 exchange there must (1) be a reciprocal exchange (rather than a sale for cash) and (2) the exchange must involve "like-kind" property. An exchange is clearly created by the use of a QI and the required exchange documentation. Like kind means "similar in nature or character." In fact, virtually any real estate is like-kind to any other real estate. However, real property is not like-kind to personal property. Therefore, for example, a warehouse cannot be exchanged for jewelry. In addition, foreign property cannot be exchanged for U.S. property. With the development of IRS regulations concerning Section 1031, tax-deferred exchanges are also used to trade lines of business, such as such as television and radio stations, newspapers, distributorships, and franchises, including, among others, sports teams, beer distributorships, and professional service practices (McBurney, 2004). Because a line of business includes multiple classes of assets – real, personal and intangible property – an exchange for each class needs to be completed (McBurney and Boshkov, 2003; McBurney, 2004).

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[6] Since 2003, a percentage ownership interest as a tenant-in-common (TIC) is qualified property for the purposes of a Section 1031 exchange. The taxpayer, however, must be careful that the TIC has been structured to avoid its re-characterization by the IRS as a partnership for federal income tax purposes.

[7] Vacation homes will only qualify if they have been rented out the majority of the year.

Advantages of Tax-Deferred Exchanges

The tax literature and popular press point to several motivations for use of Section 1031 exchanges. First, exchanges serve as an effective shelter from taxes, thereby preserving investment capital. In addition, exchanges can be used to upgrade portfolios (Fickes, 2003). By deferring taxes, the taxpayer can also leverage appreciation and afford to acquire a larger/higher priced replacement property. Section 1031 exchanges can also be used to consolidate or diversify properties, exchange low-return properties for high-return properties, or to substitute depreciable property for non-depreciable property (Wayner, 2005a and 2005b).

Drawbacks of Tax-Deferred Exchanges

Despite the advantages of tax-deferral, Section 1031 exchanges have several drawbacks. First, the taxpayer's basis in the replacement property is set equal to the market value of the replacement property, minus the deferred gain. Thus, the larger the amount of tax-deferral, the smaller is the depreciable basis in the replacement property and, therefore, the smaller is the allowable deduction for depreciation. Moreover, the larger the amount of tax-deferral, the larger will be the realized gain if and when the replacement property is subsequently disposed of in a fully taxable sale.

A second disadvantage is that the transaction costs (both monetary and non-monetary) associated with initiating and completing the exchange will likely exceed the costs of a fully taxable sale. The additional costs may include settlement fees, intermediary fees, and attorney preparation fees (Wayner, 2005b). These first two disadvantages are explicitly considered in the conceptual model presented in Chapter 4.

An additional disadvantage is that Section 1031 exchanges do not allow for the recognition of a loss for tax purposes. Thus, taxpayers will avoid using exchanges if they

have not realized a positive capital gain. Also, unlike the proceeds from a "cash out" refinancing, tax-deferred exchanges do not provide a method for drawing tax-free cash out of the relinquished property. This is because any cash received in the year of the exchange is fully taxable.

Exchanges and Price Effects

If a taxpayer is successful in completing a simultaneous or delayed tax-deferred exchange, the realized tax liability will be deferred until the replacement property is subsequently disposed of in a fully taxable sale. A portion of the realized gain will be recognized in the tax year in which the exchange occurs to the extent that the value of the relinquished property exceeds the value of the replacement property. The present value of the income tax deferral benefit is therefore a function of the magnitude of the deferred capital gain, the expected holding period of the replacement property, and the applicable discount rate.

A taxpayer entering into a tax-deferred exchange can afford to accept an offer for the relinquished property that is lower than the investment value he or she places on the property by an amount that is equal to, or less than, the present value of the income tax deferral benefit. That is, depending on current market conditions, including liquidity, the negotiating abilities of the taxpayer and potential buyers, and whether or not potential buyers are aware the taxpayer is initiating a Section 1031 exchange, the selling taxpayer may be willing or required to "share" a portion of the expected tax deferral benefits with the buyer of the relinquished property. Since Section 1031 exchanges are a tax-deferral technique, sellers will not enter in exchanges, unless their property has appreciated in value and (or) has significantly depreciated. If avoiding capital gains tax is the main motivation for participating in an exchange then all else equal relinquished properties will

have higher values than properties that are not part of an exchange. Therefore, the net effect of discussed above factors is not clear. I expect to find that prices paid for relinquished properties will be higher or less than transaction prices in fully taxable sales, all else equal.

In contrast, taxpayers face significant compliance risk when seeking to complete the second leg of a tax-deferred exchange by identifying and purchasing a replacement property within the 45- and 180-day time limits. The strict time requirements imposed by IRS regulations, in addition to the complicated nature of tax-deferred exchanges, can lead to a temporary increase in demand in order for investors to find replacement properties and close the exchanges in a timely manner. In perfect markets, a temporary increase in demand by exchange motivated investors has no effect on market prices because supply can instantaneously respond. However, commercial real estate markets are known to be "thin" and less elastic. Therefore, I expect that buyers closing on a tax-deferred exchange transaction may be willing or required to give up some of their benefits from deferring taxes and pay a premium for the replacement property relative to its fair market value in order to acquire their property within the time constraint. In a competitive market the amount of the price premium will not exceed the expected present value of tax deferral, with the actual magnitude of the premium again depending on market liquidity, the negotiating abilities of the taxpayer and potential sellers, and whether or not potential sellers are aware the taxpayer is attempting to complete a Section 1031 exchange.

CHAPTER 3
OTHER ATYPICAL MOTIVATIONS

Purchases by Out-of-State Buyers

Anecdotal evidence suggests that out-of-state buyers, especially from higher-cost areas, pay more for real estate than in-state buyers, especially those residing in lower cost areas. This observation is explained by buyers "anchoring" to the higher values in their home area and therefore being willing to pay a premium for real estate in lower-cost areas. An example of anchoring are sales in neighboring states to California. Investors from California will be more willing to offer a premium for a property in Arizona or Las Vegas, since they are anchoring on the high prices of real estate in their home state. The "anchoring" phenomenon is explained by behavioral literature. Slovic and Lichtenstein (1971) and Tversky and Kahneman (1974) were the first academics to discuss heuristics and biases. In the real estate literature, Northcraft and Neale (1987) presented strong evidence of anchoring in property pricing that was similar for both amateurs and real estate professionals. Other real estate studies that find evidence for anchoring include Black and Diaz (1996), Diaz and Hansz (1997), Diaz and Wolverton (1998), and Diaz, Zhao and Black (1999). Additional evidence of anchoring in real estate is seen in appraisal smoothing. A large body of literature discusses smoothing in appraisal based indexes, due to appraisal values lagging true prices and being too reliant on historical prices (Geltner (1989) and Webb (1994)).

Turnbull and Sirmans (1993) attribute observed out-state buyers' price premiums to higher search costs. In their model, buyers with higher search costs will search less than

investors with lower search costs, and therefore will tend to overpay on average. Lambson, McQueen and Slade (2004) identify three factors that contribute to observed premiums: biased beliefs, high search costs and time pressure, namely the haste associated with out-of-state buyers. Their paper examines 2,854 apartment sales in Phoenix during 1990 – mid 2002 and finds a 5 – 7 percent premium associated with purchases by out-of-state buyers. One limitation of the Lambson, McQueen and Slade study is that it is based on one market and one property type. Therefore, it is not clear to what extent their findings carry over to other property types and markets. The objective of this paper is to examine not only whether there is any price premium associated with purchases by out-of-state buyers, but also to establish to what extent such premiums vary accross markets and by property types.

Condominium Conversion

The conversion of rental properties to condominium ownership have been very popular in the recent past, induced by increasing house prices and lagging rent levels. This trend is expected to slow or be reversed in 2006 given an oversupply of condos and shortage of apartments in some markets. In competitive markets the motivation of the condo converter should not have an impact on sales prices. However, as Lambson, McQueen and Slade (2004) point out "apartment complexes trade infrequently with high transaction costs… and real estate buyers have heterogeneous information" (p. 86). Therefore, an investor that is buying a multifamily property with the objective of converting its units to condos may be willing to pay a premium because of the expected higher price he will net per condo sold.

Portfolio Sales

Previous studies on portfolio sales focus on the stock price effects from announcements of portfolio sales. A portfolio sale is defined as a transaction in which two or more unrelated properties are sold to the same buyer. Studies that are based on property sales prior to 1992 found no abnormal returns associated with portfolio sales announcements. Glascock, Davidson and Sirmans (1991) examined 51 real estate portfolio purchases prior to 1986 and find that abnormal returns are insignificantly different from zero. McIntosh, Ott and Liang (1995) reached a similar conclusion based on a 54-transaction sample during 1968-1990, in which all of the acquirers are Real Estate Investment Trusts (REITs). Booth, Glascock and Sarkar (1996) studied a sample of 94 portfolio acquisitions and also failed to observe any significant abnormal returns. These findings are consistent with expectations in competitive markets, since they signify that no change in shareholder wealth results whether assets are acquired and sold separately or together.

However, a more recent study based on the "modern" post-1992 REIT market by Campbell, Petrova and Sirmans (2003) finds average abnormal returns for the acquirer of approximately 0.5 percent in a study based on 209 portfolio acquisitions during 1995-2001. As the authors point out, these results suggest a clear change in the regime of such transactions, post 1992, when new regulations relaxed the restrictions on ownership concentrations for Real Estate Investment Trusts and thereby led to an increase of capital flows to REITs, especially by institutions. Campbell, Sirmans and Petrova (Ibid.) present evidence that the observed returns are related to the positive effect of reconfirming geographical focus, signaling by taking on private debt and private placement of stock with institutions.

None of the existing studies addresses whether properties with similar characteristics will sell at a premium (discount) if they are part of a portfolio transaction. By bundling together several properties in one transaction, buyers may enjoy acquisition economies of scale, decreased transaction costs, as well as decreased search costs. A portfolio acquisition can provide the buyer with quick exposure or focus in a desired geographical or property market. However, such transactions are also more complex to negotiate and complete. All else equal, a portfolio buyer may be willing to give up some of the expected benefits from acquisition and pay a premium to obtain a desired portfolio. The premium paid will also depend on the market power of the real estate portfolio buyer. Therefore, in cases involving large influential buyers (e.g. REITs, or institutions) a discount associated with real estate portfolio purchase may be observed. Anecdotal evidence from the real estate professional press suggests that portfolio acquisitions by REITs are frequently the quickest and cheapest way for REITs to acquire properties. They can consequently turn around and dispose of less attractive properties.

Sale-Leasebacks

In a sale-leaseback transaction, a firm sells an asset, such as real estate property or equipment, to another firm and simultaneously leases it back. Academic research focuses on tax motivation as the major source of value creation in corporate sale-leasebacks (see Miller and Upton (1976), Lewellen, Long and McConnell (1976), Myers, Dill and Bautista (1976), Brealey and Yong (1980)). Recent studies including Smith and Wakeman (1984), Alvayay, Rutherford and Smith (1995), Moyer and Krishnan (1995) and Lasfer and Levis (1998) confirm the importance of tax related motivations to lease or buy, but also acknowledge other non-tax incentives. Leasing offers benefits to the lessor by increased non-debt tax shields through depreciation. Sale-leasebacks create value

when there is a difference between applicable tax rates of the lessor and lessee, namely the lessor is in a higher tax bracket, while the lessee is in a lower tax bracket. Studies on the effect of sale-leaseback announcements on the lessee's and lessor's share prices record a positive effect on the lessee's share price (see Slovin, Sushka and Poloncheck (1990), Allen, Rutherford and Springer (1993), Ezzell and Vora (2001) and Fisher (2004)). Slovin, Sushka and Poloncheck (1990) conclude that the observed positive market reaction to announcements of a sale-leaseback is due to the perception of reduction of present value of expected taxes and present evidence that gains from sale-leasebacks accrue only for the lessees. In similar spirit, Lewis and Schallheim (1992) assume that leasing offers the opportunity for transferring non-debt tax shields and posit that if the lessee firm can locate a lessor firm who is more able to enjoy such tax shields then "the buyer will pay more than they are worth to the lessee" (p.498, Ibid.). According to the authors, this higher price takes the form of reduced lease payments.

In this study, sale-leasebacks are viewed as another example of atypical motivation. Under the Tax Capitalization Hypothesis and consistent with the expectations by Lewis and Schallheim (1992), I hypothesize that any expected tax benefits by the lessor may be capitalized into a higher purchase price. Therefore, everything else equal, properties that are part of sale-leaseback transactions will have higher sales price.

CHAPTER 4
THEORETICAL MOTIVATION FOR PRICE EFFECTS AND CONCEPTUAL FRAMEWORK

Theoretical Motivation for Price Effects

Generally, price models assume that buyers (sellers) are homogeneous in their motivation to buy (sell). Various conditions of sale, which can be viewed as distinct motivations appear to be quite common in commercial real estate transactions. Such conditions of sale can impact transaction prices. Motivated buyers can create a temporary increase in demand in property markets. In perfect markets, a temporary increase in demand by motivated investors has no effect on market prices because supply can instantaneously respond. However, in commercial real estate markets the supply of available properties is less elastic to shocks in demand (Wheaton and Torto, 1990; Eppli and Shilling, 1995). Jones and Orr (1999) point to differences in elasticity across real estate markets, with inelastic supply most severe in retail and office properties. Therefore, equilibrium price may change in order to eliminate excess demand. In sales motivated by a tax-deferred exchange, an out-of-state buyer, a condo-converter, a sale-leaseback transaction or a portfolio sale, I expect a positive effect on selling price, due to increased demand based on any of these atypical motivations. This effect is presented in Figure 3.

In finance theory, both the Price Pressure Hypothesis and the Imperfect Substitute Hypothesis allow for changes in equilibrium price in response to shocks in demand.

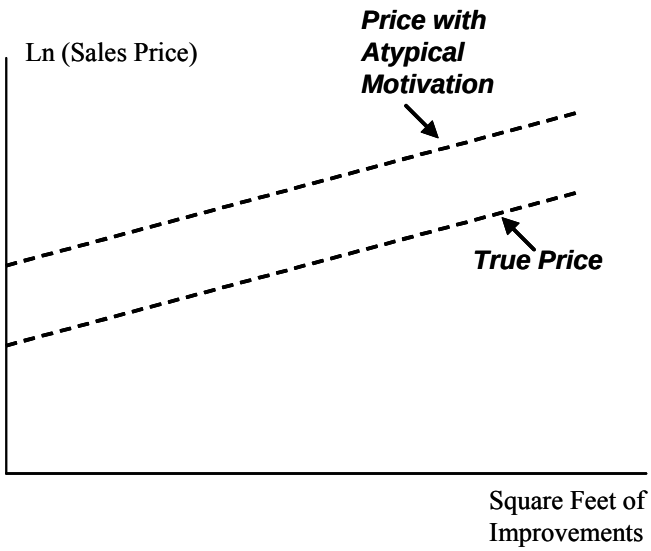

Figure 3. Impact of Atypical Motivation on Price

Price Pressure Hypothesis

The Price Pressure Hypothesis (PPH), developed first by Scholes (1972) posits that if the number of shares outstanding is increased by a secondary offering or large block sales, investors need to be offered a "sweetener" in the form of a reduced share price, so that they are willing to hold more shares. This leads to a temporary decline in share prices. Scholes (1972) tests this hypothesis by examining 1,200 secondary distributions of large block sales during 1947-1965, but finds no significant price effect.

Kraus and Stoll (1972) further develop the PPH and posit that in an imperfect market, with few investors, trading may produce significant price changes if the expectations of the marginal seller of the security are different from the marginal buyer. For example, it may be difficult for a large seller to distribute his shares at the same price. As a result, two types of distribution effects may arise. The first type is due to liquidity costs. This is a temporary effect in which the different costs of finding willing investors can move the transaction price away from the equilibrium price. In support of the PPH,

Kraus and Stoll find evidence for some form of distribution effect. Mikkelson & Partch (1985), Hess & Frost (1982), and Harris & Gurel (1986) also find empirical evidence supporting the PPH.

Imperfect Substitute Hypothesis

The second hypothesis that supports price changes in response to excess demand is the Imperfect Substitute Hypothesis (ISH). The ISH is developed as the second distribution effect discussed by Kraus & Stoll (1972). This effect is due to different investor preferences for a given security. This is a *permanent* price effect, and depends on the number of investors and on the substitutability of one security for another. In public securities markets, the Imperfect Substitute Hypothesis allows for equilibrium price changes to eliminate the excess demand. Evidence of demand induced price shocks can be found in the impact of large block trades on prices (Scholes (1972), Kraus and Stoll (1972) and Mikkelson and Parch (1985)).

Section 1031 exchanges may create a similar tax-induced demand shock. In particular, the compliance risk in delayed exchanges could create increased acquisition demand, which may force the taxpayer to share some of the expected tax-deferral benefits with the seller of the replacement property in the form of an increased purchase price. In addition, if the seller of the replacement property is aware that the taxpayer is seeking to complete a tax-deferred exchange, the taxpayer's bargaining position is clearly compromised.

Tax Capitalization Hypothesis

In competitive markets, the value of commercial real estate fully reflects the current and expected future tax treatment of depreciable assets (Hendershott and Ling, 1984, and Ling and Whinihan, 1985). Expected increases in tax liabilities are capitalized in the

value of the assets, resulting in lower asset values. The use of a tax-free exchange constitutes a "reverse tax-capitalization" (Holmes & Slade, 2001). The buyer can distribute some of his expected tax benefits due to tax-deferral in order to outbid other potential buyers.

With sale-leasebacks, leasing offers the opportunity for transferring non-debt tax shields (Lewis and Schallheim, 1992). Under the Tax Capitalization Hypothesis and consistent with the expectations by Lewis and Schallheim (1992), I hypothesize that any expected tax benefits by the lessor can be expressed in the form of a higher purchase price.

Other Factors

With out-of-state buyers a possible premium in price can be explained by anchoring. Evidence for anchoring in real estate is given by Northcraft and Neale (1987), Black and Diaz (1996), Diaz and Hansz (1997), Diaz and Wolverton (1998), and Diaz, Zhao and Black (1999). A second explanation for a possible premium involves higher search costs for out-of-state buyers (Turnbull and Sirmans, 1993). Time pressure to buy is a third possible explanation for expected price premiums (Lambson, McQueen and Slade, 2004).

Conceptual Framework

The following framework will focus on conceptualizing the net benefits from using an exchange. Assume a taxpayer who owns an income producing property has decided that the risk-return characteristics of her portfolio would be enhanced by disposing of the asset and reinvesting his (her) equity into a replacement property located in a market with more growth potential. Assume also that the replacement property has already been identified. The first strategy available to the taxpayer is to dispose of the existing

property in a fully taxable sale and then use the net proceeds, along with additional equity capital, to acquire the replacement property. The second option is to take advantage of Section 1031 of the IRC and exchange out of the existing property and into the replacement property. The second strategy would allow the taxpayer to defer recognition of the taxable gain that has accrued on the existing property. The net present value of the sale-purchase strategy, $NPVSALE_t$, assuming all-equity financing, can be represented as

$$NPVSALE_t = (ATSP_t^1 - P_t^2) + \sum_{i=1}^{n} \frac{(1-\tau_o)I_i + \tau_o DEP_i^{2,s}}{(1+k)^i} + \frac{P_{t+n}^2 - SC_{t+n}^2 - \tau_{cg} CG_{t+n}^{2,s} - \tau_{dr} RECAP_{t+n}^{2,s}}{(1+k)^n} \quad (1)$$

where:

$ATSP_t^1$	=	the net after-tax proceeds from the sale of the existing property at time *t*;
P_t^2	=	the acquisition price of the replacement property at time *t*;
τ_o	=	the taxpayer's marginal tax rate on ordinary income;
I_i	=	the expected net cash flow of the replacement property in year *i* of the expected *n*-year holding period;
$DEP_i^{2,s}$	=	allowable depreciation on the replacement property in year *i*, conditional on a sale-purchase strategy;
k	=	the required after-tax rate of return on unlevered equity;
P_{t+n}^2	=	the expected price of the replacement property in year *t*+*n*;
SC_{t+n}^2	=	expected selling costs on the disposition of the replacement property in year *t*+*n*;
τ_{cg}	=	the tax rate on capital gain income;
$CG_{t+n}^{2,s}$	=	expected capital gain income on the sale of the replacement property in year *t*+*n*, conditional on a sale-purchase strategy;
τ_{dr}	=	the tax rate on depreciation recapture income; and
$RECAP_{t+n}^{2,s}$	=	depreciation recapture income on the sale of the replacement property in year *t*+*n*, conditional on a *n*-year sale-purchase strategy.

The first term on the right-hand-side of equation (1) represents the additional equity capital that must be invested at time *t* under the sale-purchase strategy, and is equal to the after-tax proceeds from a fully taxable sale minus the acquisition price of the replacement property at time *t*. As is detailed below, if the price of the replacement property is equal

to the price of the existing property, then $ATSP_t^1 - P_t^2$ is equal to total taxes due on the sale of the existing property, plus total selling costs.

The second term on the right-hand-side of equation (1) represents the cumulative present value of the replacement property's net cash flows from annual operations, plus the present value of the annual tax savings generated by depreciation. Annual depreciation, $DEP_i^{2,s}$, is equal to

$$DEP_i^{2,s} = \frac{(1 - L_t^2)P_t^2}{RECPER} \tag{2}$$

where P_t^2 is the acquisition price of the replacement property, L_t^2 is the percentage of P_t^2 that represents non-depreciable land, and *RECPER* is the allowable cost recovery period for the replacement property.[1] Since the replacement property is purchased with the proceeds from a fully taxable sale, the original tax basis of the replacement property is "stepped up" to equal the total acquisition price, P_t^2, thereby maximizing allowable depreciation deductions over the expected *n*-year holding period.

The third and final term on the right-hand-side of equation (1) represents the expected after-tax cash proceeds from the sale of the replacement property at the end of the assumed *n*-year holding period. Deducted from the expected selling price of the replacement property at time *t*+*n* are the following: expected selling costs (SC_{t+n}^2), the expected capital gain tax liability ($\tau_{cg}\ CG_{t+n}^{2,s}$), and the expected depreciation recapture tax ($\tau_{dr}\ RECAP_{t+n}^{2,s}$).

[1] Congressional legislation has repeatedly altered the period of time over which rental real estate may be depreciated. Currently, residential real property (e.g., apartments) may be depreciated over no less than 27 and 1/2 years. The cost recovery period for nonresidential real property (e.g., shopping centers, industrial warehouses, and office buildings) is 39 years.

Under current federal income tax law, all taxable income from property sales must be classified as either ordinary income, capital gain income, or depreciation recapture income. The distinctions are important because capital gain income, under the tax rules in place in 2006, is subject to a maximum 15 percent tax rate.[2] In contrast, the maximum statutory rate on ordinary income is 35 percent.

Assuming the taxpayer's asset is classified as trade or business property and has been held for more than one year, the total taxable gain on the sale of the replacement property in year $t+n$ has the following two components

$$CG_{t+n}^{2,s} = (P_{t+n}^{2} - SC_{t+n}^{2}) - UNDBASIS_{t+n}^{2,s} \tag{3}$$

and

$$RECAP_{t+n}^{2,s} = \sum_{i=1}^{n} DEP_{i}^{2,s}\ , \tag{4},$$

where $UNDBASIS_{t+n}^{2,s}$ is the un-depreciated cost basis of the replacement property at time $t+n$. More specifically, $UNDBASIS_{t+n}^{2,s}$ is equal to acquisition price of the replacement property (P_t^2), plus any capital expenditures over the n-year holding period.[3] Note that the magnitude of $UNDBASIS_{t+n}^{2,s}$ is conditioned upon whether the replacement property was acquired via an exchange or with a sale-purchase strategy. Also note that $CG_{t+n}^{2,s}$ is the amount by which the original acquisition price of the replacement property (plus any subsequent capital improvements) is expected to increase in nominal value over the n-

[2] From 1997 to May 6, 2003, the maximum capital gain tax rate was 20 percent.

[3] According to the IRS, a capital expenditure increases the market value of the property. In contrast, expenditures deemed by the IRS to be "operating" expenses maintain, but do not fundamentally alter, the market value of the property. Capital expenditures are not depreciable in the year in which they are incurred. Rather, they are added to the tax basis of the property and then systematically expensed through annual depreciation deductions.

year holding period. Also, $RECAP_{t+n}^{2,s}$ captures the portion of the total taxable gain on sale that results from depreciation. Total taxes due on the sale of the replacement property in year $t+n$, conditional on a sale-purchase strategy, are therefore expected to be

$$TDS_{t+n}^{2,s} = \tau_{cg} CG_{t+n}^{2,s} + \tau_{dr} RECAP_{t+n}^{2,s} . \quad (5)$$

Next, the components of the after-tax proceeds from a fully taxable sale of the relinquished property at time t (the first term on the right-hand-side of equation (1)) are examined. Note that

$$ATSP_t^1 = \left(P_t^1 - SC_t^1\right) - \tau_{cg} CG_t^1 - \tau_{dr} RECAP_t^1 , \quad (6)$$

where P_t^1 is equal to the price of the relinquished property and SC_t^1 is equal to total selling costs at time t. Similar to the subsequent sale of the replacement property at time $t+n$, the capital gain and depreciation recapture portions of the total taxable gain from the sale of the relinquished property at time t are

$$CG_t^1 = (P_t^1 - SC_t^1) - UNDBASIS_t^1 \quad (7)$$

and

$$RECAP_t^1 = \sum_{i=1}^{h} DEP_i^1 , \quad (8)$$

where $UNDBASIS_t^1$ is the undepreciated cost basis of the relinquished property at time t and DEP_i^1 is equal to

$$DEP_i^1 = \frac{(1 - L_{t-h}^1) P_{t-h}^1}{RECPER} . \quad (9)$$

P_{t-h}^1 represents the acquisition price of the existing property when purchased h years ago, L_{t-h}^1 is the percentage of the original acquisition price that was non-

depreciable, and *RECPER* is the allowable cost recovery period for the existing property. Total taxes due on the sale of the relinquished property at time *t* are therefore expected to be

$$TDS_t^1 = \tau_{cg} CG_t^1 + \tau_{dr} RECAP_t^1 . \tag{10}$$

The second acquisition option available to the taxpayer is to take advantage of Section 1031 and exchange into the replacement property. The net present value of the exchange strategy, assuming all-equity financing, can be represented as

$$NPVEX_t = P_t^1 - EC_t - P_t^2 + \sum_{i=1}^{n} \frac{(1-\tau_o) I_i + \tau_o DEP_i^{2,e}}{(1+k)^i} + \frac{P_{t+n}^2 - SC_{t+n}^2 - \tau_{cg} CG_{t+n}^{2,e} - \tau_{dr} RECAP_{t+n}^{2,e}}{(1+k)^n} \tag{11}$$

where:

EC_t = the total cost of exchanging out of the relinquished property and into the replacement property at time *t*;

$DEP_i^{2,e}$ = depreciation on the replacement property in year *i*, conditional on an exchange strategy;

$CG_{t+n}^{2,e}$ = the expected capital gain income on the sale of the replacement property in year *t*+*n*, conditional on an exchange strategy; and

$RECAP_{t+n}^{2,e}$ = depreciation recapture income on the sale of the replacement property in *n* years assuming an exchange at time *t*.

All other variables are as previously defined. The capital gain and recapture components of the total taxable gain on the sale of the replacement property at time *t*+*n,* conditional on an exchange strategy are

$$CG_{t+n}^{2,e} = (P_{t+n}^2 - SC_{t+n}^2) - UNDBASIS_{t+n}^{2,e} \tag{12}$$

and

$$RECAP_{t+n}^{2,e} = \sum_{i=1}^{n} DEP_i^{2,e} , \tag{13}$$

where $UNDBASIS_{t+n}^{2,e}$ is equal to the acquisition price of the replacement property (P_t^2) minus the taxable gain that was deferred at time t ($DEFGAIN_t$) by executing an exchange strategy. $DEFGAIN_t = CG_t^1 + RECAP_t^1$, and $DEP_i^{2,e}$ is equal to

$$DEP_i^{2,e} = \frac{(1-L_t^2)(P_t^2 - DEFGAIN_t)}{RECPER}, \tag{14}$$

where L_t^2 is the percentage of the replacement property's acquisition price that is non-depreciable and $RECPER$ is the allowable cost recovery period for the existing property. Note that reducing the tax basis of the replacement property by the amount of the deferred gain insures that $DEP_i^{2,s} > DEP_i^{2,e}$. Total taxes due on the sale of the replacement property in year $t+n$, conditional on an exchange strategy at time t, are expected to be

$$TDS_{t+n}^{2,e} = \tau_{cg} CG_{t+n}^{2,e} + \tau_{dr} RECAP_{t+n}^{2,e}. \tag{15}$$

The taxpayer should exchange into the replacement property if the net present value of the exchange strategy [equation (11)] exceeds the net present value of the sale-purchase strategy [equation (1)]. To determine the net present value of the sale-purchase strategy, equations (7) and (8) are first substituted into equation (6). Equations (2), (3), (4), and (6) are then substituted into equation (1). To determine the net present value of the exchange strategy, equations (12), (13), and (14) are substituted into equation (11). Finally, subtraction of equation (1) from equation (11) produces the following expression for the incremental NPV of the exchange strategy

$$INCNPV_t = [SC_t^1 - EC_t + TDS_t^1] - \sum_{i=1}^{n} \frac{\tau_o (DEP_i^{2,s} - DEP_i^{2,e})}{(1+k)^i} + \frac{\tau_{dr} (RECAP_{t+n}^{2,s} - RECAP_{t+n}^{2,e})}{(1+k)^n}$$

$$- \frac{\tau_{cg} (CG_{t+n}^{2,e} - CG_{t+n}^{2,s})}{(1+k)^n} \qquad (16)$$

The first term in equation (16), $[SC_t^1 - EC_t + TDS_t^1]$, captures the immediate net benefit of tax deferral. Note that if the time *t* selling costs associated with the sale-purchase strategy and exchange strategy are equal, the advantage of the exchange is equal to TDS_t^1, the deferred tax liability. To the extent exchanges are more expensive to execute than sales, $SC_t^1 - EC_t$ will be negative and this incremental outflow will be netted against the positive deferral benefits.

As noted above, the tax basis of the replacement property is reduced by the amount of the taxable gain deferred by the exchange, which insures that $DEP_i^{2,s} > DEP_i^{2,e}$. The second term in equation (16) captures the cumulative present value of the foregone depreciation deductions over the *n*-year holding period. However, to the extent annual depreciation deductions are reduced by an exchange, the amount of depreciation recaptured when the replacement property is sold in year *t*+*n* is reduced by an exchange. The present value of the reduced depreciation recapture taxes is reflected in the third term in equation (16).

Finally, because the tax deferral associated with an exchange reduces the tax basis in the replacement property, the taxable capital gain due on the sale of the replacement property will be larger with an exchange. The negative effects of the increased capital gain tax liability on the incremental NPV of an exchange are captured by the fourth term in equation (16).

CHAPTER 5
SIMULATING THE MAGNITUDE OF PRICE EFFECTS FOR EXCHANGES

As previously discussed, taxpayers face significant compliance risk when seeking to complete a tax-deferred exchange. Moreover, the exchanging taxpayer may have compromised his or her bargaining position with potential sellers of replacement properties. As a result, the taxpayer may be forced to pay a premium for the replacement property, assuming the marginal (price determining) buyers and sellers in the market are not motivated by Section 1031 tax deferral benefits and compliance issues. In a competitive market, the magnitude of the price discounts accepted by sellers of relinquished properties and the price premiums paid by acquirers of replacement properties should not exceed the incremental NPV of the exchange strategy, with the actual magnitude of the premium depending on market liquidity, the negotiating abilities of the taxpayer and other potential buyers and sellers, and whether or not potential buyers and sellers are aware the taxpayer is attempting to complete a Section 1031 exchange.

Before turning to the empirical estimates of the price discounts offered by sellers of relinquished properties and the price premiums paid by purchasers of replacement properties, equation (16) is used to simulate the magnitude of $INCNPV_t$ under a number of plausible assumptions. Simulated values of $INCNPV_t$ are then divided by the price of the replacement property at time t to determine the percentage price effect. These simulations are intended to quantify the maximum percentage price effects that are likely to be found in the subsequent empirical work.

To solve equation (16) numerically, the following base-case assumptions for the parameter values are made:

- Price of relinquished and replacement property: $P_t^1 = P_t^2$
- Cost recovery period (*RECPER*): 27.5 years for residential and 39 years for non-residential commercial properties
- Selling costs (SC_t^1 and SC_{t+n}^2): 3 percent of sale price
- Exchange costs (EC_t): equal to SC_t^1
- Ordinary income tax rate (τ_o): 35 percent
- Capital gain tax rate (τ_{cg}): 15 percent
- Depreciation recapture tax rate (τ_{dr}): 25 percent
- After-tax discount rate (k): 8 percent
- Non-depreciable portion of original tax basis (L_{t-h}^1 and L_t^2): 20 percent

The price of the replacement property is assumed to be equal to the price of the relinquished property to abstract for any effects unequal equity positions would have on time t inflows and outflows as well as future depreciation deductions. Note that the assumed magnitude of $P_t^1 = P_t^2$ does not affect the numerical simulation results because $INCNPV_t$ is divided by the price of the replacement property to produce a percentage price effect. Other key variables in the calculation of $INCNPV_t$ include the number of years since acquisition of the relinquished property, $HOLD^1$, the annualized rate of price appreciation since acquisition of the relinquished property, π^1, and the expected holding period of the replacement property, $HOLD^2$.[1]

Table 1 represents the simulation results for residential commercial real estate. The top panel in Table 1 contains the base case simulation results. One pattern is noteworthy: the incremental value of an exchange is unambiguously positively related to $HOLD^1$. For example, assuming $HOLD^2 = 8$, $HOLD^1 = 5$, and $\pi^1 = 6$ percent, $INCNPV_t$ is equal to

[1] It is straightforward to show that the value of $INCNPV_t$ from equation (16) is not affected by the rate at which the replacement property is expected to appreciate in nominal value.

2.48 percent of P_t^2. This implies the taxpayer could afford to pay up to a 2.48 percent premium for the replacement property, assuming they did not agree to a price discount on the sale of the relinquished property.

As $HOLD^1$ increases to 10, the maximum price impact rises from 2.48 percent to 4.03 percent. Assuming $HOLD^1 = 20$, the maximum price impact increases further to 5.33 percent. In short, the relative attractiveness of the exchange strategy is unambiguously positively related to the magnitude of the accumulated gain, all else equal.

The relation between $INCNPV_t$ and π^1, however, for a given $HOLD^1$ is less clear. For example, assuming $HOLD^1 = 5$, increased price appreciation produces slight increases in $INCNPV_t$. However, with $HOLD^1 = 20$, higher values of π^1 produce lower values of $INCNPV_t$. With $HOLD^1 = 10$, the relation between π^1 and $INCNPV_t$ is sensitive to the assumed value of $HOLD^2$.

All else equal, the value of tax deferral increases with its duration. However, the top panel of Table 1 indicates that $INCNPV_t$ increases with $HOLD^2$, but at a decreasing rate. For expected holding periods longer than eight to ten years, $INCNPV_t$ is largely unaffected by increases in $HOLD^2$ and, in fact, for holding periods in excess of 16 years the value of $INCNPV_t$ begins to decrease.

The premium price effect in Panel A ranges from 1.85 percent to 9.00 percent of value. These results clearly indicate that any price discounts or premiums observed in the data are likely to vary depending on the magnitude of the taxpayer's accumulated gain on the relinquished property. However, the size of the taxpayer's accumulated taxable gain is not observable in the data set. The maximum price premiums displayed in Panel B of

Table 1. Incremental NPV of Apartment Exchange as a Percent of Replacement Property Value

		Holding Period of Replacement Property							Holding Period of Replacement Property						
$(HOLD^1)$	(π^1)	4	8	12	16	20	24	28	4	8	12	16	20	24	28
Panel A: τ_{cg} = 15%, k=8%, $EC_t = SC_t^1$									**Panel B:** τ_{cg} = 15%, k=10%, $EC_t = SC_t^1$						
5	2%	1.85	2.14	2.27	2.30	2.28	2.23	2.17	2.01	2.35	2.51	2.55	2.55	2.51	2.47
5	6%	2.00	2.48	2.69	2.75	2.71	2.63	2.53	2.25	2.84	3.10	3.18	3.16	3.11	3.04
5	10%	2.11	2.74	3.03	3.10	3.06	2.95	2.81	2.45	3.23	3.57	3.67	3.66	3.58	3.49
5	20%	2.30	3.21	3.61	3.72	3.66	3.51	3.31	2.79	3.90	4.38	4.53	4.51	4.41	4.27
10	2%	3.45	4.01	4.26	4.33	4.29	4.20	4.07	3.75	4.44	4.74	4.83	4.82	4.76	4.67
10	6%	3.20	4.03	4.40	4.50	4.44	4.30	4.12	3.64	4.66	5.11	5.24	5.22	5.13	5.00
10	10%	3.03	4.04	4.49	4.61	4.54	4.37	4.15	3.57	4.80	5.35	5.51	5.49	5.37	5.22
10	20%	2.81	4.05	4.61	4.75	4.67	4.46	4.19	2.79	3.90	4.38	4.53	4.51	4.41	4.27
20	2%	5.80	6.80	7.25	7.36	7.29	7.13	6.91	6.34	7.55	8.09	8.25	8.23	8.12	7.97
20	6%	4.12	5.33	5.87	6.02	5.93	5.73	5.46	4.76	6.25	6.91	7.11	7.07	6.94	6.75
20	10%	3.35	4.67	5.26	5.41	5.32	5.10	4.81	4.06	5.66	6.37	6.59	6.55	6.40	6.20
28	2%	7.04	8.29	8.85	9.00	8.91	8.71	8.43	7.71	9.24	9.91	10.12	10.09	9.95	9.76
28	6%	4.15	5.50	6.11	6.27	6.17	5.95	5.65	4.87	6.53	7.26	7.48	7.44	7.29	7.08
28	10%	3.19	4.57	5.19	5.36	5.26	5.03	4.72	3.93	5.62	6.37	6.60	6.56	6.40	6.19
Panel C: τ_{cg} = 15%, k=8%, $EC_t = 1.2 * SC_t^1$									**Panel D:** τ_{cg} = 15%, k=10%, $EC_t = 1.2 * SC_t^1$						
5	2%	1.33	1.60	1.73	1.76	1.74	1.69	1.63	1.48	1.81	1.96	2.00	2.00	1.97	1.92
5	6%	1.47	1.94	2.15	2.21	2.17	2.10	1.99	1.72	2.30	2.55	2.63	2.62	2.56	2.49
5	10%	1.58	2.21	2.49	2.56	2.52	2.42	2.28	1.92	2.68	3.02	3.12	3.11	3.04	2.94
5	20%	1.78	2.67	3.08	3.18	3.12	2.97	2.77	2.26	3.35	3.84	3.99	3.96	3.86	3.72
10	2%	2.92	3.48	3.73	3.79	3.75	3.66	3.54	3.22	3.90	4.19	4.29	4.27	4.21	4.12
10	6%	2.67	3.49	3.86	3.96	3.90	3.77	3.58	3.11	4.12	4.56	4.69	4.67	4.58	4.46
10	10%	2.50	3.50	3.95	4.07	4.00	3.83	3.61	3.04	4.26	4.80	4.96	4.94	4.83	4.67
10	20%	2.29	3.52	4.07	4.21	4.13	3.92	3.65	2.95	4.45	5.11	5.31	5.28	5.14	4.96
20	2%	5.28	6.26	6.71	6.82	6.75	6.59	6.37	5.80	7.01	7.54	7.71	7.68	7.57	7.42
20	6%	3.59	4.80	5.34	5.48	5.39	5.19	4.93	4.23	5.71	6.36	6.56	6.53	6.39	6.21
20	10%	2.83	4.13	4.72	4.87	4.78	4.56	4.27	3.52	5.12	5.82	6.04	6.00	5.86	5.66
28	2%	6.52	7.76	8.32	8.46	8.38	8.17	7.89	7.18	8.70	9.37	9.57	9.54	9.40	9.21
28	6%	3.63	4.97	5.57	5.73	5.63	5.41	5.11	4.34	5.99	6.71	6.93	6.89	6.74	6.54
28	10%	2.66	4.04	4.65	4.82	4.72	4.49	4.19	3.40	5.08	5.82	6.05	6.01	5.86	5.65
Panel E: τ_{cg} = 20%, k=8%, $EC_t = SC_t^1$									**Panel F:** τ_{cg} = 20%, k=10%, $EC_t = SC_t^1$						
5	2%	1.46	1.93	2.20	2.33	2.39	2.40	2.38	1.66	2.22	2.52	2.66	2.72	2.74	2.72
5	6%	1.89	2.69	3.15	3.38	3.47	3.49	3.45	2.23	3.18	3.68	3.93	4.03	4.05	4.03
5	10%	2.24	3.30	3.90	4.21	4.33	4.35	4.30	2.69	3.95	4.61	4.94	5.07	5.11	5.08
5	20%	2.84	4.36	5.21	5.65	5.83	5.86	5.78	3.49	5.27	6.23	6.69	6.88	6.93	6.89
10	2%	2.77	3.71	4.24	4.51	4.62	4.64	4.59	3.17	4.28	4.87	5.16	5.28	5.31	5.28
10	6%	3.15	4.54	5.32	5.72	5.88	5.91	5.84	3.74	5.38	6.25	6.68	6.85	6.89	6.86
10	10%	3.39	5.08	6.03	6.51	6.71	6.75	6.66	4.11	6.10	7.16	7.68	7.89	7.94	7.90
10	20%	3.71	5.78	6.95	7.55	7.79	7.83	7.73	4.60	7.04	8.34	8.97	9.24	9.30	9.24
20	2%	4.76	6.42	7.36	7.84	8.04	8.07	7.99	5.47	7.43	8.48	8.99	9.20	9.25	9.21
20	6%	4.32	6.35	7.50	8.08	8.32	8.36	8.26	5.19	7.58	8.86	9.48	9.74	9.80	9.75
20	10%	4.12	6.32	7.56	8.19	8.45	8.49	8.38	5.06	7.65	9.03	9.70	9.98	10.05	9.99
28	2%	5.85	7.94	9.12	9.72	9.97	10.01	9.90	6.74	9.21	10.52	11.16	11.42	11.49	11.43
28	6%	4.59	6.85	8.13	8.78	9.04	9.09	8.97	5.56	8.22	9.64	10.33	10.62	10.69	10.63
28	10%	4.17	6.49	7.80	8.46	8.74	8.78	8.66	5.16	7.89	9.35	10.06	10.35	10.42	10.36

Table 1 are based on an increase in the assumed after-tax equity discount rate (k) to 10 percent from 8 percent. All other variables remain at their base case levels. Comparison of Panel A and Panel B demonstrates that a higher discount rate unambiguously increases the incremental value of the exchange option. This is because the value of tax deferral produced by the exchange is immediate. In contrast, the foregone depreciation deductions and the increased capital gain tax liability at sale that results from the decreased tax basis both occur in subsequent years. Thus, the present value of these future cash outflows is reduced by a higher discount rate. The net percentage price benefit from exchange in this panel ranges from 2 percent to slightly above 10 percent.

The calculated price impacts reported in Panel C of Table 1 assume the discount rate has been reset to 8 percent, but that the dollar costs of executing an exchange (EC_t) are 20 percent higher than the costs of a fully taxable sale (SC_t^1). As expected, higher up-front exchange costs reduce the maximum benefit of an exchange (relative to the base case in Panel A). However, decreases in the maximum price impacts are modest, averaging approximately one-half of a percentage point across varying assumptions for $HOLD^1$, $HOLD^2$, and π^1. The price benefits in this panel range from 1.33 percent to 8.46 percent.

In Panel D, the dollar costs of executing an exchange (EC_t) are assumed to be 20 percent higher than the costs of a fully taxable sale (SC_t^1) and the discount rate is set to 10 percent. Hence, Panel D has the same assumptions as Panel B, except for an increased cost associated with exchange. This simulation represents a combination of higher after tax discount rate, which has immediate positive effect to the incremental NPV and increased cost of using an exchange which has a slight negative impact on the net benefit

of using an exchange. Therefore, the values in this panel are lower than in Panel B, but higher than in Panel C. The maximum price impact is 9.57 percent for $HOLD^1 = 28$, $HOLD^2 = 16$ and $\pi^1 = 2$ percent.

Panel E of Table 1 reports the results assuming a tax rate on capital gain income of 20 percent (the maximum statutory τ_{cg} from 1999 to 2003). Clearly, the immediate value of tax deferral is larger the higher is τ_{cg}. However, the simulated price effects in Panel E are not uniformly higher than those reported in Panel A. This is because a higher capital gain tax rate will also increase the tax liability that results from the eventual sale of the replacement property. The longer the expected holding period of the replacement property, the more likely it is that the immediate tax deferral benefits associated with a higher τ_{cg} will exceed the present value of the increased taxes due on the subsequent sale of the replacement property. This anticipated result is confirmed in panel E. That is, increasing τ_{cg} from 15 percent to 20 percent produces larger values of $INCNPV_t$, except in some cases where the magnitude of the deferred gain is small (i.e., when $HOLD^1$ and π^1 are small) or when the expected holding period of the replacement property is relatively short.

Panel F of Table 1 reports the results assuming a tax rate on capital gain income of 20 percent and after tax discount rate of 10 percent. Values tend to be higher than in Panel B, where τ_{cg} is set to 15 percent. However, similar to Panel E, values are only higher for longer holding periods and appreciation rates. The difference between Panel E and Panel F is that in Panel F values increase faster, which expresses the added positive effect of the increased discount rate. The maximum price impact in this panel is 11.49 percent for $HOLD^1 = 28$, $HOLD^2 = 24$ and $\pi^1 = 2$ percent.

Overall, the maximum effect a Section 1031 exchange is likely to have on observed transaction prices in a competitive residential market (when the marginal buyer and seller are not exchange motivated) is estimated to range from about 1 percent to approximately 11.5 percent.

In Table 2 I repeat the simulation analysis for non-residential real estate. The only difference in this case is that non-residential real estate, such as office, industrial and retail properties, has a 39 year cost recovery period (*RECPER*). All other assumptions in the simulation analysis remain the same.

Table 2 reveals results similar to Table 1. All else equal, the value of tax deferral tends to increase with its duration. Therefore, with the longer depreciation recovery period of 39 years, the maximum net benefit from using an exchange will also be higher. However, with longer recovery period, benefits from depreciation each year are smaller compared to if faster depreciation schedule is used. Hence, values in Table 2 will tend to be smaller than the corresponding values in Table 1 for small appreciation rates. For appreciation rate $\pi^1 = 10$ percent and higher, the faster depreciation effect is offset by higher appreciation and values in Table 2 become higher than the corresponding values in Table 1.

I record a maximum benefit based on all simulations of 13.25 percent in Panel F for $HOLD^1 = 39$, $HOLD^2 = 39$ and $\pi^1 = 2$ percent. There is a U-shaped relationship between *INCNPVt* and $HOLD^2$. At first *INCNPVt* increases with $HOLD^2$, it peaks at year 25 for Panels A though D and then it decreases at a slow rate. With Panels E and F, where the tax rate on capital gain income is set to 20 percent there is a strictly positive relationship

between *INCNPVt* and $HOLD^2$; however, after year 20 *INCNPVt* increases at a decreasing rate.

The premium price effects in Panel A vary from 1.51 percent to 9.85 percent of value. In Panel B of Table 2 the assumed after-tax equity discount rate (k) is increased to 10 percent. Comparison of Panel A and Panel B demonstrates the incremental value of the exchange is increased by as little as 0.14 percent, for holding periods of 5 years and appreciation rate of 25 percent, to more than 1.3 percent, for holding periods of 39 years for both the relinquished and the replacement property. The percentage price net benefit from exchange in this panel ranges from 1.65 percent to close to 11 percent.

Panels C and D repeat the simulations of Panels A and B, with costs of executing an exchange (EC_t) set to be 20 percent higher than the costs of a fully taxable sale (SC_t^1). Higher up-front exchange costs again reduce the maximum benefit of an exchange. Maximum price differences in both panels are about 55 percentage points lower than the corresponding values in Panels A and B (9.30 percent in Panel C vs. 9.85 percent in Panel A, and 10.40 percent in Panel D vs. 10.96 percent in Panel C).

Panels E and F of Table 2 report the results based on the same assumptions as Panels A and B, but assuming a tax rate on capital gain income of 20 percent (the maximum statutory τ_{cg} from 1999 to 2003). As with the residential simulations, the simulated price effects in Panels E and F are not uniformly higher than those reported in Panels A and B. A higher capital gain tax rate is also associated with increased tax liability when the taxpayer eventually sells the replacement property in an ordinary sale.

With a higher capital gains tax the added benefit of using an exchange is larger for higher appreciation rates and longer holding periods. The maximum price impact in

Table 2. Incremental NPV of Non-Residential Exchange as a Percent of Replacement Property Value

		Holding Period of Replacement Property						Holding Period of Replacement Property					
($HOLD^1$)	(π^1)	5	10	20	25	30	39	5	10	20	25	30	39
Panel A:								**Panel B:**					
τ_{cg} = 15%, k=8%, $EC_t = SC_t^1$								τ_{cg} = 15%, k=10%, $EC_t = SC_t^1$					
5	2%	1.51	1.81	2.02	2.03	2.02	1.99	1.65	1.99	2.21	2.23	2.23	2.20
5	6%	1.87	2.45	2.84	2.87	2.85	2.78	2.13	2.80	3.22	3.25	3.24	3.20
5	10%	2.15	2.95	3.50	3.53	3.51	3.41	2.52	3.44	4.01	4.06	4.04	3.99
5	20%	2.65	3.83	4.64	4.69	4.65	4.51	3.19	4.55	5.40	5.46	5.44	5.36
10	2%	2.85	3.47	3.89	3.91	3.89	3.82	3.13	3.84	4.28	4.32	4.31	4.26
10	6%	3.08	4.10	4.79	4.84	4.81	4.68	3.54	4.71	5.45	5.50	5.49	5.42
10	10%	3.23	4.51	5.39	5.45	5.41	5.25	3.81	5.29	6.22	6.29	6.27	6.18
10	20%	3.42	5.05	6.17	6.24	6.19	5.99	4.17	6.04	7.22	7.30	7.28	7.16
20	2%	4.86	5.98	6.73	6.78	6.75	6.61	5.37	6.65	7.45	7.51	7.49	7.41
20	6%	4.16	5.69	6.73	6.80	6.75	6.56	4.86	6.61	7.71	7.79	7.77	7.66
20	10%	3.85	5.56	6.73	6.80	6.75	6.54	4.63	6.59	7.83	7.92	7.89	7.77
30	2%	6.18	7.65	8.65	8.71	8.67	8.49	6.85	8.54	9.60	9.67	9.65	9.55
30	6%	4.39	6.14	7.33	7.41	7.35	7.14	5.19	7.20	8.46	8.55	8.53	8.40
30	10%	3.83	5.67	6.93	7.01	6.95	6.72	4.67	6.78	8.11	8.20	8.18	8.05
39	2%	6.92	8.62	9.78	9.85	9.80	9.59	7.69	9.65	10.88	10.96	10.94	10.82
39	6%	4.31	6.15	7.41	7.49	7.43	7.20	5.15	7.26	8.59	8.69	8.66	8.53
39	10%	3.74	5.61	6.89	6.97	6.91	6.68	4.59	6.74	8.09	8.19	8.16	8.03
Panel C:								**Panel D:**					
τ_{cg} = 15%, k=8%, $EC_t = 1.2*SC_t^1$								τ_{cg} = 15%, k=10%, $EC_t = 1.2*SC_t^1$					
5	2%	0.97	1.27	1.47	1.48	1.47	1.43	1.11	1.44	1.66	1.67	1.67	1.65
5	6%	1.33	1.90	2.29	2.32	2.30	2.23	1.59	2.25	2.66	2.69	2.68	2.64
5	10%	1.62	2.41	2.95	2.98	2.96	2.86	1.98	2.89	3.46	3.50	3.48	3.43
5	20%	2.12	3.29	4.09	4.14	4.10	3.96	2.65	3.99	4.84	4.90	4.88	4.80
10	2%	2.32	2.92	3.34	3.36	3.34	3.27	2.59	3.29	3.73	3.76	3.75	3.70
10	6%	2.54	3.55	4.24	4.29	4.25	4.13	3.01	4.16	4.89	4.94	4.93	4.86
10	10%	2.69	3.97	4.84	4.90	4.85	4.70	3.28	4.74	5.66	5.73	5.71	5.62
10	20%	2.89	4.51	5.61	5.69	5.63	5.44	3.63	5.49	6.66	6.74	6.72	6.60
20	2%	4.33	5.43	6.18	6.23	6.20	6.06	4.84	6.10	6.89	6.95	6.93	6.85
20	6%	3.63	5.15	6.18	6.24	6.20	6.01	4.32	6.06	7.15	7.23	7.21	7.10
20	10%	3.32	5.02	6.18	6.25	6.20	5.99	4.09	6.04	7.27	7.36	7.33	7.21
30	2%	5.65	7.10	8.10	8.16	8.12	7.94	6.31	7.99	9.04	9.11	9.09	8.99
30	6%	3.85	5.59	6.78	6.86	6.80	6.59	4.65	6.65	7.90	7.99	7.97	7.84
30	10%	3.30	5.13	6.37	6.45	6.39	6.17	4.13	6.23	7.55	7.64	7.62	7.49
39	2%	6.38	8.08	9.23	9.30	9.25	9.04	7.16	9.10	10.32	10.40	10.38	10.26
39	6%	3.78	5.61	6.86	6.93	6.88	6.65	4.61	6.71	8.03	8.13	8.10	7.97
39	10%	3.20	5.07	6.33	6.42	6.36	6.13	4.05	6.19	7.53	7.63	7.60	7.47
Panel E:								**Panel F:**					
τ_{cg} = 20%, k=8%, $EC_t = SC_t^1$								τ_{cg} = 20%, k=10%, $EC_t = SC_t^1$					
5	2%	1.29	1.77	2.17	2.24	2.27	2.27	1.48	2.01	2.42	2.48	2.50	2.51
5	6%	1.96	2.87	3.63	3.76	3.81	3.82	2.31	3.33	4.11	4.22	4.27	4.27
5	10%	2.49	3.74	4.80	4.98	5.05	5.05	2.98	4.39	5.45	5.61	5.67	5.68
5	20%	3.42	5.26	6.82	7.08	7.19	7.20	4.14	6.21	7.79	8.02	8.11	8.12
10	2%	2.52	3.48	4.29	4.43	4.48	4.49	2.89	3.97	4.80	4.92	4.96	4.97
10	6%	3.34	4.94	6.29	6.51	6.60	6.61	3.97	5.76	7.12	7.32	7.40	7.41
10	10%	3.89	5.90	7.60	7.89	8.00	8.01	4.68	6.93	8.65	8.90	9.00	9.02
10	20%	4.60	7.15	9.31	9.67	9.81	9.82	5.60	8.46	10.63	10.96	11.08	11.10
20	2%	4.40	6.13	7.60	7.85	7.95	7.96	5.08	7.03	8.51	8.73	8.81	8.83
20	6%	4.78	7.16	9.18	9.51	9.65	9.66	5.71	8.39	10.42	10.72	10.83	10.86
20	10%	4.95	7.62	9.89	10.26	10.42	10.43	6.00	9.00	11.28	11.62	11.75	11.77
30	2%	5.69	7.98	9.93	10.25	10.38	10.39	6.59	9.17	11.12	11.41	11.52	11.54
30	6%	5.29	8.03	10.34	10.73	10.88	10.90	6.36	9.43	11.77	12.11	12.25	12.27
30	10%	5.17	8.04	10.47	10.88	11.04	11.05	6.29	9.52	11.97	12.33	12.47	12.50
39	2%	6.47	9.13	11.38	11.75	11.90	11.92	7.51	10.50	12.76	13.10	13.23	13.25
39	6%	5.41	8.29	10.72	11.13	11.29	11.30	6.54	9.77	12.22	12.58	12.72	12.75
39	10%	5.18	8.10	10.58	10.99	11.16	11.17	6.32	9.61	12.10	12.47	12.61	12.64

Panel E is 11.92 percent for $HOLD^1 = 39$, $HOLD^2 = 39$ and $\pi^1 = 2$ percent, while the maximum benefit from exchange in Panel F is 13.25 percent for $HOLD^1 = 39$, $HOLD^2 = 39$ and $\pi^1 = 2$ percent.

To summarize the results in Table 2, an increase in the after tax-cost of equity by two percent, all else the same, is associated with a maximum increase in the incremental NPV from completing an exchange of slightly over 1.3 percent. Increase, in the dollar costs associated with an exchange, relative to the cost of completing a taxable sale, is associated with approximately a 0.5 percent decrease in NPV, all else the same, in the worst case. A capital gain tax rate of 20 percent, all else the same is associated with, at most, approximately a 4.5 percent higher allowed price premium. Maximum price benefits vary between 8.5 and 11.5 percent for apartments and between 9.3 and 13.3 percent for non-residential real estate.

The next chapter describes the data and empirical methodology used to measure the size of exchange premiums and discounts actually observed in commercial real estate markets over the 1999 to 2005 period.

CHAPTER 6
DATA AND METHODOLOGY

Data

Property sales data is obtained from CoStar Group, Inc. The *CoStar Comps Professional* database includes historical information on over 1.2 million confirmed commercial real estate transactions from 1999 through the first half of 2005. The CoStar database includes all sales in excess of $250,000 in more than 40 major U.S. markets.[1] Land, mobile homes, and special use properties are excluded from this analysis. The initial sample contains 270,415 confirmed sales in five property markets: office, industrial, apartment, retail and hotel/motel. *CoStar Comps Professional* has a separate attribute field that identifies whether the sale represents an exchange. Therefore, any missing exchange identification is due to a lack of information, rather than CoStar's failure to report the type of transaction. An observation is eliminated from the sample if it could not be determined whether the sale was a part of a Section 1031 exchange. This further reduces the sample to 158,196 observations.

CoStar Comps Professional also contains descriptive information on the type of exchange (e.g. taxpayer's sale of relinquished property, simultaneous exchange, reverse exchange, etc.) in detailed notes. Based on the manual inspection of these notes, each exchange property sale is placed into one of the following categories:

1. Seller's relinquished property in delayed (Starker) exchange
2. Buyer's replacement property in delayed (Starker) exchange

[1] The CoStar product used in this analysis is *CoStar Comps Professional* (www.costar.com/products/comps/).

3. Seller's relinquished and buyer's replacement property in two separate transactions
4. Direct exchange (swap)
5. Seller's relinquished property in reverse exchange
6. Buyer's replacement property in reverse exchange
7. Reverse exchange (type not confirmed)
8. Exchange into Tenants-in-Common
9. Other tax-deferred exchange – exchange which cannot be categorized in any of the above types or where CoStar was unable to confirm its type.

To assure reliability of the data, CoStar requires agents to physically inspect the site and record a variety of property characteristics and transaction details. I therefore exclude sales not confirmed by CoStar. In addition, I exclude all transactions with recorded sales price below $250,000. CoStar covers comprehensively only transactions that are above this threshold, although in some cases brokers do report smaller transactions. For the sake of consistency such smaller transactions are eliminated from the sample. The final sample has 124,830 transactions which facilitates a comprehensive empirical investigation of the Section 1031 exchange market, as well as other atypical motivations, not possible with previous datasets. Of the 124,830 usable sales transactions, 23,989 (or 19 percent) involved the use of a Section 1031 exchange.

Table 3 summarizes the number of transactions by year and property type. The year 1999 contains fewer transactions than year 2000. Also in 2005 there is only data for half of the year – through June 2005.

A substantial increase in the use of exchanges in commercial real estate markets has been discussed in the popular press (e.g., McLinden, 2004). However, the data necessary to support a comprehensive analysis has not been available. Table 3 breaks down the sample by exchange and non-exchange transactions. The table reveals that exchanges as percentage of all sales are very stable over the 1999-2005 sample period.

For example, between 1999 and 2000, the total number of commercial real estate

Table 3. Description of Size of Exchange Market

Property Type		1999	2000	2001	2002	2003	2004	Jun-05	Total
Apartment	*Exchange*	587	2011	1774	2089	2096	2016	636	11209
	Non-exchange	1291	4754	4505	4683	4728	4996	1381	26338
	All	1878	6765	6279	6772	6824	7012	2017	37547
Industrial	*Exchange*	222	757	640	630	671	749	231	3900
	Non-exchange	1172	4248	4210	4437	4469	4711	1308	24555
	All	1394	5005	4850	5067	5140	5460	1539	28455
Office	*Exchange*	180	675	587	575	631	671	241	3560
	Non-exchange	1028	3512	3430	3388	3519	3993	1074	19944
	All	1208	4187	4017	3963	4150	4664	1315	23504
Retail	*Exchange*	252	904	755	897	1023	958	294	5083
	Non-exchange	1372	4836	4839	5300	5389	5186	1249	28171
	All	1624	5740	5594	6197	6412	6144	1543	33254
Hotel/ Motel	*Exchange*	16	47	41	37	43	43	10	237
	Non-exchange	88	338	328	301	334	359	85	1833
	All	104	385	369	338	377	402	95	2070
Total	*Exchange*	1257	4394	3797	4228	4464	4437	1412	23989
	Non-exchange	4951	17688	17312	18109	18439	19245	5097	100841
	All	**6208**	**22082**	**21109**	**22337**	**22903**	**23682**	**6509**	**124830**

exchanges grew from 1,257 to 4,394; however the exchanges' share of all verified CoStar transactions remained in the 18-20 percent range. Notably, the year of 2003, which is the year in which the maximum statutory capital gain rate was decreased from 20 percent to 15 percent, was not associated with a decrease in the number of exchanges. In fact, the number of exchanges increased from 4,228 in the previous year to 4,464. A decrease in the maximum capital gain rate as the simulation analysis suggests can possibly make an exchange a less attractive alternative if the tax deferral is the main motivation to participate in such a transaction.

Inspection of Table 3 reveals that exchanges are more frequently used in apartment markets. Of the 37,547 verified apartment transactions in the sample, 11,209 (approximately 30 percent) involved the use of an exchange. Moreover, this percentage has remained remarkably stable during 1999 - 2005. Among other property types, exchanges generally account for 10-18 percent of all transactions.

Tables 4 through 6 present breakdowns of property sales for all 46 markets covered by CoStar for apartment, office and retail properties, respectively. Markets are sorted alphabetically to make it easier for the reader to locate his or her market of interest. The number of transactions for each market and the percentage of total transactions by property type are presented. The tables show that there is a substantial variability in terms of transactions observed in different markets.

Apartments

Table 4 reveals that the largest apartment market is Los Angeles with 25 percent of all sales. New York City is the second largest market with 12 percent of all transactions. The smallest market (Charlotte) contains only 12 usable sales observations. The table reveals that relatively few markets account for a major share of all apartment sales. For

example, more than half of all transactions are concentrated in less than 10 markets and the top 20 markets account for 86 percent of all sales.

Table 4 also contains the percentage of exchanges observed in each market, as well as the breakdown of the type of exchanges observed: relinquished, replacement, relinquished and replacement, direct swaps, and other types. Table 4 clearly shows that the use of exchanges varies substantially across the major markets. Importantly, in eight markets (Marin-North SF Bay Area, Portland, Reno, Sacramento, San Diego, San Francisco, San Jose and Seattle) exchanges represent the dominant form of property transaction. Interestingly, all of these markets are located in the Western U.S., and most are in California. This is consistent with anecdotal evidence that exchanges are more common on the West Coast.

One factor cited for the wider use of Section 1031 exchanges in the Western US is that exchanges are related to the "real estate booms in the West in the 1960s, 1970s and 1980s, which made investors more entrepreneurial" (McLinden, 2004). Another possible explanation is the rapid appreciation of real estate in major metropolitan areas in California in the last few years. Anecdotal evidence suggests that homes have appreciated at an annual rate of 20 percent in Southern California over the last five years. In the other major markets tracked by CoStar, exchanges have been much less prominent. For example, over the 1999-2005 time period, only 1.6 percent of apartment sales in New York involved an exchange.

The distribution of exchange types of shows that the number of relinquished and replacement exchanges by markets is quite similar. This is expected, since for each exchange involving a relinquished property, there should be at least one replacement

Table 4. Description of Apartment Property Sales by Markets

Name	Apts. All	% of Total	Apt. Exch.	% Exch.	Reliq. Exch.	Repl. Exch.	Both	Direct	Other
Los Angeles	9450	25.17%	3574	37.82%	1139	1348	514	24	549
New York City	4586	12.21%	73	1.59%	20	27	5	11	10
San Diego	2448	6.52%	1419	57.97%	477	490	360	6	86
Chicago	1991	5.30%	377	18.94%	162	114	41	18	42
Seattle	1686	4.49%	900	53.38%	207	349	99	3	242
Phoenix	1442	3.84%	143	9.92%	31	68	17	0	27
Oakland	1398	3.72%	645	46.14%	256	200	152	1	36
Miami	1102	2.93%	81	7.35%	30	42	4	1	4
San Francisco	1029	2.74%	521	50.63%	275	137	94	4	11
Denver	1002	2.67%	473	47.21%	141	189	106	5	32
Portland	748	1.99%	516	68.98%	87	163	102	1	163
Ft. Lauderdale	733	1.95%	85	11.60%	22	46	5	3	9
Riverside/San Bernardino	712	1.90%	283	39.75%	77	108	66	3	29
Tucson	615	1.64%	212	34.47%	34	120	51	3	4
Washington, DC	579	1.54%	31	5.35%	10	10	1	3	7
San Jose	569	1.52%	287	50.44%	122	83	63	4	15
Dallas/Fort Worth	546	1.45%	129	23.63%	22	43	8	2	54
Colorado Springs	527	1.40%	38	7.21%	22	8	5	2	1
Boston	506	1.35%	64	12.65%	20	38	1	1	4
Tampa	497	1.32%	37	7.44%	10	20	2	2	3
Sacramento	421	1.12%	261	62.00%	71	104	73	3	10
Cincinnati/Dayton	408	1.09%	53	12.99%	21	24	4	1	3
Atlanta	398	1.06%	24	6.03%	6	8	0	5	5
Detroit/Toledo	350	0.93%	44	12.57%	24	12	0	6	2
Las Vegas	336	0.89%	125	37.20%	22	82	12	0	9
Fresno	316	0.84%	107	33.86%	23	54	13	1	16
Cleveland/Akron	297	0.79%	20	6.73%	14	5	1	0	0
North SF Bay Area	296	0.79%	183	61.82%	67	55	50	1	10
Houston	287	0.76%	55	19.16%	12	34	2	2	5
West Palm Beach	277	0.74%	27	9.75%	7	13	4	0	3
Stockton/Modesto	274	0.73%	121	44.16%	44	35	29	3	10
New Jersey	249	0.66%	8	3.21%	3	4	0	0	1
Orlando	236	0.63%	16	6.78%	2	9	1	0	4
Austin	227	0.60%	32	14.10%	10	7	4	1	10
Philadelphia	201	0.54%	19	9.45%	14	1	0	0	4
Minneapolis	170	0.45%	65	38.24%	21	26	10	2	6
Baltimore	132	0.35%	13	9.85%	2	10	1	0	0
Columbus	126	0.34%	55	43.65%	18	24	11	0	2
Jacksonville	125	0.33%	7	5.60%	0	3	1	2	1
Ventura	106	0.28%	44	41.51%	18	11	11	1	3
St Louis	46	0.12%	10	21.74%	5	2	1	1	1
Kansas City	40	0.11%	10	25.00%	5	5	0	0	0
Salt Lake City	20	0.05%	7	35.00%	3	2	2	0	0
San Antonio	16	0.04%	3	18.75%	0	1	0	0	2
Reno	15	0.04%	8	53.33%	1	6	1	0	0
Charlotte	12	0.03%	4	33.33%	0	3	1	0	0

exchange. However, if the taxpayer fails to identify replacement properties in a timely fashion, or close the exchange according to the guidelines issued by the IRS, no replacement exchange takes place. Also, it is common for the replacement property to be of a different type than the original (relinquished property). Finally, replacement properties may also be located in different markets than the original properties.

Table 4 shows that direct exchanges are quite rare. Out of 9,450 sales in Los Angeles only 24 transactions represented direct swaps. This is also the largest number of direct exchanges recorded for any market. The small number of direct swaps is not surprising given how difficult it is to match the requirements of both taxpayers and complete a direct swap of properties.

For the purposes of the regression analysis that follows in a later chapter, I exclude all direct exchanges to eliminate the possible bias that their inclusion may induce in the model. “Other” exchanges, which mostly include exchanges whose type has not been confirmed, can introduce similar problems as with direct exchanges; hence, these transactions are also eliminated from the sample. I also exclude sales that are associated with any other “special condition” that is not of interest for this study. Examples of such special conditions are sales that are part of an auction, bankruptcy or sales that involve building contamination, natural disaster damage, or the threat of contamination. In total, CoStar delineates more than 30 such unusual conditions, which potentially have an effect on observed transaction prices. I therefore eliminate all observations that contain a sale condition which is not analyzed by this study. The only special conditions that I allow are related to condominium conversions and portfolio sales. Since, as noted previously, the number of sales in the top 20 apartment markets accounts for 86 percent of all apartment

sales, I focus in the empirical analysis on property sales in these markets only. In addition, I exclude markets for which there is not a sufficient number of exchanges to generate meaningful statistical tests. These excluded markets are Miami, Ft. Lauderdale, Washington, DC, Dallas, and Colorado Springs. This leaves us with 15 markets, which represent 75 percent of all apartment sales. The final sample has 23,640 apartment transactions over the 1999-2005 time period.

Office Properties

Table 5 presents information on office property sales by markets and shows that in this sample the largest office market is Los Angeles with 8.5 percent of all sales. Phoenix is the second largest market with 7.2 percent of all transactions, while Washington, DC is the third largest market with 6.8 percent of all office transactions. The smallest market (San Antonio) contains only 22 sales observations.

The table reveals a different picture than with apartments. First, there is less concentration of transactions in the largest markets. Consequently, the top 20 markets account for 75 percent of all sales. Second, the distribution of exchanges across markets is also quite different. Although the use of exchanges varies substantially across major metropolitan areas, in none of the markets do exchanges represent the dominant form of property transaction.[2] The observation that markets located in the Western U.S. have the highest number of exchanges remains unchanged. The distribution of relinquished and replacement types of exchanges also varies across the sample. In approximately one half of the markets, replacement exchanges are either equal to or as much as twice the number of relinquished exchanges. In some markets, sharp contrasts are observed. For example,

[2] Salt Lake City is the only market that has a share of exchanges that is above 50 percent, but this market can be ignored since it only has 26 transactions. Therefore, percentages may be biased due to the small sample.

Table 5. Description of Office Property Sales by Markets

Name	Office All	% of Total	Office Exch.	% Exch.	Reliq. Exch.	Repl. Exch.	Relq. & Repl. Exch.	Direct Exch.	Other Exch.
Los Angeles	2001	8.51%	446	22.29%	158	202	33	3	50
Phoenix	1683	7.16%	126	7.49%	12	84	9	0	21
Washington D.C.	1600	6.81%	120	7.50%	30	57	6	10	17
Chicago	1163	4.95%	116	9.97%	29	59	4	11	13
Atlanta	1073	4.57%	36	3.36%	6	16	0	8	6
Seattle	1039	4.42%	340	32.72%	111	149	28	3	49
Denver	902	3.84%	241	26.72%	64	128	34	4	11
San Diego	858	3.65%	282	32.87%	63	152	43	2	22
New York City	835	3.55%	42	5.03%	14	13	2	6	7
Tampa	714	3.04%	49	6.86%	14	24	3	7	1
New Jersey	698	2.97%	34	4.87%	6	13	2	10	3
Detroit/Toledo	639	2.72%	46	7.20%	12	20	0	9	5
Miami	628	2.67%	28	4.46%	7	13	5	2	1
Philadelphia	625	2.66%	30	4.80%	11	10	1	3	5
Ft. Lauderdale	580	2.47%	41	7.07%	8	25	2	3	3
Orlando	571	2.43%	26	4.55%	5	13	1	4	3
Dallas/Fort Worth	540	2.30%	68	12.59%	9	39	4	0	16
Boston	506	2.15%	19	3.75%	4	7	0	3	5
Oakland	495	2.11%	167	33.74%	49	71	34	0	13
Baltimore	430	1.83%	25	5.81%	7	16	0	0	2
Colorado Springs	416	1.77%	38	9.13%	10	17	4	4	3
West Palm Beach	402	1.71%	33	8.21%	7	23	0	0	3
Portland	395	1.68%	159	40.25%	61	57	12	0	29
Sacramento	394	1.68%	159	40.36%	26	89	38	1	5
Las Vegas	392	1.67%	117	29.85%	15	80	15	0	7
Tucson	379	1.61%	60	15.83%	11	36	8	4	1
Riverside/San Bernardino	373	1.59%	142	38.07%	28	80	22	1	11
Houston	344	1.46%	39	11.34%	7	30	0	0	2
Cleveland/Akron	299	1.27%	20	6.69%	3	6	3	3	5
San Jose	277	1.18%	65	23.47%	23	27	10	0	5
Cincinnati/Dayton	275	1.17%	9	3.27%	1	6	1	1	0
Austin	266	1.13%	19	7.14%	1	11	1	0	6
North SF Bay Area	261	1.11%	102	39.08%	31	51	18	1	1
Jacksonville	249	1.06%	7	2.81%	2	5	0	0	0
San Francisco	212	0.90%	69	32.55%	34	25	7	1	2
Fresno	200	0.85%	59	29.50%	9	33	9	0	8
Columbus	200	0.85%	63	31.50%	19	36	6	2	0
Stockton/Modesto	136	0.58%	31	22.79%	6	17	4	0	4
Minneapolis	104	0.44%	16	15.38%	1	9	2	3	1
Ventura	94	0.40%	18	19.15%	3	7	3	0	5
St Louis	65	0.28%	7	10.77%	1	5	0	1	0
Kansas City	61	0.26%	11	18.03%	3	7	0	0	1
Charlotte	50	0.21%	8	16.00%	2	4	0	0	2
Reno	32	0.14%	9	28.13%	1	6	2	0	0
Salt Lake City	26	0.11%	14	53.85%	5	7	1	0	1
San Antonio	22	0.09%	4	18.18%	2	2	0	0	0

replacement exchanges in Phoenix outnumber relinquished exchanges by a factor of 7. In Las Vegas, replacement exchanges are 5 times more frequent than relinquished property sales and in Sacramento this ratio is equal to 3.4. A possible explanation for such differences is the combination of several properties used to complete a replacement exchange, as well as replacement property sales being completed outside of the particular market or with a different property type. Table 5 reveals that direct exchanges are also rare for office properties. The largest number of swaps is observed in Chicago, where only 11 transactions represent direct exchanges.

As with apartments, I exclude all direct and "other" types of exchanges from the sample in the regression analysis. I also exclude transactions associated with special conditions that are not sale-leasebacks or portfolio sales. As noted previously, the office sales in the top 20 office markets represent 75 percent of all office transactions. However, after elimination from the sample of sales with the characteristics described above, eight markets out of the largest 20 markets do not have a sufficient number of exchanges to generate statistically meaningful tests. These markets are: Atlanta, New York City, Northern New Jersey, Detroit, Miami, Philadelphia, Orlando, Boston and Baltimore. I include in the sample the next largest markets that have a sufficient number of exchanges: Sacramento, Las Vegas, Tucson, and Riverside/San Bernardino. Therefore, in the empirical analysis I focus on the office property sales in the largest 15 markets that also have a sufficient number of replacement and relinquished exchanges to generate any results that are statistically meaningful. The sales in these 15 markets represent 56 percent of the office real estate market. The final sample has 8,871 office transactions during the 1999-2005 time period.

Retail Properties

Table 6 presents a breakdown of retail property sales by markets. New York City with 3,669 retail sales (11 percent of all sales) is the largest market, followed by Los Angeles with 3,235 retail transactions (9.7 percent of all sales), and Chicago with 2,796 observations (8.4 percent of all sales). The smallest retail market is Reno, which only has 9 sales recorded. Similarly to the office sales, there is less concentration of transactions in the largest markets. The top 20 markets account for 77 percent of all sales.

The use of exchanges in retail transactions also varies substantially across markets. Similarly to the office transactions, tax deferred exchanges are not as popular as with apartment sales. In none of the 46 CoStar markets do exchanges outnumber non-exchanges. The largest percentage of exchanges is observed in Portland, where this type of transaction represents more than 40 percent of all sales.[3] Once again exchanges are more frequently observed in the Western United States.

There is substantial variation in the distribution of relinquished and replacement types of exchanges across the sample. In 10 of the retail markets relinquished exchanges outnumber the replacement exchanges. In more than 50 percent of the sample the replacement exchanges are less than twice as frequent as relinquished exchanges. Finally, the replacement exchanges in 10 markets are more than 3 times higher than the relinquished exchanges[4]. Notable markets, in which replacement exchanges significantly outnumber relinquished exchanges include Tucson, with a ratio of replacement to relinquished property sales equal to 5.6. Las Vegas has a ratio of 5.3, Riverside – 4.9, Dallas /Forth Worth – 4.2, and Houston – 3.8. Table 6 illustrates also the rareness of

[3] In Reno 44 percent of all sales are exchanges; however this percentage is not reliable since it is based on only 9 observations.
[4] Reno and San Antonio are not included in this analysis, based on their small number of observations.

Table 6. Description of Retail Property Sales by Markets

Name	Retail All	% of Total	Retail Exch.	% Exch.	Reliq. Exch.	Repl. Exch.	Relq. & Repl. Exch.	Direct Exch.	Other Exch.
New York City	3669	11.03%	60	1.64%	8	20	4	12	16
Los Angeles	3235	9.73%	775	23.96%	247	360	61	12	95
Chicago	2796	8.41%	381	13.63%	138	158	30	29	26
Seattle	1546	4.65%	470	30.40%	127	228	40	11	64
Phoenix	1443	4.34%	145	10.05%	22	66	8	5	44
Atlanta	1323	3.98%	90	6.80%	11	37	7	7	28
Detroit/Toledo	1068	3.21%	61	5.71%	24	19	2	7	9
Denver	1035	3.11%	299	28.89%	82	158	43	3	13
Tampa	1017	3.06%	43	4.23%	4	27	3	3	6
Dallas/Fort Worth	966	2.90%	165	17.08%	19	79	8	2	57
San Diego	918	2.76%	317	34.53%	82	163	47	2	23
Boston	853	2.57%	50	5.86%	14	21	2	3	10
Washington, DC	841	2.53%	43	5.11%	16	11	3	2	11
Miami	819	2.46%	41	5.01%	10	20	3	2	6
Orlando	799	2.40%	35	4.38%	6	20	2	3	4
Oakland	739	2.22%	192	25.98%	63	91	27	0	11
Ft. Lauderdale	733	2.20%	47	6.41%	14	23	5	4	1
Houston	661	1.99%	121	18.31%	21	80	8	1	11
Tucson	584	1.76%	106	18.15%	14	79	11	2	0
Riverside/San Bernardino	578	1.74%	207	35.81%	27	133	30	3	14
Las Vegas	561	1.69%	199	35.47%	27	144	18	1	9
West Palm Beach	551	1.66%	43	7.80%	12	26	2	2	1
Portland	535	1.61%	220	41.12%	67	95	19	4	35
Philadelphia	520	1.56%	34	6.54%	4	12	0	4	14
San Francisco	492	1.48%	175	35.57%	81	56	35	1	2
Cleveland/Akron	474	1.43%	27	5.70%	6	13	0	5	3
New Jersey	461	1.39%	14	3.04%	3	6	0	2	3
Cincinnati/Dayton	454	1.37%	34	7.49%	4	24	2	1	3
Colorado Springs	444	1.34%	39	8.78%	13	22	2	2	0
Baltimore	413	1.24%	22	5.33%	11	5	3	1	2
North SF Bay Area	356	1.07%	118	33.15%	38	58	17	2	3
Sacramento	308	0.93%	117	37.99%	26	68	22	0	1
Fresno	291	0.88%	40	13.75%	10	19	2	1	8
Jacksonville	285	0.86%	14	4.91%	3	8	0	1	2
San Jose	274	0.82%	80	29.20%	30	29	15	1	5
Columbus	256	0.77%	91	35.55%	23	56	11	0	1
Austin	246	0.74%	28	11.38%	12	9	3	0	4
Stockton/Modesto	180	0.54%	35	19.44%	10	9	4	4	8
Minneapolis	146	0.44%	22	15.07%	9	6	2	4	1
Ventura	95	0.29%	33	34.74%	8	15	8	1	1
St Louis	95	0.29%	11	11.58%	3	5	0	2	1
Kansas City	64	0.19%	6	9.38%	1	5	0	0	0
Charlotte	52	0.16%	10	19.23%	7	3	0	0	0
Salt Lake City	49	0.15%	12	24.49%	6	5	1	0	0
San Antonio	20	0.06%	7	35.00%	0	7	0	0	0
Reno	9	0.03%	4	44.44%	0	3	1	0	0

direct exchanges in retail sales. Once again, the largest number of direct swaps is observed in Chicago, where a total of 29 such transactions occurred.

As with apartments and office properties, I exclude all direct exchanges and "other" types of exchanges from the regression sample. I also eliminate all transactions associated with other special conditions that are not condominium conversions, sale-leasebacks, or portfolio sales. The number of sales in the top 20 retail markets accounts for 77 percent of all retail sales. However, after elimination of the above observations, seven of the largest 20 markets do not have a sufficient number of exchanges to generate statistical meaningful tests. These markets include New York City, Atlanta, Tampa, Boston, Washington, DC, Miami and Orlando. Therefore, in order to have a sample of 15 markets I include the next largest markets that have also a sufficient number of exchanges. These are Las Vegas and San Francisco. Hence, in the empirical analysis I focus on the property sales in the largest 15 markets that also have a sufficient number of replacement and relinquished exchanges to generate any results that are statistically meaningful. The sales in these 15 markets represent 52 percent of the retail real estate market. This yields a final sample of 12,015 office transactions over the 1999-2005 time period.

Research Methodology

I use standard hedonic regression techniques to assess the influence of tax-deferred exchanges, as well as other sale conditions on observed transaction prices. Standard hedonic models include the log of the transaction price or rent as the dependent variable and a set of independent variables that capture the site, structural, and location characteristics of the property. For example, Frew and Jud (2003) regress the observed sale price on a number of independent variables, including the square footage of rental

space, land area, age, and number of units. In an apartment rent prediction model based on 4,500 apartment complexes in eight markets, Valente et al. (2005) use the log of asking rent as the dependent variable. For regressors they use square footage per unit, number of floors, property age, submarket dummies, and year of sale dummies.

Building age, age squared, the square footage of improvements, building foot print, lot size, number of units, and number of floors, are some of the most common structural characteristics used in commercial property price or rent equations (see, for example, Colwell, Munneke and Trefzger, 1998, and Saderion, Smith and Smith, 1993). The choice of functional form is also very important in order to ensure that the model is correctly specified. Weirick and Ingram (1990) provide an excellent analysis of various approaches to functional forms in hedonic regressions, when the dependent variable is selling price. In particular, the authors compare three standard functional forms:

- A linear model
- A semi-log model which uses the logarithmic transform of the dependent variable (selling price)
- A log-linear model, which uses logarithmic transforms of both the dependent variable as well as independent variables

As Weirick and Ingram (Ibid.) point out, the linear form has "serious deficiencies from a market theory standpoint." Such models force the value of an extra square foot of improvement for a 2,000 sq. ft. property to be the same as the value of an extra square foot for a 10,000 sq. ft. property. The semi-log and log-linear models take into account nonlinearities in the data. In addition, by using quadratic transformations of explanatory variables (such as square footage and lot size) I can capture property value relationships that are concave or convex in certain characteristics (Ibid.).

Recently, the focus of the residential hedonic pricing literature has shifted to the proper control of location. One of the most important papers in this area is Clapp (2003), who presents a semi-parametric method for valuing residential location and includes latitude and longitude as explanatory variables. Case, Clapp, Dubin and Rodriguez (2004) use a second order longitude-latitude expansion to control for location, as well as a number of demographic characteristics, such as percent Black, Hispanic, etc.

Finally, by using geographic coordinates, Fik, Ling and Mulligan (2003) fully account not only for the absolute location of the home, but also for relative location in a metropolitan market. The authors use a complete variable interactive approach to model the log of sale price as a function of structural characteristics, discrete location dummies, location dummies and {x, y} coordinates interacted with structural characteristics, interaction terms between structural characteristics (e.g. age*sq. ft.), interacted structural characteristics interacted with location dummies and triple interaction terms of location dummies, geographic coordinates and structural characteristics. This fully interactive specification allows Fik et al. (2003) to effectively estimate separate price surfaces for identified sub-markets, rather than constrain the estimated coefficients on structural characteristics to be constant across submarkets with the price surface shifted up or down by location dummies only. In addition, interacting sub-market dummies with absolute location allows Fik et al. (2003) to capture discontinuities or structural shifts that occur as the price surface crosses submarket boundaries.

Table 7 provides definitions for all variables used in the hedonic regressions. The dependent variable is *LNPRICE* – the natural logarithm of the sale price. An advantage of using the log of price is that less weight is given to extreme values than when using

untransformed prices. I also divide square footage of improvement and land square footage by 1000 to keep size ranges consistent.

Following Weirick and Ingram (1990), I use a semi-log model with quadratic transforms for square footage in thousands (*SQFT*), and land square footage in thousands (*LANDSQFT*). With this semi-log form, unit price per unit change in the characteristic is given by simply multiplying the estimated coefficient by the observed selling price.

To quantify the effect of Section 1031 exchanges, condominium conversions, sale-leasebacks, portfolio sales, and out-of-state buyers on sale prices, I use a stepwise estimation technique and estimate the following model separately for each of the identified 15 markets in the apartment sales sample

$$\begin{aligned} LNPRICE_m &= \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_4 AGE + \alpha_5 AGE2 + \alpha_6 SQFT \\ &+ \alpha_7 SQFT2 + \alpha_8 LANDSQFT + \alpha_9 LANDSQFT2 + \alpha_{10} PARKING + \alpha_{11} FLOORS + \alpha_{12} UNITS \\ &+ \sum_{i=2}^{3} \beta_i CONDITION_i + \alpha_{13} BUYEROUT + \alpha_{14} SENIOR + \alpha_{15} SUBSIDIZED + \alpha_{16} CONDO \\ &+ \alpha_{17} CONDOCONV + \alpha_{18} PORTSALE + \sum_{n=2000}^{2005} \chi_n YR_n + \sum_{s=2}^{P\leq 43} \delta_s SMDUM_s \end{aligned} \quad (17)$$

I use a similar model to estimate the effect of tax-deferred exchanges, condominium conversions, sale-leasebacks, portfolio sales, and out-of-state buyers on property sale prices in offices and retail transactions

$$\begin{aligned} LNPRICE_m &= \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_4 AGE + \alpha_5 AGE2 + \alpha_6 SQFT \\ &+ \alpha_7 SQFT2 + \alpha_8 LANDSQFT + \alpha_9 LANDSQFT2 + \alpha_{10} PARKING + \alpha_{11} FLOORS + \sum_{i=2}^{3} \beta_i CONDITION_i \\ &+ \alpha_{12} BUYEROUT + \alpha_{13} SALELEASEBACK + \alpha_{14} PORTSALE + \sum_{n=2000}^{2005} \chi_n YR_n + \sum_{s=2}^{P\leq 43} \delta_s SMDUM_s \end{aligned} \quad (18)$$

In the estimation of the hedonic pricing equation, I include a dummy variable (EXRELQ) that quantifies the extent to which transaction prices are lower (higher), all else equal, if the seller of the property is a taxpayer initiating the “downleg” portion of a

delayed exchange (i.e., if the property is a "relinquished" property). I also include a dummy variable (EXREPL) that quantifies the extent to which transaction prices are higher, all else equal, if the buyer of the property is a taxpayer completing the "upleg" portion of a delayed exchange (i.e., if the sample property is a "replacement" property). Finally, I include a dummy variable (*RELQ_REPL*) that quantifies the extent to which prices are higher, all else equal, if the same property is used as both the relinquished property for the seller and the replacement property for the buyer. The first exchange involves the front end of a 1031 transaction for the seller, who now needs to find a replacement property in order to complete the exchange. The second exchange involves the back end of an exchange in which the taxpayer has already sold his property and uses this sale to acquire a replacement property thereby completing his own exchange.

Lambson, McQueen and Slade (2004) find evidence that out-of state buyers pay price premiums for apartment complexes in Phoenix, which the authors associate with possible higher search costs and anchoring. I therefore use a dummy variable *BUYEROUT* to control for any effects related to whether the buyer's principal residence is out-of-state.

Two dummy variables (*CONDOCONV* and *PORTSALE*) are also used in the apartment regressions to quantify the extent to which prices are higher, all else equal, when the apartments are purchased with the intention to convert them to condos, or when the transaction is part of a portfolio sale.

In the office and retail regressions, dummy variables (*SALELEASEBACK* and *PORTSALE*) are used to quantify the price premium associated with sale-leasebacks or portfolio sales.

Table 7. List of Regression Variables

Dependent Variable:	
LNPRICE	Natural logarithm of the sale price
Exchange Variables:	
EXRELQ	Binary variable set equal to one if transaction represents sale of a relinquished property
EXREPL	Binary variable set equal to one if transaction represents purchase of a replacement property
RELQ_REPL	Binary variable set equal to one if transaction represents both sale of a relinquished property and purchase of a replacement property
***Building Characteristics*:**	
AGE	Age of the building(s) in years
SQFT	Total improvements square footage in thousands
FLOORS	Number of floors
UNITS	Number of units
$CONDITION_i$	Physical condition of the property based on inspection. The categories include below average, average, and above average. The omitted category is average.
PARKING	Number of parking spaces
SUBSIDIZED	Binary variable set equal to one if property use is subsidized multi-family
SENIOR	Binary variable set equal to one if property use is senior multi-family
CONDO	Binary variable set equal to one if property use is multi-family condominium
Year Dummies:	
YR_i	Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed.
***Site and Location Characteristics*:**	
LANDSQFT	Log of *s*quare footage of land in thousands
X	Latitude of property
Y	Longitude of property
$SDUM_i$	Binary variable signifying the submarket in which the property is located, as defined by CoStar
$\{X^k, Y^l\}$	*X,Y* polynomial, where $k,l > 0,\ k+l <= 3$
Deal Characteristics:	
BUYEROUT	Binary variable set equal to one if buyer lives out of state
CONDOCONV	Binary variable set equal to one if the transaction was motivated by condo-conversion
SALELEASEBACK	Binary variable set equal to one if transaction was part of sale-leaseback
PORTSALE	Binary variable set equal to one if transaction was part of portfolio sale

I use several variables to account for the relationship between selling price and property structural characteristics. First, I expect a negative relation between age (*AGE*) and price and a positive coefficient on age squared (*AGE2*). This expectation reflects the frequently observed quadratic relation between price and age. A "vintage" effect is sometimes observed, which is related to high prices for very old properties. I expect the coefficients on *SQFT, LANDSQFT, PARKING, FLOORS* and *UNITS* to be positive.

The variable $CONDITION_i$ controls for building condition. I specify average condition as the control group. With residential real estate, 79 percent of apartments are reported to be in average condition, 14 percent of the apartment properties are categorized by CoStar as being in above average condition, and 7 percent are labeled as below average. In the office sample, 66 percent of the properties are classified to be in average condition, 32 percent are above average, and only 3 percent are in below average condition. Finally, with retail properties 70 percent are in average condition, 22 percent are above average, and 8 percent are in below average condition.

I control for the effects of time by including dummies for each year in the sample with 1999 as the base year for comparison. In the apartment regressions, I also determine whether the use of the apartments is primarily as senior housing, subsidized housing, or multifamily condominiums. The comparison group, which represents 98 percent of the sample, is all other multifamily apartments.

Finally, I include dummy variables to control for differences across submarkets within each major market. These submarkets are defined by CoStar. There are 405 unique submarkets in the apartment sample. In the largest market, Los Angeles, 42 submarkets are identified by CoStar. In the second largest market, New York, 30 different

submarkets are defined. In the smallest of the 15 apartment markets, Sacramento, there are 21 submarkets.

In the office sample there are 488 distinct submarkets and that these submarkets largely overlap with the submarkets defined in the apartment sample. There are 51 submarkets present in the Los Angeles office sample, 35 submarkets distinguished in the Phoenix area and only 6 submarkets identified in Tucson, the smallest of the 15 studied markets.

The retail sample contains 491 different submarkets. Los Angeles is once again the largest market in this sample with 60 submarkets, Chicago, the second largest market in the sample, has 37 submarkets, and San Francisco, which is the smallest market in the sample with only 339 observations, has 33 submarkets defined.

The estimated models differ for residential and non-residential (office and retail) properties. For each property type I run the specified model by market. In order to avoid the effect of outliers in the data, I winsorize all continuous dependent variables in the regressions at the top and bottom one percent of the distribution. The winsorising procedure takes the non-missing values of a continuous variable sorted in ascending order and replaces its one percent highest and lowest values by the next value counting inwards from the extremes. The only exceptions are *FLOORS*, *PARKING* and *UNITS*, where I winsorize at the top and bottom 0.5 percent of the distribution, to account for the narrow distribution. Longitude and latitude coordinates are not winsorized.

The next chapter presents summary statistics of apartment transaction data by market and the regression results from the models specified.

CHAPTER 7
RESULTS FOR RESIDENTIAL REAL ESTATE

This chapter focuses on the results from the empirical analysis on the apartment market. An additional benefit of the analysis on apartment markets is the relative simplicity and homogeneity of apartment leases, which simplifies modeling relative to office and retail properties.

Summary statistics for the variables of interest are presented in Table 8. The first two columns present a summary of the data at the aggregate level, while the remaining columns present statistics for each of the 15 markets studied. The average apartment complex in the sample is 49 years old, contains 23,034 square feet of improvements, is built on 40,162 square feet of land area, has 27 units, 2.5 floors, 29 parking spaces and sold for $2,194,040.

With an average age of 79 years properties in New York and Boston tend to be much older than in other markets across the country. Phoenix has the newest apartments with an average age of 27 years. The apartment buildings in the sample tend to be the largest in Phoenix with an average size of 76,688 sq. ft. Oakland is the market with the smallest average size of apartment buildings, both in terms of square footage (12,267) and number of units (15).

Approximately 13 percent of the transactions involve the purchase of a replacement property to finalize an exchange; 12 percent involve the sale of the relinquished property in an exchange; and eight percent involve the sale of relinquished property that is also the replacement property of the buyer in a separate exchange.

Table 8. Summary Statistics of Apartment Data by Markets

	All		Boston		Chicago		Denver		Los Angeles		New York	
Apartments	**Obs**	**23640**	**Obs**	**400**	**Obs**	**1585**	**Obs**	**782**	**Obs**	**7761**	**Obs**	**4067**
	Mean	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	2,194,040	4,687,458	2,373,855	5,558,665	1,769,994	4,413,919	3,329,894	7,490,368	1,633,174	3,190,086	1,932,527	4,289,929
AGE	48.81	26.46	78.73	29.67	58.96	25.62	41.98	21.45	42.75	20.41	79.51	17.61
SQFT	23,034	47,387	18,303	41,339	23,116	46,243	37,569	77,415	15,132	25,928	16,829	34,333
LANDSQFT	40,162	115,064	34,552	121,501	35,967	127,081	76,477	188,721	19,308	49,358	5,888	25,033
UNITS	26.99	47.45	21.13	44.46	26.69	42.53	41.34	71.88	18.80	26.80	19.31	31.72
FLOORS	2.47	1.45	3.05	1.24	2.90	1.85	2.40	1.48	2.06	0.74	3.95	1.96
PARKING	29.51	80.43	18.00	56.20	19.85	70.96	57.06	133.35	18.11	40.59	0.58	11.50
X	37.29	4.26	42.36	0.23	41.89	0.16	39.77	0.14	34.05	0.13	40.74	0.08
Y	-107.55	18.27	-71.15	0.25	-87.76	0.17	-105.01	0.10	-118.29	0.14	-73.93	0.05
Binary Variables												
EXREPL	0.13		0.08		0.05		0.20		0.15		0.01	
EXRELQ	0.12		0.05		0.08		0.14		0.13		0.00	
RELQ_REPL	0.08		0.00		0.02		0.12		0.09		0.00	
EXCH	0.32		0.13		0.16		0.46		0.37		0.01	
CONDITION_BA	0.07		0.09		0.06		0.06		0.05		0.14	
CONDITION_A	0.79		0.82		0.87		0.80		0.86		0.53	
CONDITION_AA	0.14		0.08		0.07		0.13		0.08		0.34	
BUYEROUT	0.07		0.06		0.02		0.13		0.01		0.04	
MULTIFAMILY	0.98		0.95		0.98		0.97		0.99		1.00	
SENIOR	0.00		0.00		0.00		0.00		0.00		0.00	
SUBSIDIZED	0.01		0.01		0.01		0.02		0.00		0.00	
CONDO	0.01		0.03		0.01		0.01		0.00		0.00	
CONDOCONV	0.01		0.08		0.01		0.01		0.00		0.00	
PORTSALE	0.02		0.02		0.02		0.06		0.01		0.04	
YR2000	0.17		0.09		0.20		0.22		0.18		0.04	
YR2001	0.17		0.16		0.30		0.17		0.17		0.15	
YR2002	0.19		0.18		0.18		0.18		0.22		0.19	
YR2003	0.19		0.04		0.18		0.17		0.19		0.24	
YR2004	0.19		0.38		0.08		0.18		0.16		0.30	
YR2005	0.06		0.12		0.02		0.06		0.05		0.07	

Table 8. Continued

	Oakland		Phoenix		Portland		Riverside/San Bernardino		Sacramento	
Apartments	**Obs**	**1176**	**Obs**	**1291**	**Obs**	**490**	**Obs**	**593**	**Obs**	**370**
	Mean	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. De***
PRICE	1,557,993	3,049,442	5,215,020	8,142,932	2,275,221	4,588,447	3,859,097	7,191,817	3,180,281	5,283,3
AGE	49.04	21.41	27.35	13.46	36.57	22.36	28.08	14.77	33.00	16.21
SQFT	12,267	24,835	76,688	96,327	32,946	56,284	46,825	70,886	38,826	57,132
LANDSQFT	20,988	52,797	179,486	235,606	80,334	161,134	126,363	203,940	93,007	153,49
UNITS	15.43	23.90	85.55	93.84	36.26	57.03	53.65	73.32	46.30	60.44
FLOORS	2.15	0.75	1.86	1.09	2.05	0.95	1.79	1.37	1.93	0.36
PARKING	16.29	41.72	133.63	172.03	51.43	103.14	82.47	134.03	67.89	107.51
X	37.82	0.10	33.49	0.08	45.51	0.07	34.03	0.21	38.60	0.07
Y	-122.19	0.12	-112.02	0.13	-122.66	0.13	-117.22	0.40	-121.43	0.13
Binary Variables										
EXREPL	0.14		0.05		0.28		0.17		0.26	
EXRELQ	0.19		0.02		0.15		0.12		0.18	
RELQ_REPL	0.12		0.01		0.22		0.10		0.18	
EXCH	0.46		0.08		0.64		0.39		0.62	
CONDITION_BA	0.08		0.06		0.07		0.02		0.03	
CONDITION_A	0.89		0.83		0.75		0.84		0.80	
CONDITION_AA	0.03		0.11		0.18		0.14		0.17	
BUYEROUT	0.01		0.59		0.23		0.03		0.03	
MULTIFAMILY	0.99		0.96		0.97		0.98		0.99	
SENIOR	0.00		0.00		0.01		0.01		0.00	
SUBSIDIZED	0.00		0.01		0.01		0.00		0.01	
CONDO	0.00		0.03		0.01		0.00		0.00	
CONDOCONV	0.00		0.01		0.01		0.00		0.00	
PORTSALE	0.00		0.03		0.01		0.02		0.01	
YR2000	0.30		0.15		0.17		0.14		0.24	
YR2001	0.10		0.16		0.25		0.13		0.16	
YR2002	0.13		0.16		0.15		0.25		0.22	
YR2003	0.19		0.18		0.10		0.21		0.13	
YR2004	0.12		0.22		0.23		0.13		0.12	
YR2005	0.05		0.10		0.05		0.06		0.06	

Table 8. Continued

	San Diego		San Francisco		San Jose		Seattle		Tucson	
Apartments	**Obs**	**2031**	**Obs**	**796**	**Obs**	**471**	**Obs**	**1281**	**Obs**	**546**
	Mean	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	2,456,796	5,202,395	1,685,894	2,231,469	1,821,914	3,851,114	2,615,822	5,353,083	2,400,949	4,261,516
AGE	32.31	16.59	68.57	26.86	42.82	15.79	35.49	23.64	30.05	15.37
SQFT	19,124	37,755	7,913	8,770	9,650	19,492	31,382	58,257	44,434	71,118
LANDSQFT	38,008	94,553	6,579	10,138	20,088	46,560	68,933	153,127	111,491	176,153
UNITS	23.45	38.97	9.54	11.08	13.27	25.14	33.41	54.85	57.67	79.91
FLOORS	1.98	0.56	2.61	0.97	1.89	0.39	2.40	0.96	1.78	2.40
PARKING	30.98	66.50	5.91	11.23	14.53	30.31	47.80	100.41	83.36	133.18
X	32.82	0.17	37.71	0.11	37.32	0.08	47.56	0.24	32.24	0.04
Y	-117.12	0.10	-122.40	0.08	-121.93	0.11	-122.31	0.11	-110.93	0.05
Binary Variables										
EXREPL	0.21		0.13		0.16		0.24		0.19	
EXRELQ	0.21		0.29		0.23		0.15		0.06	
RELQ_REPL	0.16		0.10		0.10		0.08		0.09	
EXCH	0.57		0.52		0.48		0.47		0.33	
CONDITION_BA	0.04		0.04		0.04		0.07		0.21	
CONDITION_A	0.85		0.89		0.91		0.73		0.72	
CONDITION_AA	0.11		0.07		0.05		0.20		0.07	
BUYEROUT	0.03		0.01		0.02		0.10		0.43	
MULTIFAMILY	0.95		1.00		0.99		0.96		0.97	
SENIOR	0.01		0.00		0.00		0.01		0.02	
SUBSIDIZED	0.00		0.00		0.00		0.02		0.00	
CONDO	0.03		0.00		0.00		0.01		0.01	
CONDOCONV	0.04		0.00		0.00		0.01		0.00	
PORTSALE	0.00		0.04		0.00		0.01		0.04	
YR2000	0.20		0.37		0.31		0.15		0.12	
YR2001	0.19		0.08		0.06		0.18		0.12	
YR2002	0.18		0.09		0.09		0.18		0.17	
YR2003	0.17		0.11		0.12		0.17		0.21	
YR2004	0.17		0.16		0.13		0.21		0.23	
YR2005	0.05		0.05		0.13		0.04		0.12	

Approximately seven percent of all buyers reside out-of-state. There are 1,749 transactions in which the buyer was out of state. Phoenix is the market with the highest percentage of out-of-state buyers. They represent 59 percent of the 1,291 observations. Other markets of potential interest when quantifying the effect of having an out-of-state buyer include: Tucson with 43 percent out-of-state buyers, Portland with 23 percent, Denver with 13 percent, Seattle – 10 percent, and New York – 4 percent.

Approximately two percent of all sales were part of a portfolio sale; there are 488 portfolio sales in the sample. Denver is the market with the highest percentage of portfolio sales; they represent 6 percent of all sales. The other markets with a large enough number of portfolio sales to generate statistical significance are: New York City, 4 percent of all sales; San Francisco, 4 percent of sales; Phoenix, 3 percent of all observations; and Chicago, 2 percent of sales. Portfolio sales and out-of-state buyers in Los Angeles are only 1 percent each, but there are 7,761 observations in this market.

Slightly over 200 properties, or one percent of all sales were were purchased by condo converters. There are only two markets in which I could look for any price effects from condo-conversion motivation: San Diego with 77 condo conversions, and Boston with 34 such transactions.

Table 9 performs t-tests for differences between the mean price of apartments in a control group that contains all properties not associated with any conditions and the groups of properties that are the subject of study. These are properties that represent a replacement exchange only; properties that are associated with a relinquished exchange only; properties that served as both the replacement and relinquished property; purchases by out-of-state buyers only; purchases by condo converters; and portfolio sales not

associated with any conditions. For example, the replacement exchanges group contains all properties in which *EXREPL* is equal to 1, there are no conditions of sale (*CONDOCONV* and *PORTSALE* are both equal to zero) and the buyer is not from out-of-state.

Table 9. Differences in Mean Prices of Control Sample and Identified Groups of Interest for Apartment Properties

Apartments	**Observations**	**Mean Value of Sales Price**	**Standard Error**	**T-test Value**
Control Group	14,383	1,703,610	30,440	
EXREPL	2,786	1,878,481	59,843	-2.36*
EXRELQ	2,609	1,749,449	57,314	-0.61
RELQ_REPL	1,687	1,707,154	48,233	-0.04
BUYEROUT	1,288	7,004,433	295,063	-39.36*
CONDOCONV	133	7,545,770	989,659	-17.68*
PORTSALE	310	4,650,359	352,059	-13.79*

The results show that replacement apartment exchanges are associated, on average, with a 10.3% price premium and the price difference is statistically significant. Relinquished exchanges and transactions associated with both replacement and relinquished exchanges have average prices that are not statistically significantly different from the average price in the control group.

Sales that are completed by out-of-state buyers are associated with a price which is four times higher than the average price of properties in the comparison group. The results are similar with respect to sales to condo converters, which are associated with an even higher premium, which is also statistically significant. Finally, I also observe that portfolio sales are, on average, 173% more expensive than transactions in the comparison

sample. Therefore, I reject the null hypothesis that the difference between the mean price in the comparison group and the mean price observed with replacement exchanges, out-of-state buyers, condo conversions and portfolio sales correspondingly are equal to zero. I was not able to reject the null hypothesis for sales involving relinquished exchanges and two different exchanges. This result is consistent with our expectations.

Next, I present the results from estimating equation (17) for each of the 15 markets in Table 10.

I perform each of the regressions using a stepwise estimation procedure to decide which of the submarket dummies to leave in the final model. All other dependent variables are not subject to the procedure. I use a robust estimation method to account for potential heteroskedasticity; therefore all reported p-values are adjusted values.

The reported results in Table 10 show that the estimated coefficients on the structural attributes are of the predicted sign and statistically significant in most of the market regressions. *PARKING* tends to be positive and insignificant. However, in two markets, San Diego and New York City, it is negative and significant. It also has a negative sign in the Chicago and Los Angeles regressions, with p-values of 0.14 and 0.16 correspondingly.

This finding is not surprising and is specific to higher density areas in which more parking is usually associated with apartment communities that are distant from the centers of the city and hence tend to be cheaper. The coefficient on *UNITS* is positive in all regressions but one, and is significant in 6 of the 15 models. In Phoenix, *UNITS* reverses sign and becomes negative and significant at less than one percent level. Phoenix is the market in which the largest average transactions are observed. The average

apartment property in the sample has 86 units and 76,688 sq. ft. of improvements. In contrast, the average apartment property sold in the 15 markets has 27 units and 23,034 sq. ft. of improvements.

The estimated coefficient on the variable of interest, *EXREPL*, is positive and significant in 12 of the 15 regressions. This provides evidence that buyers of replacement properties are paying statistically significant price premiums in the majority of the larger markets contained in the regression sample.

The coefficient estimates of *EXRELQ* are generally positive and significant in 7 out of the 15 regressions. However, in only three of the regressions are the coefficient estimates on relinquished exchanges higher than the coefficient estimates of replacement exchanges. Casual observation shows that relinquished exchanges have significant and positive coefficients in markets that have seen more appreciation in residential real estate than others. In addition, it is important to remember that if the main motivation to enter into an exchange is to postpone capital gain taxes, properties that are part of relinquished exchanges will tend to be ones that have seen more capital appreciation than other markets. Hence, all else the same, they will tend to be more expensive properties. Therefore, the observed positive coefficients provide evidence that sellers enter in tax delayed exchanges when their properties have appreciated in value. This positive effect on price may offset any other possible negative effects related with relinquished exchanges and thus I can not make any conclusions about the magnitude of the price impact related to a sale being part of a relinquished exchange.

With replacement exchanges, there are no such issues; and therefore all else equal the coefficient on EXREPL can be directly associated with a price premium paid when

Table 10. Regression Statistics for OLS Model with Structural Characteristics and Submarket Dummies by Apartment Markets

Market	**Boston**	**Chicago**	**Denver**	**Los Angeles**	**New York City**	**Oakland**	**Phoenix**	**Portland**
Observations	**400**	**1585**	**782**	**7761**	**4067**	**1176**	**1291**	**490**
EXREPL	0.139	0.107	0.160	0.076	0.094	0.071	-0.020	0.086
	0.10	***0.01***	***0.00***	***0.00***	***0.43***	***0.03***	***0.67***	***0.06***
EXRELQ	-0.145	0.137	0.140	0.043	0.081	0.050	0.000	0.087
	0.23	***0.00***	***0.00***	***0.00***	***0.15***	***0.07***	***1.00***	***0.13***
RELQ_REPL	0.756	0.260	0.192	0.093	-0.005	0.113	-0.108	0.113
	0.00	***0.00***	***0.00***	***0.00***	***0.98***	***0.00***	***0.18***	***0.01***
AGE	-0.008	-0.005	-0.007	-0.009	-0.003	0.000	-0.010	-0.008
	0.12	***0.05***	***0.04***	***0.00***	***0.10***	***0.96***	***0.00***	***0.02***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.71	***0.10***	***0.21***	***0.00***	***0.03***	***0.14***	***0.72***	***0.03***
SQFT	0.021	0.030	0.029	0.039	0.028	0.043	0.023	0.027
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.003	-0.001	0.000	0.000	0.010	0.000	0.000	0.002
	0.03	***0.62***	***0.63***	***0.87***	***0.00***	***0.89***	***0.37***	***0.12***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.02	***0.18***	***0.31***	***0.20***	***0.00***	***0.35***	***0.95***	***0.12***
PARKING	0.001	-0.001	0.000	-0.001	-0.002	0.000	0.000	0.000
	0.48	***0.14***	***0.22***	***0.16***	***0.05***	***0.80***	***0.82***	***0.99***
FLOORS	-0.036	0.024	0.041	0.044	0.081	0.118	0.035	0.085
	0.26	***0.23***	***0.08***	***0.02***	***0.00***	***0.00***	***0.14***	***0.06***
UNITS	0.008	0.002	0.002	0.006	0.003	0.001	-0.001	0.002
	0.01	***0.17***	***0.02***	***0.00***	***0.07***	***0.79***	***0.00***	***0.33***
CONDITION_BA	-0.101	-0.202	-0.194	-0.089	-0.008	-0.094	-0.232	-0.035
	0.22	***0.00***	***0.00***	***0.00***	***0.69***	***0.01***	***0.00***	***0.58***
CONDITION_AA	-0.057	0.167	-0.018	0.116	0.094	0.099	0.064	0.174
	0.51	***0.00***	***0.73***	***0.00***	***0.00***	***0.20***	***0.20***	***0.01***
BUYEROUT	0.051	0.065	0.038	0.016	0.040	-0.206	0.109	-0.047
	0.66	***0.65***	***0.47***	***0.77***	***0.30***	***0.22***	***0.00***	***0.32***
SENIOR	-0.003	0.024	0.607	-0.419	-0.634	0.257	0.394	0.310
	0.99	***0.93***	***0.00***	***0.13***	***0.00***	***0.05***	***0.17***	***0.36***
SUBSIDIZED	-0.536	0.174	0.060	-0.069	-0.364	-1.110	-0.015	0.277
	0.20	***0.25***	***0.60***	***0.67***	***0.08***	***0.25***	***0.84***	***0.00***

Table 10. Continued

Market	Boston	Chicago	Denver	Los Angeles	New York City	Oakland	Phoenix	Portland
CONDO	0.154	0.186	0.307	0.171	-0.484	-0.007	0.103	0.030
	0.36	***0.09***	***0.00***	***0.05***	***0.00***	***0.90***	***0.12***	***0.84***
CONDOCONV	-0.038	0.098	-0.038	0.044	0.093	0.516	0.046	0.006
	0.71	***0.21***	***0.79***	***0.86***	***0.03***	***0.04***	***0.47***	***0.99***
PORTSALE	0.509	0.158	-0.104	-0.012		0.072	-0.042	-0.601
	0.01	***0.02***	***0.16***	***0.82***		***0.62***	***0.48***	***0.00***
YR2000	-0.089	0.145	0.067	0.032	-0.038	0.134	0.136	-0.045
	0.58	***0.01***	***0.34***	***0.12***	***0.63***	***0.00***	***0.04***	***0.58***
YR2001	-0.005	0.270	0.338	0.142	0.040	0.457	0.179	-0.091
	0.97	***0.00***	***0.00***	***0.00***	***0.60***	***0.00***	***0.01***	***0.24***
YR2002	0.112	0.364	0.261	0.295	0.139	0.627	0.262	-0.028
	0.43	***0.00***	***0.00***	***0.00***	***0.07***	***0.00***	***0.00***	***0.73***
YR2003	0.332	0.541	0.279	0.523	0.373	0.657	0.279	0.095
	0.06	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.27***
YR2004	0.394	0.622	0.220	0.753	0.507	0.802	0.443	0.146
	0.01	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.08***
YR2005	0.559	0.691	0.381	0.911	0.641	0.858	0.539	0.343
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SDUMi (not reported)								
CONST	14.276	13.295	12.631	13.132	12.079	12.517	13.372	12.858
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
R-squared	**0.88**	**0.80**	**0.90**	**0.83**	**0.83**	**0.85**	**0.93**	**0.89**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; *UNITS* – Number of units; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SENIOR* – Binary variable set equal to one if property use is senior multi-family; *SUBSIDIZED* – Binary variable set equal to one if property use is subsidized multi-family; *CONDO* – Binary variable set equal to one if property use is multi-family condominium; *CONDOCONV* – Binary variable set equal to one if transaction was part of condo conversion; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

Table 10. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	San Francisco	San Jose	Seattle	Tucson
Observations	**593**	**370**	**2031**	**796**	**471**	**1281**	**546**
EXREPL	0.098	0.158	0.075	0.078	0.101	0.055	0.044
	0.03	***0.00***	***0.00***	***0.01***	***0.00***	***0.03***	***0.28***
EXRELQ	0.120	0.184	0.030	0.068	0.004	0.016	0.031
	0.02	***0.00***	***0.19***	***0.01***	***0.87***	***0.59***	***0.61***
RELQ_REPL	0.234	0.182	0.087	0.115	0.082	0.094	0.124
	0.00	***0.00***	***0.00***	***0.00***	***0.05***	***0.02***	***0.02***
AGE	-0.012	-0.009	-0.002	0.000	-0.002	-0.002	-0.005
	0.01	***0.04***	***0.25***	***0.90***	***0.75***	***0.36***	***0.13***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.33	***0.34***	***0.81***	***0.51***	***0.97***	***0.69***	***0.60***
SQFT	0.028	0.028	0.030	0.094	0.053	0.025	0.021
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	-0.001	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.001	0.002	0.001	-0.001	0.005	0.000	0.002
	0.21	***0.43***	***0.25***	***0.90***	***0.14***	***0.67***	***0.05***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.08	***0.29***	***0.36***	***0.09***	***0.17***	***0.64***	***0.54***
PARKING	0.000	-0.001	-0.001	0.001	-0.002	0.001	0.001
	0.47	***0.18***	***0.03***	***0.79***	***0.33***	***0.18***	***0.00***
FLOORS	-0.001	0.143	0.112	0.072	0.137	0.158	-0.003
	0.98	***0.04***	***0.01***	***0.00***	***0.00***	***0.00***	***0.60***
UNITS	0.000	0.001	0.007	0.001	0.020	0.002	0.001
	0.81	***0.43***	***0.00***	***0.80***	***0.02***	***0.14***	***0.47***
CONDITION_BA	-0.061	-0.153	-0.101	-0.186	-0.113	-0.140	-0.163
	0.53	***0.11***	***0.02***	***0.00***	***0.06***	***0.00***	***0.00***
CONDITION_AA	0.047	0.048	0.175	0.180	0.140	0.107	0.055
	0.38	***0.47***	***0.00***	***0.00***	***0.01***	***0.00***	***0.45***
BUYEROUT	-0.013	0.057	0.019	-0.017	-0.019	-0.015	0.190
	0.89	***0.74***	***0.78***	***0.83***	***0.79***	***0.75***	***0.00***
SENIOR	0.172		0.151		-0.888	0.061	0.248
	0.18		***0.04***		***0.00***	***0.80***	***0.00***
SUBSIDIZED	0.358	0.002	-0.226	-0.181	-1.378	0.102	0.400
	0.00	***0.98***	***0.17***	***0.20***	***0.00***	***0.14***	***0.00***
CONDO	-0.040		0.174	0.341	4.651	0.325	0.424
	0.61		***0.01***	***0.00***	***0.00***	***0.00***	***0.06***

Table 10. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	San Francisco	San Jose	Seattle	Tucson
CONDOCONV	-0.338	-0.061	0.160			0.146	
	0.12	***0.82***	***0.02***			***0.19***	
PORTSALE	0.037	-0.798	-0.248	-0.156	-0.550	0.111	0.154
	0.70	***0.00***	***0.16***	***0.00***	***0.15***	***0.35***	***0.16***
YR2000	0.106	0.147	0.052	0.208	0.108	-0.007	-0.128
	0.19	***0.07***	***0.27***	***0.00***	***0.00***	***0.89***	***0.16***
YR2001	0.258	0.221	0.211	0.321	0.347	0.022	-0.024
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.68***	***0.80***
YR2002	0.343	0.474	0.445	0.376	0.363	0.077	0.035
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.14***	***0.71***
YR2003	0.472	0.620	0.664	0.386	0.375	0.148	0.074
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.41***
YR2004	0.726	0.855	0.907	0.454	0.397	0.163	0.127
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.15***
YR2005	0.998	0.877	0.842	0.510	0.370	0.299	0.309
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SDUMi (not reported)							
CONST	12.528	12.704	13.363	12.940	13.050	12.804	12.869
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
R-squared	**0.91**	**0.91**	**0.85**	**0.84**	**0.92**	**0.89**	**0.92**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; *UNITS* – Number of units; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SENIOR* – Binary variable set equal to one if property use is senior multi-family; *SUBSIDIZED* – Binary variable set equal to one if property use is subsidized multi-family; *CONDO* – Binary variable set equal to one if property use is multi-family condominium; *CONDOCONV* – Binary variable set equal to one if transaction was part of condo conversion; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

the sale is part of a replacement exchange. The coefficient on *RELQ_REPL* also is positive and significant in 13 out of the 15 markets. As discussed, this coefficient represents the combined price effect of relinquished and replacement exchange motivation. The magnitude of this coefficient tends to be larger than the coefficient on replacement exchanges.

The coefficient on the variable indicating that the buyer is out-of-state, *BUYEROUT*, is statistically and economically significant in just two markets – Phoenix and Tucson. These are also markets of specific interest when analyzing the price premiums associated with out-of-state buyers. In Phoenix 59 percent of sales were to out-of-state buyers, while in Tucson their share was 44 percent.

With condominium conversions there are only two markets of potential interest – San Diego and Boston. I find that the coefficient on the variable indicating a purchase by a condo converter, *CONDOCONV*, is economically and statistically significant in San Diego. The coefficient is also significant in New York City and Oakland.

The coefficient on the variable indicating a portfolio sale, *PORTSALE*, is statistically significant in 3 out of the 5 markets of interest – Chicago, New York City and San Francisco. However, contrary to our intuition the coefficient on *PORTSALE* in San Francisco is negative, rather than positive.

The estimated year dummies, with 1999 as the omitted year, are generally positive and significant. Moreover, the magnitude and significance of the time dummy coefficients reveal substantial price appreciation over the seven year study period. Finally, although submarket dummy variables are not reported in the regression tables, the model fit is improved significantly by the use of the submarket location controls.

In OLS Model II, I add controls for absolute location by using a third order expansion of the property's latitude and longitude coordinates. This expansion yields nine additional explanatory variables.[1] The resulting model specification has the following form:

$$LNPRICE_m = \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_4 AGE + \alpha_5 AGE2 + \alpha_6 SQFT + \alpha_7 SQFT2 + \alpha_8 LANDSQFT + \alpha_9 LANDSQFT2 + \alpha_{10} PARKING + \alpha_{11} FLOORS + \alpha_{12} UNITS + \sum_{i=2}^{3} \beta_i CONDITION_i + \alpha_{13} BUYEROUT + \alpha_{14} SENIOR + \alpha_{15} SUBSIDIZED + \alpha_{16} CONDO + \alpha_{17} CONDOCONV + \alpha_{18} PORTSALE + \sum_{n=2000}^{2005} \chi_n YR_n + \sum_{s=2}^{P\leq 43} \delta_s SMDUM_s + \sum_{k=0}^{r} \sum_{l=0}^{r} \phi_{k,l} (X^k, Y^l) \quad (19)$$

Table 11 presents the regression results for Model II. Controlling for absolute location, in addition to relative location, improves slightly (by about 0.01) the fit of the models. Adjusted R-squared for the market regressions range from 0.81 to 0.92. The regression results are virtually unchanged from the results reported for Model 1. Therefore, I will only discuss results related to the key variables of interest.

The coefficient on the variable indicating a replacement exchange, *EXREPL*, is positive and significant in 12 of the 15 regressions. This reconfirms the previous result that buyers of replacement properties are paying statistically significant price premiums in the majority of the sample markets. The coefficient on the variable indicating a relinquished exchange, *EXRELQ*, remains generally positive and significant in 7 out of the 15 regressions. The size of coefficient estimates remains largely unchanged. The coefficient on *RELQ_REPL* is again positive and significant in 13 out of the 15 markets and its magnitude remains larger than the coefficient on replacement exchanges.

[1] I also experiment with a model where I control for differences in the effects of key structural characteristics across submarkets by interacting age and the square footage of improvements with the sub market dummies. The Third Model yields a slightly better fit – R-squares are increased by 1-5 percent across markets. However, it sacrifices even more degrees of freedom. In addition, coefficients on age and square footage, due to the presence of interaction variables, are mostly insignificant and hard to interpret. Therefore, I do not report the results from the third model in the dissertation.

Table 11. Regression Statistics for OLS Model with Structural Characteristics, Submarket Dummies and Longitude, Latitude Coordinates by Apartment Markets

Market	**Boston**	**Chicago**	**Denver**	**Los Angeles**	**New York City**	**Oakland**	**Phoenix**	**Portland**
Observations	**400**	**1585**	**782**	**7761**	**4067**	**1176**	**1291**	**490**
EXREPL	0.145	0.099	0.162	0.076	0.108	0.070	-0.020	0.086
	0.09	***0.02***	***0.00***	***0.00***	***0.35***	***0.03***	***0.66***	***0.06***
EXRELQ	-0.131	0.128	0.137	0.046	0.046	0.054	0.000	0.088
	0.28	***0.00***	***0.00***	***0.00***	***0.45***	***0.05***	***1.00***	***0.13***
RELQ_REPL	0.754	0.234	0.191	0.092	-0.010	0.115	-0.106	0.111
	0.00	***0.00***	***0.00***	***0.00***	***0.97***	***0.00***	***0.19***	***0.02***
AGE	-0.008	-0.005	-0.006	-0.010	-0.002	-0.001	-0.010	-0.008
	0.13	***0.08***	***0.05***	***0.00***	***0.21***	***0.60***	***0.00***	***0.02***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.71	***0.16***	***0.22***	***0.00***	***0.23***	***0.29***	***0.72***	***0.03***
SQFT	0.021	0.029	0.029	0.039	0.029	0.043	0.023	0.027
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.002	0.000	0.000	0.001	0.009	0.000	0.000	0.002
	0.04	***0.95***	***0.68***	***0.60***	***0.00***	***0.78***	***0.36***	***0.13***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.02	***0.34***	***0.33***	***0.30***	***0.00***	***0.40***	***0.97***	***0.13***
PARKING	0.001	-0.001	0.000	-0.001	-0.002	0.000	0.000	0.000
	0.43	***0.19***	***0.21***	***0.17***	***0.11***	***0.90***	***0.81***	***0.99***
FLOORS	-0.039	0.024	0.042	0.043	0.072	0.114	0.035	0.086
	0.23	***0.19***	***0.07***	***0.02***	***0.00***	***0.00***	***0.14***	***0.06***
UNITS	0.009	0.002	0.002	0.006	0.003	0.001	-0.001	0.002
	0.01	***0.19***	***0.02***	***0.00***	***0.08***	***0.85***	***0.00***	***0.33***
CONDITION_BA	-0.093	-0.191	-0.199	-0.086	-0.019	-0.091	-0.232	-0.040
	0.25	***0.00***	***0.00***	***0.00***	***0.34***	***0.01***	***0.00***	***0.54***
CONDITION_AA	-0.063	0.160	-0.015	0.114	0.071	0.089	0.064	0.172
	0.47	***0.00***	***0.78***	***0.00***	***0.00***	***0.25***	***0.20***	***0.01***
BUYEROUT	0.056	0.072	0.035	0.013	0.038	-0.222	0.110	-0.046
	0.63	***0.61***	***0.50***	***0.80***	***0.31***	***0.18***	***0.00***	***0.33***
SENIOR	-0.017	-0.002	0.548	-0.418	-0.677	0.241	0.398	0.270
	0.91	***0.99***	***0.01***	***0.12***	***0.00***	***0.08***	***0.17***	***0.41***
SUBSIDIZED	-0.531	0.223	0.049	-0.074	-0.328	-1.060	-0.018	0.245
	0.20	***0.13***	***0.66***	***0.66***	***0.13***	***0.27***	***0.81***	***0.03***

Table 11. Continued

Market	Boston	Chicago	Denver	Los Angeles	New York City	Oakland	Phoenix	Portland
CONDO	0.140	0.171	0.298	0.154	-0.441	0.018	0.103	0.028
	0.41	***0.11***	***0.00***	***0.07***	***0.01***	***0.74***	***0.12***	***0.85***
CONDOCONV	-0.035	0.028	-0.045	0.041		1.415	0.049	0.006
	0.74	***0.74***	***0.75***	***0.87***		***0.00***	***0.44***	***0.99***
PORTSALE	0.514	0.149	-0.098	-0.005	0.086	0.145	-0.041	-0.605
	0.01	***0.02***	***0.18***	***0.92***	***0.04***	***0.33***	***0.50***	***0.00***
YR2000	-0.087	0.142	0.074	0.033	-0.050	0.135	0.138	-0.049
	0.60	***0.01***	***0.30***	***0.10***	***0.53***	***0.00***	***0.03***	***0.55***
YR2001	-0.003	0.272	0.351	0.146	0.034	0.468	0.180	-0.095
	0.98	***0.00***	***0.00***	***0.00***	***0.65***	***0.00***	***0.01***	***0.23***
YR2002	0.119	0.366	0.271	0.298	0.129	0.636	0.263	-0.032
	0.41	***0.00***	***0.00***	***0.00***	***0.09***	***0.00***	***0.00***	***0.70***
YR2003	0.356	0.535	0.287	0.529	0.365	0.665	0.279	0.094
	0.04	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.28***
YR2004	0.401	0.642	0.233	0.759	0.506	0.812	0.443	0.143
	0.01	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.09***
YR2005	0.552	0.694	0.393	0.916	0.645	0.864	0.540	0.337
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
Y3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.54	***0.00***	***0.18***	***0.00***	***0.00***	***0.00***	***0.96***	***0.97***
XY2		0.000	0.000	0.000		0.000	0.000	0.000
		0.00	***0.71***	***0.24***		***0.00***	***0.42***	***0.73***
YX2	0.000				0.000			
	0.08				***0.60***			
SDUMi (not reported)								
CONST	7.226	13.126	33.875	-33.261	-62.993	9.494	22.172	27.363
	0.34	***0.09***	***0.03***	***0.00***	***0.00***	***0.66***	***0.05***	***0.16***
R-squared	**0.88**	**0.81**	**0.90**	**0.83**	**0.83**	**0.85**	**0.93**	**0.89**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; *UNITS* – Number of units; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SENIOR* – Binary variable set equal to one if property use is senior multi-family; *SUBSIDIZED* – Binary variable set equal to one if property use is subsidized multi-family; *CONDO* – Binary variable set equal to one if property use is multi-family condominium; *CONDOCONV* – Binary variable set equal to one if transaction was part of condo conversion; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – latitude of property; *Y* – longitude of property.

Table 11. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	San Francisco	San Jose	Seattle	Tucson
Observations	**593**	**370**	**2031**	**796**	**471**	**1281**	**546**
EXREPL	0.096	0.158	0.072	0.076	0.099	0.053	0.045
	0.03	***0.00***	***0.00***	***0.02***	***0.00***	***0.04***	***0.28***
EXRELQ	0.122	0.182	0.028	0.062	0.002	0.013	0.034
	0.02	***0.00***	***0.23***	***0.01***	***0.96***	***0.67***	***0.59***
RELQ_REPL	0.225	0.182	0.087	0.109	0.084	0.090	0.130
	0.00	***0.00***	***0.00***	***0.00***	***0.04***	***0.02***	***0.02***
AGE	-0.012	-0.009	-0.002	-0.001	-0.002	-0.002	-0.006
	0.01	***0.04***	***0.21***	***0.75***	***0.74***	***0.38***	***0.07***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.36	***0.33***	***0.78***	***0.66***	***0.99***	***0.72***	***0.39***
SQFT	0.028	0.028	0.030	0.093	0.053	0.026	0.021
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	-0.001	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.001	0.002	0.001	0.001	0.005	0.000	0.002
	0.17	***0.46***	***0.24***	***0.84***	***0.15***	***0.63***	***0.05***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.08	***0.32***	***0.35***	***0.33***	***0.18***	***0.65***	***0.59***
PARKING	0.000	-0.001	-0.001	0.001	-0.002	0.001	0.001
	0.52	***0.18***	***0.04***	***0.84***	***0.33***	***0.20***	***0.00***
FLOORS	-0.001	0.147	0.109	0.070	0.137	0.158	-0.003
	0.97	***0.04***	***0.01***	***0.00***	***0.00***	***0.00***	***0.58***
UNITS	0.000	0.001	0.007	0.001	0.020	0.002	0.001
	0.77	***0.45***	***0.00***	***0.72***	***0.02***	***0.15***	***0.33***
CONDITION_BA	-0.056	-0.159	-0.100	-0.182	-0.112	-0.139	-0.145
	0.58	***0.10***	***0.02***	***0.00***	***0.06***	***0.00***	***0.00***
CONDITION_AA	0.046	0.047	0.173	0.150	0.139	0.107	0.054
	0.39	***0.49***	***0.00***	***0.00***	***0.01***	***0.00***	***0.46***
BUYEROUT	-0.021	0.047	0.016	-0.008	-0.017	-0.012	0.197
	0.83	***0.77***	***0.81***	***0.92***	***0.81***	***0.81***	***0.00***
SENIOR	0.175		0.156		-0.891	0.061	0.248
	0.18		***0.03***		***0.00***	***0.80***	***0.00***
SUBSIDIZED	0.375	0.021	-0.191	-0.235	-1.388	0.085	0.446
	0.00	***0.86***	***0.28***	***0.10***	***0.00***	***0.24***	***0.00***
CONDO	-0.057		0.170	0.365	4.640	0.348	0.401
	0.48		***0.02***	***0.00***	***0.00***	***0.00***	***0.07***

Table 11. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	San Francisco	San Jose	Seattle	Tucson
CONDOCONV	-0.345	-0.066	0.152			0.143	
	0.07	***0.81***	***0.02***			***0.19***	
PORTSALE	0.026	-0.807	-0.252	-0.160	-0.555	0.093	0.124
	0.79	***0.00***	***0.15***	***0.00***	***0.15***	***0.43***	***0.27***
YR2000	0.111	0.144	0.046	0.208	0.107	-0.008	-0.118
	0.17	***0.07***	***0.33***	***0.00***	***0.00***	***0.88***	***0.19***
YR2001	0.261	0.217	0.209	0.317	0.351	0.024	-0.028
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.65***	***0.77***
YR2002	0.345	0.474	0.441	0.366	0.368	0.078	0.037
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.14***	***0.69***
YR2003	0.474	0.620	0.664	0.379	0.381	0.149	0.071
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.43***
YR2004	0.724	0.852	0.907	0.463	0.399	0.167	0.129
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.14***
YR2005	1.002	0.876	0.848	0.506	0.374	0.306	0.319
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
Y3	0.000	0.000	0.000	0.000	0.000	0.001	0.000
	0.64	***0.89***	***0.00***	***0.00***	***0.10***	***0.00***	***0.03***
XY2	-0.001	0.000	0.000	0.000	0.000	0.007	0.000
	0.67	***0.73***	***0.02***	***0.00***	***0.28***	***0.00***	***0.07***
YX2	-0.001					0.009	
	0.68					***0.00***	
SDUMi (not reported)							
CONST	3.215	28.361	-9.089	-18.833	-8.118	20.801	28.200
	0.70	***0.36***	***0.60***	***0.45***	***0.69***	***0.07***	***0.04***
R-squared	**0.91**	**0.91**	**0.85**	**0.85**	**0.92**	**0.89**	**0.92**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; *UNITS* – Number of units; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SENIOR* – Binary variable set equal to one if property use is senior multi-family; *SUBSIDIZED* – Binary variable set equal to one if property use is subsidized multi-family; *CONDO* – Binary variable set equal to one if property use is multi-family condominium; *CONDOCONV* – Binary variable set equal to one if transaction was part of condo conversion; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – latitude of property; *Y* – longitude of property.

The coefficient on BUYEROUT remains positive and significant in Phoenix and Tucson. The coefficient on CONDOCONV remains positive and significant in San Diego. The coefficient on PORTSALE is economically and statistically significant in Chicago, New York City, Portland and San Francisco. PORTSALE is also positive and significant in Boston, but negative and significant in Portland and Sacramento. However these results will not be discussed since they are based on too few observations.

Based on OLS Model II, the percentage sales price changes corresponding to the estimated (statistically significant) coefficients for *EXREPL*, *EXRELQ, RELQ_REPL, CONDOCONV, BUYEROUT,* and *PORTSALE* for each market are presented in Table 12.

Percentage price effects are calculated using $100*g = 100*\{\exp(x) - 1\}$ consistent with Halvorsen and Palmquist (1980). In this equation g is the relative effect on sale price (PRICE) of the presence of a condition (e.g. replacement exchange (*EXREPL*), relinquishment exchange (*EXRELQ*), etc); x is *EXREPL* or *EXRELQ,* or some other condition.

The percentage price effect of the sale being part of a replacement property exchange ranges from 5.43 percent (in Seattle) to 17.58 percent in Denver, while the effect of the transaction being part of relinquished property exchange on sales price is between 4.73 percent in Los Angeles to 20.02 percent in Sacramento. The price premium associated with a sale being part of both a replacement and relinquished exchange ranges from 8.81 percent in San Jose to 26.26 percent in Chicago. Although the coefficient on relinquished property is harder to interpret, because of the issues discussed, it is clear that replacement exchanges have a positive effect on price. Moreover, in the majority of the markets (12 out of 15) this price effect is statistically and economically significant.

In comparison, the simulation analysis discussed in Chapter 5 predicts that when the holding period, both for the relinquished and replacement property, does not exceed 5 years, the observed incremental NPV from a 1031 exchange is 1 – 4 percent. With a 10 year holding period, the incremental NPV increases to 4 – 8 percent, depending on the assumptions for the other key variables. Finally, with a 20 year holding period incremental value from using an exchange ranges from 4.8 to 10 percent. Therefore, participants in tax-delayed exchanges that have a short-term investment horizon need to be very careful, since the wealth that they lose in the form of a higher replacement property price may offset, in whole or in part, the gain from the deferment of taxes.

Out-of-state buyers are associated with a price premium of 11.61 percent in Phoenix and 21.77 percent in Tucson. Condominium conversions are associated with a price premium of 16.37 percent of sales price in San Diego. Finally, portfolio sales result in 8.99 percent higher prices in NYC, a 16.10 percent increase in price in Chicago and a 14.79 percent positive impact on price in San Francisco.

Robustness of Results

Omitted Variables Issues

As noted previously there is a concern that coefficient estimates may be biased due to omitted variables. The magnitude of the coefficients of the variable representing a relinquished exchange (*EXRELQ*) clearly shows that properties that become part of relinquished exchanges may have some extraordinary characteristics which are not captured by the variables in the model. I follow the Haurin (1988) and Glower, Haurin and Hendershott (1998) approach to form a variable that controls for unusual

Table 12. Marginal Effects for Significant Coefficients for Variables of Interest

Market	Obs	*EXREPL*	*EXRELQ*	*RELQ_REPL*	*BUYEROUT*	*CONDOCONV*	*PORTSALE*
Boston	400	15.55%					
Chicago	1585	10.41%	13.65%	26.36%			16.10%
Denver	782	17.58%	14.65%	21.00%			
Los Angeles	7761	7.90%	4.72%	9.63%			
New York City	4067						8.99%
Oakland	1176	7.28%	5.53%	12.24%			
Phoenix	1291				11.61%		
Portland	490	8.96%		11.69%			
Riverside/San Bernardino	593	10.03%	13.01%	25.23%			
Sacramento	370	17.12%	20.02%	19.96%			
San Diego	2031	7.44%		9.09%		16.37%	
San Francisco	796	7.86%	6.39%	11.55%			-14.79%
San Jose	471	10.41%		8.81%			
Seattle	1281	5.43%		9.46%			
Tucson	546			13.91%	21.77%		

characteristics of a property. Each property's atypicality is computed based on the hedonic equation's coefficients, and the formula provided in Glower, Haurin and Hendershott (1998)

$$ATYP = \frac{\sum_i \left| \exp(a + b_i h_i) - \exp(a + b_i h_i^*) \right|}{SP} * 100\% \quad (20)$$

The property atypicality measure, *ATYP* is presented as percentage of selling price (*SP*); h_i are the physical characteristics, h_i^* are the mean values of these characteristics, and *a* and b_i are the intercept and the slope estimates from the hedonic regression (Ibid.). The hedonic equation used has the following form

$$\begin{aligned} LNPRICE_m &= \alpha_0 + \alpha_1 AGE + \alpha_2 AGE2 + \alpha_3 SQFT + \alpha_4 SQFT2 \\ &+ \alpha_5 LANDSQFT + \alpha_6 LANDSQFT2 + \alpha_7 PARKING \\ &+ \alpha_8 FLOORS + \alpha_9 UNITS + \sum_{i=2}^{3} \beta_i CONDITION_i + \alpha_{10} SENIOR \\ &+ \alpha_{11} SUBSIDIZED + \alpha_{12} CONDO \end{aligned} \quad (21)$$

Location characteristics are excluded. The fundamental value of a property is presented by the value predicted from a hedonic price equation based on a sample of apartment properties sold across all markets that are not associated with any conditions, completed with out-of-state buyers, or part of an exchange.

Next, I include the atypicality measure in the model specified by the equation

$$\begin{aligned} LNPRICE_m &= \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_{13} BUYEROUT + \alpha_{19} ATYP + \\ &+ \sum_{s=2}^{P \le 43} \delta_s SMDUM_s + \sum_{k=0}^{r} \sum_{l=0}^{r} \phi_{k,l} (X^k, Y^l) \end{aligned} \quad (22)$$

The estimated coefficients from this model are not different from the ones estimated with OLS Model II. This leads us to conclude that OLS Model II is well specified.

Endogeneity Issues

There is a concern that the variable representing relinquished exchanges, *EXRELQ*, is not exogenous with respect to selling price. For example, an omitted factor such as extreme price appreciation, which is correlated with both the probability for a sale to be part of a relinquished exchange as well as selling price, could cause a significant relationship between the variable representing that the sale is part of a relinquished exchange and the selling price. To address these concerns, I perform a Durbin–Wu–Hausman (DWH) test for endogeneity. I estimate the base OLS Model II using two-stage least squares regressions, where *EXRELQ* is an endogenous variable. The DWH test first estimates the endogenous variable as a function of all exogenous variables. In the second stage it regresses the dependent variable (in this case, natural log of price) on all variables and includes the residuals of the endogenous variable. The second stage coefficient estimates, when performing this procedure, are not different from the coefficients estimated in the original model. Also the DWH test shows that there is no severe bias in the OLS model estimates. Therefore, the results from the OLS model appear to be robust to endogeneity concerns.

CHAPTER 8
RESULTS FOR OFFICE PROPERTIES

This chapter focuses attention on results from the empirical analysis on the commercial real estate office market. There are 8,871 observations in the office property sample used for regression analysis. Summary statistics for the variables of interest are presented in Table 13. Statistics at the aggregate data level are presented in the first two columns. With office properties, the average property price is about 2.5 times higher than apartments. The mean sales price is $5,353,894 and the standard deviation of price is $9,734,759. Office transactions are, on average, much larger than our apartment sales. The average office property sold in the sample has 41,718 square feet of improvements and is built on 78,952 square feet of land. Also, the office properties in our sample are newer than apartments, averaging 29 years of age. A large portion of the office properties are classified as being in excellent condition (32 percent), 66 percent are in good condition, and only 3 percent are in below average condition. The average office property has 2.43 floors and 100 parking spaces.

There are fifteen markets represented in this sample including: Chicago, Dallas/Forth Worth, Denver, Fort Lauderdale, Las Vegas, Los Angeles, Oakland, Phoenix, Riverside/San Bernardino, Sacramento, San Diego, Seattle, Tampa, Tucson and Washington, DC. Los Angeles is the largest market represented with 1,491 sales, followed by Phoenix with 995 observations. The smallest market is Tucson with 264 office transactions.

Table 13 also presents summary statistics of regression variables by markets. I notice that the largest average transactions are observed in the Washington, DC area with an average sales price of $14,800,000, which is a significantly higher than the average price of $5,353,894 for the entire office sample. Washington, DC also has the largest average size office property in the sample with a mean square footage of 93,519, which is also significantly higher than the average square footage size of properties in the sample, 41,718. In contrast, the smallest average transactions based on both price and square footage of improvements, are observed in Tucson. The average office property in Tucson had a selling price of only $1,713,384 and is just 15,370 sq. ft. in size. Office properties sold in Oakland and Los Angeles tend to be the oldest with average ages of 34.82 and 37.96 years, respectively. The market with the newest office properties is Las Vegas. The mean office building age in Las Vegas is only 14.54 years with a standard deviation of 15.89.

Approximately 12 percent of the transactions in the office sample involve the purchase of a replacement property to complete an exchange; 6 percent involve the sale of a relinquished property; and 3 percent represent both a sale of relinquished property and purchase of a replacement property in a separate exchange. This is in contrast to the exchange distribution in apartment markets, where replacement and relinquished property exchanges were approximately equal in number. The retail data, which will be analyzed in the next chapter, also contain a much higher number of replacement exchanges than relinquished exchanges. This leads us to the conclusion that with offices and retail properties it is often the case that more than one property is involved in the replacement exchange.

Table 13. Summary Statistics of Office Data by Markets

	All		Chicago		Dallas/Fort Worth		Denver		Ft. Lauderdale		Las Vegas	
Office	**Obs**	**8871**	**Obs**	**758**	**Obs**	**333**	**Obs**	**587**	**Obs**	**455**	**Obs**	**316**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	5,353,894	9,734,759	6,044,914	11,100,000	6,746,054	10,900,000	4,206,118	7,670,378	3,255,151	5,563,656	2,982,523	5,367,330
AGE	28.75	22.58	34.80	27.66	21.17	17.42	30.46	23.80	24.14	14.98	14.54	15.89
SQFT	41,718	74,669	60,316	103,901	69,816	103,381	39,709	67,725	30,517	48,961	20,377	42,892
LANDSQFT	78,952	140,584	95,382	163,710	133,962	188,928	93,531	166,457	83,720	117,994	57,093	93,724
FLOORS	2.43	2.14	2.81	2.58	2.90	2.87	2.42	1.89	2.18	1.67	1.41	0.87
PARKING	100.04	170.16	104.22	185.12	181.29	239.47	111.41	179.69	91.88	154.71	73.14	113.33
X	36.26	5.40	41.93	0.21	32.88	0.12	39.75	0.16	26.14	0.08	36.13	0.09
Y	-105.72	16.34	-87.90	0.21	-96.96	0.21	-105.01	0.13	-80.19	0.07	-115.16	0.10
Binary Variables												
EXREPL	0.12		0.07		0.07		0.17		0.05		0.22	
EXRELQ	0.06		0.03		0.02		0.08		0.02		0.04	
RELQ_REPL	0.03		0.01		0.01		0.04		0.00		0.04	
EXCH	0.21		0.10		0.11		0.29		0.07		0.31	
CONDITION_BA	0.03		0.03		0.04		0.03		0.01		0.05	
CONDITION_A	0.66		0.70		0.38		0.62		0.80		0.22	
CONDITION_AA	0.32		0.28		0.58		0.35		0.19		0.73	
BUYEROUT	0.16		0.11		0.25		0.16		0.08		0.38	
SALELEASEBACK	0.04		0.03		0.05		0.05		0.04		0.03	
PORTSALE	0.02		0.04		0.04		0.02		0.03		0.03	
YR1999	0.04		0.04		0.05		0.05		0.04		0.00	
YR2000	0.17		0.16		0.18		0.22		0.26		0.18	
YR2001	0.17		0.26		0.13		0.15		0.17		0.13	
YR2002	0.18		0.16		0.16		0.17		0.16		0.20	
YR2003	0.18		0.17		0.23		0.15		0.14		0.17	
YR2004	0.20		0.17		0.19		0.17		0.19		0.22	
YR2005	0.06		0.04		0.05		0.08		0.04		0.10	

Table 13. Continued

	Los Angeles		Oakland		Phoenix		Riverside /San Bernardino		Sacramento	
Office	**Obs**	**1491**	**Obs**	**366**	**Obs**	**995**	**Obs**	**278**	**Obs**	**302**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	5,054,013	9,195,275	2,689,489	5,631,661	4,317,847	7,569,004	2,311,880	3,180,745	2,735,394	4,929,805
AGE	34.82	19.74	37.96	22.33	19.42	12.66	20.92	14.65	23.86	19.19
SQFT	36,902	70,484	18,779	40,404	35,792	58,350	22,592	28,558	23,125	40,889
LANDSQFT	46,773	91,730	36,530	79,888	103,293	152,106	68,407	97,102	71,421	134,544
FLOORS	2.47	2.04	1.95	1.40	1.75	1.35	1.79	0.84	1.56	0.90
PARKING	92.56	166.00	45.01	99.50	102.60	168.64	76.83	106.87	71.71	119.26
X	34.05	0.14	37.80	0.13	33.50	0.10	34.01	0.22	38.62	0.08
Y	-118.28	0.19	-122.12	0.15	-111.99	0.13	-117.31	0.31	-121.37	0.14
Binary Variables										
EXREPL	0.11		0.17		0.07		0.25		0.25	
EXRELQ	0.08		0.10		0.01		0.07		0.07	
RELQ_REPL	0.03		0.09		0.01		0.07		0.12	
EXCH	0.22		0.36		0.09		0.39		0.43	
CONDITION_BA	0.02		0.04		0.02		0.01		0.01	
CONDITION_A	0.74		0.88		0.71		0.83		0.60	
CONDITION_AA	0.24		0.08		0.27		0.17		0.39	
BUYEROUT	0.04		0.01		0.30		0.06		0.03	
SALELEASEBACK	0.04		0.02		0.02		0.03		0.05	
PORTSALE	0.01		0.00		0.02		0.02		0.00	
YR1999	0.05		0.07		0.03		0.03		0.04	
YR2000	0.13		0.20		0.20		0.12		0.22	
YR2001	0.14		0.13		0.14		0.14		0.17	
YR2002	0.24		0.17		0.15		0.22		0.22	
YR2003	0.21		0.22		0.20		0.24		0.18	
YR2004	0.20		0.15		0.21		0.15		0.10	
YR2005	0.05		0.05		0.08		0.10		0.07	

Table 13. Continued

	San Diego		Seattle		Tampa		Tucson		Washington	
Office	**Obs**	**620**	**Obs**	**692**	**Obs**	**528**	**Obs**	**264**	**Obs**	**886**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	6,503,274	10,300,000	3,991,226	7,427,023	3,382,267	7,114,803	1,713,384	4,228,926	14,800,000	15,900,000
AGE	24.00	16.93	32.58	24.04	26.63	18.95	20.73	20.87	34.37	30.95
SQFT	43,849	74,519	27,122	47,905	35,616	66,332	15,370	37,476	93,519	108,583
LANDSQFT	81,662	134,771	59,428	102,161	92,706	152,931	42,841	85,756	114,823	199,195
FLOORS	2.46	1.85	2.10	1.58	2.07	1.91	1.48	1.49	4.70	2.99
PARKING	119.78	180.12	68.52	122.62	87.46	163.62	47.23	115.41	168.58	220.65
X	32.87	0.16	47.55	0.24	27.92	0.16	32.25	0.09	38.92	0.10
Y	-117.15	0.09	-122.29	0.12	-82.54	0.23	-110.93	0.05	-77.14	0.16
Binary Variables										
EXREPL	0.20		0.17		0.03		0.13		0.05	
EXRELQ	0.08		0.11		0.02		0.02		0.02	
RELQ_REPL	0.06		0.04		0.00		0.03		0.01	
EXCH	0.34		0.32		0.06		0.17		0.08	
CONDITION_BA	0.01		0.02		0.04		0.05		0.04	
CONDITION_A	0.71		0.67		0.47		0.55		0.60	
CONDITION_AA	0.28		0.31		0.49		0.41		0.36	
BUYEROUT	0.10		0.09		0.14		0.13		0.44	
SALELEASEBACK	0.05		0.07		0.03		0.04		0.04	
PORTSALE	0.03		0.02		0.04		0.02		0.06	
YR1999	0.03		0.06		0.05		0.03		0.03	
YR2000	0.15		0.13		0.18		0.09		0.16	
YR2001	0.18		0.18		0.20		0.14		0.17	
YR2002	0.19		0.14		0.18		0.19		0.13	
YR2003	0.19		0.18		0.13		0.19		0.18	
YR2004	0.19		0.26		0.21		0.27		0.25	
YR2005	0.07		0.05		0.04		0.11		0.07	

Approximately 16 percent of office property buyers reside out-of-state; out of 8,871 office sales 1,418 involved an out-of-state buyer. This is in sharp contrast to apartment sales where only 7 percent of sales were completed by out-of-state buyers. The markets with the highest share of out-of-state buyers are: Washington, DC, 44 percent; Las Vegas, 38 percent; Phoenix, 30 percent; and Dallas/Forth Worth, 25 percent. Other markets of potential interest when quantifying the price effect of out-of-state buyers include Denver with 16 percent out-of-state buyers; Chicago, 11 percent; Tampa, 14 percent; Tucson, 13 percent; San Diego,10 percent; Seattle, 9 percent; Fort Lauderdale, 8 percent; and Los Angeles, 4 percent.

Approximately 4 percent of all sales are part of sale-leaseback transactions; there are 342 sale-leaseback transactions in the office sample. The market with the highest percentage of sale-leasebacks is Seattle, where this type of transaction represented 7 percent of all sales. Other markets of potential interest when quantifying the effect sale-leasebacks have on sales price include Los Angeles (56 observations), Washington, DC (32 observations) and San Diego (30 observations).

On average, portfolio sales comprise only 2 percent of all sales in the office sample; therefore there are only 222 portfolio sales in the sample. Washington, DC is the market with the highest percentage of portfolio sales, where such transactions are observed in 6 percent of all sales. The only other market where I observe a sufficient number of portfolio sales for the purposes of quantifying potential price premiums associated with the motivation to bundle several transactions together is Chicago, which has 30 portfolio sales.

Table 14. Differences in Mean Prices of Control Sample and Identified Groups of Interest for Office Properties

Office	Observations	Mean Value of Sales Price	Standard Error	T-test Value
Control Group	5,780	3,472,731	96,485	
EXREPL	856	3,842,241	202,277	-1.41
EXRELQ	454	3,027,999	261,805	1.26
RELQ_REPL	240	2,824,935	201,544	1.36
BUYEROUT	1,044	16,200,000	478,294	-41.92
SALELEASEBACK	239	3,768,159	476,300	-0.61
PORTSALE	79	12,500,000	1,585,380	-10.69

I perform differences of means tests to examine differences in selling prices for variables of interest at the aggregate level. Table 14 presents the results. The null hypothesis is that the average observed price of the properties in the comparison group, which contains sales that have no conditions and are typically motivated, is equal to the average price of the sample composed of replacement property sales (EXREPL group). Similar hypotheses are formed with respect to the relinquished properties (EXRELQ), the sample containing sales that are part of two separate exchanges (RELQ_REPL), purchases by out-of-state buyers (BUYEROUT), sale-leasebacks (SALELEASEBACK) and portfolio sales (PORTSALE). Table 14 shows that replacement office exchanges are associated, on average, with a 10.6% price premium, but the price difference is not statistically significant. Relinquished exchanges and properties that are part of two different exchanges have lower average prices than the control sample, but the differences in the mean prices are not significant. Out-of-state buyer purchases and portfolio sales are associated with very high prices, which are also statistically

significantly different from the average price of properties in the control group. Since these statistics do not control for size, the reason for the extreme average value of portfolio sales is, as their name suggests, that they simply involve larger transactions than with single sales. Sale-leaseback transactions are associated with insignificantly higher average prices than those of the control group.

Next I perform regressions based on estimating equation (18) for each of the 15 office markets

$$LNPRICE_m = \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_4 AGE + \alpha_5 AGE2 + \alpha_6 SQFT + \alpha_7 SQFT2 + \alpha_8 LANDSQFT + \alpha_9 LANDSQFT2 + \alpha_{10} PARKING + \alpha_{11} FLOORS + \sum_{i=2}^{3} \beta_i CONDITION_i + \alpha_{12} BUYEROUT + \alpha_{13} SALELEASEBACK + \alpha_{14} PORTSALE + \sum_{n=2000}^{2005} \chi_n YR_n + \sum_{s=2}^{P\leq 43} \delta_s SMDUM_s \quad (18)$$

Similarly to the previous chapter, each of the regressions is estimated using stepwise regression, in which I allow the procedure to select which of the submarket dummies to leave in the final model, based on their contribution to the fit of the model. All other dependent variables are not subject to the stepwise procedure.

Table 15 reports coefficient estimates for each variable by market. The reported results are based on regressions in which standard errors are adjusted to account for potential heteroskedasticity. P-values are reported below the coefficient estimates. R-squared varies by market from 84 percent (Las Vegas and Riverside / San Bernardino) to 92 percent (Washington, DC model). Although the R-squares suggest very good fits of the models, they are driven primarily by the strong relationship between price and square footage, and price and lot size. It is important to note that, in general, non-residential commercial real estate is harder to value than residential commercial real estate. With office, industrial and retail properties, lease structures can be very complicated and vary

significantly across properties. Sale price can be viewed as the sum of the present value of the income that the property is producing each year. However, net rents are hard to determine; they are often determined by complicated rent step-up procedures. Price also depends on the credit quality of the current tenant, the terms remaining on the current leases (for example 2 years vs. 15 years), the probability of the current tenant renewing the lease, the cost of re-tenanting the property, etc. Such information is not available in this data set and therefore any potential factors related to the lease structures of the properties are not captured in the current model.

The reported results in Table 15 reveal that the estimated coefficients on the structural attributes are of the predicted sign and statistically significant in most of the market regressions. The coefficient on *AGE* is negative and significant in all but three of the market models. The coefficient on *AGE2* is positive, as expected, and significant in 10 out of the 15 markets. The coefficients on *SQFT, SQFT2, LANDSQFT,* and *LANDSQFT2* are all positive and highly significant. The coefficient on *PARKING* is positive, but significant in only three of the markets. The coefficient on *FLOORS* is positive and significant in all but two of the regression models. The coefficient on *CONDITION_BA* has negative estimated coefficients, which are also significant in three out of the 15 regressions. The coefficient on *CONDITION_AA* is positive and significant in approximately 50 percent of the models.

The estimated coefficient on the primary variable of interest representing replacement exchange, *EXREPL*, is positive and significant in 14 out of the 15 regressions. Also the estimated coefficients on *EXREPL* tend to be much larger than with the apartment models. The lowest estimated coefficient is in Oakland, 0.101, while the

Table 15. Regression Statistics for OLS Model with Structural Characteristics and Submarket Dummies by Office Markets

Market	**Chicago**	**Dallas/ Fort Worth**	**Denver**	**Ft. Lauder-dale**	**Las Vegas**	**Los Angeles**	**Oakland**	**Phoenix**
Observations	**758**	**333**	**587**	**455**	**316**	**1491**	**366**	**995**
EXREPL	0.304	0.263	0.260	0.296	0.250	0.202	0.101	0.192
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.00***	***0.15***	***0.00***
EXRELQ	0.116	0.101	0.095	0.360	0.211	0.079	0.039	-0.250
	0.26	***0.61***	***0.21***	***0.06***	***0.06***	***0.05***	***0.62***	***0.06***
RELQ_REPL	0.020	0.192	0.289	0.341	0.208	0.263	0.279	-0.101
	0.94	***0.38***	***0.00***	***0.00***	***0.08***	***0.00***	***0.00***	***0.63***
AGE	-0.015	-0.029	-0.024	-0.023	-0.020	-0.015	-0.019	-0.019
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.31***	***0.00***	***0.00***	***0.09***
SQFT	0.019	0.020	0.024	0.019	0.018	0.028	0.026	0.020
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.004	0.003	0.002	0.005	0.006	0.003	0.003	0.005
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.16***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.02***	***0.72***	***0.00***
PARKING	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
	0.71	***0.55***	***0.62***	***0.33***	***0.09***	***0.38***	***0.35***	***0.06***
FLOORS	0.071	0.053	0.058	0.164	0.167	0.076	0.130	0.088
	0.00	***0.12***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
CONDITION_BA	-0.190	-0.122	-0.101	0.148	-0.151	-0.149	-0.126	-0.185
	0.07	***0.39***	***0.21***	***0.33***	***0.16***	***0.03***	***0.41***	***0.08***
CONDITION_AA	0.059	0.033	0.115	-0.011	0.075	0.075	0.069	0.063
	0.24	***0.65***	***0.03***	***0.87***	***0.27***	***0.02***	***0.37***	***0.18***
BUYEROUT	0.063	0.371	0.072	0.217	0.211	0.148	0.478	0.207
	0.42	***0.00***	***0.31***	***0.01***	***0.00***	***0.05***	***0.10***	***0.00***
SALELEASEBACK	-0.026	0.227	0.099	0.110	0.282	0.092	-0.016	0.292
	0.82	***0.20***	***0.28***	***0.41***	***0.14***	***0.18***	***0.84***	***0.00***
PORTSALE	0.004	-0.143	-0.033	-0.190	0.762	0.527		-0.054
	0.97	***0.32***	***0.80***	***0.25***	***0.00***	***0.00***		***0.76***
YR2000	-0.187	-0.121	-0.035	-0.153	0.002	-0.028	-0.029	-0.009
	0.07	***0.46***	***0.70***	***0.19***	***0.99***	***0.68***	***0.76***	***0.92***
YR2001	-0.110	-0.234	0.160	-0.035		0.085	0.066	-0.096
	0.29	***0.16***	***0.09***	***0.77***		***0.20***	***0.53***	***0.31***

Table 15. Continued

Market	Chicago	Dallas/ Fort Worth	Denver	Ft. Lauder-dale	Las Vegas	Los Angeles	Oakland	Phoenix
YR2002	-0.037	-0.153	0.092	-0.004	0.048	0.169	0.125	-0.053
	0.72	***0.37***	***0.33***	***0.98***	***0.60***	***0.01***	***0.22***	***0.58***
YR2003	0.192	-0.184	0.034	0.205	0.025	0.379	0.248	0.071
	0.07	***0.27***	***0.73***	***0.09***	***0.81***	***0.00***	***0.01***	***0.45***
YR2004	0.173	-0.029	0.242	0.303	0.291	0.552	0.374	0.321
	0.10	***0.85***	***0.01***	***0.01***	***0.00***	***0.00***	***0.00***	***0.00***
YR2005	0.454	-0.081	0.050	0.517	0.370	0.751	0.376	0.384
	0.00	***0.72***	***0.66***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
CONST	13.838	13.647	12.772	13.591	12.927	14.268	13.012	13.210
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SDUMi (not reported)								
R-squared	**0.90**	**0.91**	**0.89**	**0.87**	**0.84**	**0.88**	**0.87**	**0.89**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

Table 15. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	Seattle	Tampa	Tucson	Washington
Observations	**278**	**302**	**620**	**692**	**528**	**264**	**886**
EXREPL	0.205	0.235	0.266	0.176	0.280	0.304	0.214
	0.00	***0.00***	***0.00***	***0.00***	***0.02***	***0.00***	***0.01***
EXRELQ	-0.022	0.033	0.139	0.114	0.002	-0.004	0.109
	0.81	***0.80***	***0.02***	***0.03***	***0.99***	***0.98***	***0.40***
RELQ_REPL	0.117	0.382	0.262	0.393	0.865	-0.009	-0.172
	0.25	***0.00***	***0.00***	***0.00***	***0.00***	***0.96***	***0.46***
AGE	-0.005	-0.010	-0.020	-0.017	-0.014	-0.005	-0.005
	0.28	***0.03***	***0.00***	***0.00***	***0.00***	***0.13***	***0.12***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.72	***0.49***	***0.00***	***0.00***	***0.01***	***0.20***	***0.77***
SQFT	0.041	0.033	0.030	0.032	0.024	0.049	0.022
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.002	0.001	0.001	0.002	0.004	0.005	0.002
	0.16	***0.25***	***0.17***	***0.06***	***0.00***	***0.00***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.38	***0.38***	***0.32***	***0.61***	***0.00***	***0.00***	***0.01***
PARKING	0.001	0.000	0.000	-0.001	0.000	0.002	0.000
	0.50	***0.47***	***0.31***	***0.17***	***0.08***	***0.03***	***0.90***
FLOORS	0.122	0.157	0.051	0.073	0.093	0.023	0.076
	0.01	***0.00***	***0.01***	***0.02***	***0.00***	***0.58***	***0.00***
CONDITION_BA	0.088	0.111	-0.139	-0.097	-0.003	-0.032	-0.233
	0.85	***0.80***	***0.50***	***0.43***	***0.97***	***0.77***	***0.08***
CONDITION_AA	0.095	0.136	0.160	0.157	0.014	0.143	0.132
	0.23	***0.05***	***0.00***	***0.00***	***0.74***	***0.06***	***0.00***
BUYEROUT	-0.206	-0.024	-0.040	0.082	0.102	0.117	0.105
	0.12	***0.89***	***0.53***	***0.30***	***0.13***	***0.23***	***0.02***
SALELEASEBACK	0.409	-0.094	-0.148	0.051	0.128	0.173	0.228
	0.10	***0.33***	***0.08***	***0.44***	***0.33***	***0.11***	***0.01***
PORTSALE	-0.091	3.739	-0.059	-0.225	0.113	0.064	0.064
	0.61	***0.00***	***0.58***	***0.09***	***0.36***	***0.79***	***0.35***
YR2000	0.138	0.051	-0.091	0.053	-0.320	0.034	0.138
	0.36	***0.66***	***0.43***	***0.50***	***0.00***	***0.76***	***0.13***
YR2001	0.234	0.133	0.085	0.033	-0.123	0.025	0.210
	0.14	***0.28***	***0.45***	***0.66***	***0.25***	***0.77***	***0.02***

Table 15. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	Seattle	Tampa	Tucson	Washington
YR2002	0.367	0.218	0.113	0.160	-0.153	0.018	0.301
	0.02	***0.07***	***0.33***	***0.03***	***0.14***	***0.85***	***0.00***
YR2003	0.454	0.276	0.240	0.181	0.045	-0.060	0.302
	0.00	***0.02***	***0.03***	***0.02***	***0.71***	***0.54***	***0.00***
YR2004	0.677	0.317	0.389	0.236	0.120	0.146	0.418
	0.00	***0.02***	***0.00***	***0.00***	***0.26***	***0.07***	***0.00***
YR2005	0.747	0.530	0.609	0.428	0.296	0.107	0.523
	0.00	***0.00***	***0.00***	***0.00***	***0.09***	***0.32***	***0.00***
CONST	11.735	13.410	14.151	12.887	12.900	12.579	13.722
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SDUMi (not reported)							
R-squared	**0.84**	**0.85**	**0.90**	**0.87**	**0.88**	**0.86**	**0.92**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

highest coefficient is estimated in the regression based on sales in the Chicago metropolitan area, 0.304. This provides strong evidence that buyers of replacement office properties are paying statistically significant price premiums in the 15 office markets examined in this study.

The coefficient estimates of *EXRELQ* are positive in 12 markets and significant in 5 models. In three of the models *EXRELQ* is negative, and in one market (Phoenix) the coefficient on *EXRELQ* is negatively significant. In addition, the coefficient estimates of *EXRELQ* are substantially smaller than coefficient estimates on *EXREPL.* These findings are generally consistent with our expectation for *EXREPL* not to be associated with any significant positive premium. In addition, the recorded positive coefficients present evidence that relinquished exchanges are properties with higher capital appreciation, and tend to be more expensive. Therefore, such positive effects partially offset any negative effects related to relinquished exchanges. As previously noted, no such issues exist with replacement exchanges, and therefore all else equal the coefficient on *EXREPL* can be directly associated with a price premium paid when the sale is part of a replacement exchange.

The coefficient on *RELQ_REPL* is positive and significant in 9 out of the 15 markets. However, the magnitude of this coefficient tends to be larger than the coefficient on replacement exchanges.

The coefficient on the variable representing out-of-state buyers, *BUYEROUT*, is positive and significant in multiple markets. The coefficient on *BUYEROUT* is significant in all four of the markets with highest shares of buyers that are out of state: Washington, DC (44 percent); Las Vegas (38 percent); Phoenix (30 percent); and Dallas/Forth Worth

(25 percent). The coefficient on *BUYEROUT* is also significant in Fort Lauderdale and Los Angeles, which have 8 and 4 percent of out-of-state buyers, respectively. These findings add to the evidence that out-of-state buyers pay price premiums.

The coefficient estimate on the variable representing sale-leaseback transactions, *SALELEASEBACK*, is generally positive and significant in three markets: Phoenix, Riverside / San Bernardino and Washington, DC. In one market, San Diego, *SALELEASEBACK* is significant but negative. The negative coefficient of the variable in Seattle is contrary to our expectation. One possible explanation is that the result may be influenced by an outlier, since it is based on only 30 observations. Generally, the results present evidence supporting our hypothesis that sale-leasebacks are associated with higher transaction prices.

The estimated coefficient on *PORTSALE* is positive and significant in three markets (Las Vegas, Los Angeles, and Sacramento) and negatively significant in Seattle. However, none of these markets have a large number of portfolio sales from which to draw any meaningful conclusions about observed price increases (decreases) associated with portfolio sales. In addition, in the two markets where portfolio sales are numerous, Washington, DC and Chicago, no significant results are observed. Therefore, there is only weak evidence that portfolio sales of office properties are associated with price premiums.

The estimated year dummies present a mixed picture that is quite different than with apartment properties. Sales in years 2000 and 2001 tend to have lower prices than sales in 1999. The dummy coefficients show that in 2000, prices in 9 markets were lower than prices, all else equal, in 1999. In 2001, dummy variables in 5 markets are negative,

although insignificant. The year 2002 marks the beginning of a trend of substantial price appreciation. This trend is continued throughout 2003-2005, with year dummies significant in 9, 13 and 12 markets, respectively. One exception to this general trend in price appreciation after 2002 is notable. Dallas/Forth Worth is the only market in which all year dummies are negative, and therefore no price appreciation is observed.

Submarket dummy variables are not reported in the regression outputs, but they are the main instrument used to control for location within the metropolitan area and their inclusion improves dramatically the fit of the models.

Next, I examine OLS Model II, which adds variables that control for the absolute location of the property by using a third order expansion of the latitude and longitude coordinates. The third order expansion rather than a simple linear form is entered in the equation to effectively draw a price surface based on location. The resulting model specification has the following form

$$LNPRICE_m = \alpha_0 + \alpha_1 EXREPL + \alpha_2 EXRELQ + \alpha_3 RELQ\_REPL + \alpha_4 AGE + \alpha_5 AGE2 + \alpha_6 SQFT + \alpha_7 SQFT2 + \alpha_8 LANDSQFT + \alpha_9 LANDSQFT2 + \alpha_{10} PARKING + \alpha_{11} FLOORS + \sum_{i=2}^{3} \beta_i CONDITION_i + \alpha_{12} BUYEROUT + \alpha_{13} SALELEASEBACK + \alpha_{14} PORTSALE + \sum_{n=2000}^{2005} \chi_n YR_n + \sum_{s=2}^{P\leq 43} \delta_s SMDUM_s + \sum_{k=0}^{r} \sum_{l=0}^{r} \phi_{k,l} (X^k, Y^l) \quad (20)$$

Table 16 presents the regression results for Model II. Controlling for absolute location in addition to relative location does not lead to any significant changes in the estimated coefficients relative to OLS Model I. Moreover, the fitness of the models improves only modestly with an increase in R-squared ranging from half to one percent.

With respect to the key variables of interest, the results are re-confirmed. The coefficient on the variable indicating that the sale is part of a replacement exchange,

EXREPL, is positive and significant in 14 of the 15 regressions. This provides additional evidence that buyers of replacement properties are paying statistically significant price premiums in the majority of the markets. Results with respect to relinquished exchanges, *EXRELQ*, and the combination of relinquished and replacement exchanges, *RELQ_REPL*, remain the same.

The coefficient on the variable representing whether the buyer is from out of state, *BUYEROUT*, remains positive and significant in Washington, DC, Las Vegas, Phoenix, Dallas/Forth Worth, Fort Lauderdale and Los Angeles. There is slight improvement in the P-values, which are reduced by approximately one percent. The magnitude of the coefficient on the variable representing whether the sale is part of a sale-leaseback transaction, *SALELEASEBACK*, is decreased in most markets by about 0.01 – 0.05. When additional controls are added the significance of this coefficient disappears in Riverside / San Bernardino, but remains unchanged for Phoenix, Washington, DC and San Diego. Results remain largely unchanged also for the variable representing portfolio sales, *PORTSALE*.

Based on OLS Model II, the percentage sales price changes corresponding to the estimated and statistically significant coefficients for replacement exchanges (*EXREPL*), relinquished exchanges (*EXRELQ*), combined relinquished and replacement exchanges (*RELQ_REPL*), purchases by out-of-state buyers (*BUYEROUT*), sale-leaseback (*SALELEASEBACK*) and portfolio sales (*PORTSALE*) for each market are presented in Table 17.

Table 17 shows that the percentage price effects associated with being part of a replacement property exchange ranges from 18.93 percent in Seattle to 36.09 percent in

Chicago. The average price premium paid when a property is used to complete a replacement exchange is 28.3 percent. This premium is larger than any predicted exchange benefits, as indicated by the simulation analysis in Chapter 5. In comparison, the simulation analysis predicts that when the holding period, both for the relinquished and replacement property, does not exceed 5 years, observed incremental NPV from a 1031 exchange is at most 4 percent. With 10-year holding periods, incremental NPV ranges from 2.92 percent to 8.46 percent (when assuming an annual appreciation of 20 percent, and 20 percent capital gain tax rate). With 20-year holding periods the maximum incremental value from using an exchange is below 12 percent.

Finally, with 39-year holding period, which is also the depreciation recovery period for non-residential commercial real estate, the maximum net benefit from using an exchange, based on our simulation analysis, is below 14 percent.

Therefore, based on an average premium of 28.3 percent for the replacement exchanges, the results indicate that investors pay a premium in exchanges that is significantly larger than the expected tax benefit, especially if they have a short-term investment horizon.

In three of the markets I also observe premiums related to relinquished exchanges. The implied percentage effects of relinquished exchanges on selling price are, on average, 11.98 percent and they are also significantly smaller than the effects associated with replacement exchanges. The price premium associated with a property being part of both replacement and relinquished exchange ranges from 28.66 percent in San Diego to 48.27 percent in Sacramento. The average price premium associated with this type of transaction is 35.38 percent.

Table 16. Regression Statistics for OLS Model with Structural Characteristics, Submarket Dummies and Longitude, Latitude Coordinates by Office Markets

Market	**Chicago**	**Dallas/ Fort Worth**	**Denver**	**Ft. Lauder-dale**	**Las Vegas**	**Los Angeles**	**Oakland**	**Phoenix**
Observations	**758**	**333**	**587**	**455**	**316**	**1491**	**366**	**995**
EXREPL	0.31	0.27	0.26	0.30	0.25	0.20	0.09	0.21
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.00***	***0.18***	***0.00***
EXRELQ	0.12	0.08	0.10	0.39	0.20	0.08	0.04	-0.25
	0.25	***0.70***	***0.20***	***0.04***	***0.07***	***0.03***	***0.64***	***0.06***
RELQ_REPL	0.02	0.29	0.31	0.32	0.21	0.26	0.29	-0.11
	0.93	***0.23***	***0.00***	***0.00***	***0.07***	***0.00***	***0.00***	***0.60***
AGE	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
AGE2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	***0.00***	***0.00***	***0.00***	***0.38***	***0.00***	***0.00***	***0.03***
SQFT	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.14***	***0.00***
LANDSQFT2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.02***	***0.68***	***0.00***
PARKING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.65	***0.72***	***0.75***	***0.38***	***0.12***	***0.33***	***0.42***	***0.06***
FLOORS	0.07	0.06	0.06	0.16	0.17	0.07	0.13	0.08
	0.00	***0.10***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
CONDITION_BA	-0.19	-0.11	-0.08	0.16	-0.15	-0.13	-0.13	-0.19
	0.06	***0.43***	***0.33***	***0.29***	***0.16***	***0.07***	***0.39***	***0.06***
CONDITION_AA	0.05	0.04	0.12	-0.01	0.06	0.08	0.07	0.07
	0.29	***0.62***	***0.02***	***0.93***	***0.38***	***0.02***	***0.37***	***0.12***
BUYEROUT	0.06	0.36	0.09	0.21	0.22	0.15	0.46	0.20
	0.42	***0.00***	***0.23***	***0.01***	***0.00***	***0.04***	***0.11***	***0.00***
SALELEASEBACK	-0.03	0.18	0.11	0.11	0.27	0.09	-0.03	0.26
	0.77	***0.33***	***0.24***	***0.38***	***0.18***	***0.20***	***0.72***	***0.00***
PORTSALE	0.00	-0.17	-0.02	-0.17	0.79	0.53		-0.04
	0.98	***0.22***	***0.86***	***0.27***	***0.00***	***0.00***		***0.82***
YR2000	-0.19	-0.14	-0.03	-0.16	0.00	-0.03	-0.04	-0.01
	0.07	***0.38***	***0.78***	***0.17***	***0.97***	***0.65***	***0.71***	***0.94***

Table 16. Continued

Market	Chicago	Dallas/ Fort Worth	Denver	Ft. Lauder-dale	Las Vegas	Los Angeles	Oakland	Phoenix
YR2001	-0.11	-0.24	0.17	-0.04		0.08	0.07	-0.10
	0.29	***0.15***	***0.07***	***0.75***		***0.20***	***0.53***	***0.26***
YR2002	-0.03	-0.15	0.10	-0.02	0.05	0.17	0.13	-0.06
	0.76	***0.36***	***0.30***	***0.88***	***0.60***	***0.01***	***0.21***	***0.49***
YR2003	0.19	-0.19	0.05	0.19	0.03	0.38	0.25	0.05
	0.07	***0.25***	***0.58***	***0.12***	***0.78***	***0.00***	***0.01***	***0.53***
YR2004	0.17	-0.03	0.25	0.29	0.30	0.55	0.37	0.32
	0.10	***0.82***	***0.01***	***0.02***	***0.00***	***0.00***	***0.00***	***0.00***
YR2005	0.46	-0.10	0.05	0.51	0.37	0.73	0.36	0.38
	0.00	***0.66***	***0.65***	***0.00***	***0.00***	***0.00***	***0.01***	***0.00***
X3	0.01	-0.03	0.00	0.06	0.00	-0.03	0.00	0.00
	0.33	***0.15***	***0.96***	***0.27***	***0.48***	***0.04***	***0.96***	***0.89***
Y3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.34	***0.14***	***0.93***	***0.27***	***0.49***	***0.05***	***0.95***	***0.94***
XY2	0.00	0.01	0.00	-0.02	-0.01	0.01	0.00	0.00
	0.33	***0.15***	***0.94***	***0.27***	***0.48***	***0.05***	***0.95***	***0.87***
CONST	18.73	72.70	-0.91	-3.60	-41.76	-8.45	-19.56	-58.87
	0.04	***0.02***	***0.95***	***0.90***	***0.28***	***0.53***	***0.69***	***0.00***
R-squared	**0.90**	**0.91**	**0.89**	**0.87**	**0.85**	**0.88**	**0.87**	**0.89**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – latitude of property; *Y* – longitude of property.

Table 16. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	Seattle	Tampa	Tucson	Washington
Observations	**278**	**302**	**620**	**692**	**528**	**264**	**886**
EXREPL	0.21	0.23	0.27	0.17	0.28	0.30	0.21
	0.00	***0.00***	***0.00***	***0.00***	***0.02***	***0.00***	***0.01***
EXRELQ	0.02	0.04	0.14	0.11	0.00	0.04	0.10
	0.80	***0.78***	***0.02***	***0.03***	***0.98***	***0.80***	***0.44***
RELQ_REPL	0.15	0.39	0.25	0.38	0.86	-0.02	-0.18
	0.13	***0.00***	***0.00***	***0.00***	***0.00***	***0.92***	***0.46***
AGE	0.00	-0.01	-0.02	-0.02	-0.02	-0.01	0.00
	0.57	***0.05***	***0.00***	***0.00***	***0.00***	***0.05***	***0.14***
AGE2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.91	***0.68***	***0.00***	***0.00***	***0.01***	***0.08***	***0.72***
SQFT	0.04	0.03	0.03	0.03	0.02	0.05	0.02
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.14	***0.34***	***0.25***	***0.08***	***0.00***	***0.00***	***0.00***
LANDSQFT2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.31	***0.44***	***0.40***	***0.63***	***0.00***	***0.00***	***0.02***
PARKING	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.38	***0.47***	***0.35***	***0.17***	***0.10***	***0.03***	***0.95***
FLOORS	0.12	0.16	0.05	0.07	0.09	0.02	0.08
	0.01	***0.00***	***0.01***	***0.02***	***0.00***	***0.62***	***0.00***
CONDITION_BA	0.06	0.11	-0.13	-0.09	-0.01	-0.02	-0.23
	0.90	***0.81***	***0.55***	***0.44***	***0.94***	***0.87***	***0.08***
CONDITION_AA	0.10	0.14	0.16	0.15	0.02	0.15	0.13
	0.17	***0.04***	***0.00***	***0.00***	***0.73***	***0.05***	***0.00***
BUYEROUT	-0.18	-0.01	-0.04	0.07	0.11	0.10	0.11
	0.19	***0.97***	***0.57***	***0.41***	***0.12***	***0.33***	***0.01***
SALELEASEBACK	0.38	-0.11	-0.15	0.06	0.11	0.17	0.24
	0.12	***0.27***	***0.07***	***0.38***	***0.39***	***0.13***	***0.01***
PORTSALE	-0.16	3.72	-0.07	-0.23	0.11	0.07	0.07
	0.31	***0.00***	***0.52***	***0.08***	***0.39***	***0.77***	***0.34***
YR2000	0.09	0.04	-0.11	0.05	-0.31	0.03	0.14
	0.56	***0.72***	***0.34***	***0.53***	***0.00***	***0.75***	***0.13***

Table 16. Continued

Market	Riverside /San Bernardino	Sacramento	San Diego	Seattle	Tampa	Tucson	Washington
YR2001	0.19	0.14	0.06	0.03	-0.11	0.00	0.21
	0.20	***0.28***	***0.57***	***0.70***	***0.29***	***0.97***	***0.02***
YR2002	0.32	0.21	0.10	0.16	-0.15	0.02	0.30
	0.03	***0.10***	***0.39***	***0.04***	***0.17***	***0.85***	***0.00***
YR2003	0.39	0.27	0.22	0.19	0.06	-0.06	0.30
	0.01	***0.03***	***0.05***	***0.02***	***0.65***	***0.57***	***0.00***
YR2004	0.64	0.33	0.37	0.23	0.13	0.14	0.42
	0.00	***0.02***	***0.00***	***0.00***	***0.23***	***0.11***	***0.00***
YR2005	0.71	0.53	0.59	0.43	0.31	0.12	0.52
	0.00	***0.00***	***0.00***	***0.00***	***0.07***	***0.26***	***0.00***
X3		-0.01	-0.05	0.01	-0.02	-0.02	
		0.77	***0.01***	***0.07***	***0.27***	***0.40***	
Y3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.29	***0.78***	***0.01***	***0.06***	***0.28***	***0.39***	***0.97***
XY2	0.00	0.00	0.01	-0.01	0.01	0.01	0.00
	0.30	***0.78***	***0.01***	***0.07***	***0.28***	***0.40***	***0.07***
CONST	44.42	59.64	30.05	6.54	16.15	59.63	61.82
	0.00	***0.22***	***0.33***	***0.77***	***0.33***	***0.03***	***0.06***
R-squared	**0.85**	**0.85**	**0.91**	**0.87**	**0.88**	**0.87**	**0.92**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – latitude of property; *Y* – longitude of property.

Another strong result in the office regressions involves transactions in which the buyer is from a out-of-state. Purchases by out-of-state buyers are associated with a price premium of at least 11.25 percent in Washington, DC and up to 43.14 percent in Dallas. On average, the selling price premium associated with out-of-state buyers is 23.5 percent. In six out of the 15 markets, the coefficient on the variable indicating that the buyer is out-of-state has statistical and economic significance. This result presents strong evidence that there is a significant price premium associated with purchases by out-of-state buyers.

Sale-leasebacks are associated with a price discount in San Diego of 14 percent, a price premium of 27 percent in Washington, DC, and a premium of 30 percent in Phoenix. As noted earlier, the result in San Diego is based on just 30 observations only and may be driven by an outlier. Generally, the sale-leaseback results present mixed evidence on the existence of price premiums or discounts.

Finally, with respect to portfolio sales no statistically significant results are found Thus, I was not able to support the hypothesis of a price premium associated with portfolio transactions.

In the next chapter summary statistics and results based on regressions for the commercial retail real estate properties sample are presented.

Table 17. Marginal Effects for Significant Coefficients for Variables of Interest in Office Regressions

Market	**Obs**	***EXREPL***	***EXRELQ***	***RELQ_ REPL***	***BUYER OUT***	***SALE LEASE BACK***	***PORT SALE***
Chicago	758	36.09%					
Dallas/ Fort Worth	333	31.62%			43.14%		
Denver	587	30.20%		36.96%			
Ft. Lauderdale	455	34.95%			23.66%		
Las Vegas	316	28.08%			23.99%		
Los Angeles	1491	22.40%	8.76%	29.76%	16.52%		
Oakland	366			33.25%			
Phoenix	995	23.50%			22.44%	29.95%	
Riverside /San Bernardino	278	23.70%					
Sacramento	302	26.04%		48.27%			
San Diego	620	30.38%	15.18%	28.66%		-14.00%	
Seattle	692	18.93%	11.99%				
Tampa	528	32.43%					
Tucson	264	34.46%					
Washington	886	23.81%			11.25%	26.74%	

CHAPTER 9
RESULTS FOR RETAIL PROPERTIES

This chapter presents an analysis of the retail property data and analyses the results from the empirical analysis. There are 12,015 observations in the final retail property sample. Table 18 presents the summary statistics for the variables of interest. Mean values and standard deviations are reported at the aggregate level as well as by market. The first two columns identify the characteristics of an average retail property sale in the full sample, which includes all 15 retail markets studied. The average retail selling price is $2,436,535, which is much less than the average office property price of $5,353,894. Based on transaction size as well as square footage of improvements, the observations in the retail sample appear to be more similar to the observations in the apartment sample. The average retail property in the sample has 19,327 sq. ft. of improvements compared to 23,034 sq. ft. for the apartment properties sample. However, retail properties include as much as three times more land than improvements. The average retail property is built on 77,171 sq. ft. of land. Retail properties, with an average age of 33.83 years, are generally newer than the apartment properties, but older than the office properties. In the sample a relatively high proportion of the retail properties is in "above average" condition (22 percent), 70 percent are in average condition and 8 percent are in fair or poor condition. The average retail property has 1.26 floors and 57 parking spaces.

The fifteen metropolitan markets in the retail sample include: Chicago, Dallas/Forth Worth, Denver, Fort Lauderdale, Houston, Las Vegas, Los Angeles,

Table 18. Summary Statistics of Retail Data by Markets

	All		Chicago		Dallas/Fort Worth		Denver		Detroit		Ft. Lauderdale	
Retail	**Obs**	**12015**	**Obs**	**2069**	**Obs**	**566**	**Obs**	**699**	**Obs**	**639**	**Obs**	**516**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	2,436,535	4,890,586	1,450,804	3,312,595	3,417,107	6,711,767	2,310,104	4,825,539	1,295,017	2,190,695	3,662,719	7,159,872
AGE	33.83	27.38	48.20	33.18	16.01	14.85	28.50	24.29	32.41	23.59	25.06	14.77
SQFT	19,327	39,732	14,467	30,561	28,196	50,005	20,350	42,093	14,707	32,683	32,303	61,435
LANDSQFT	77,171	156,161	45,606	115,115	140,167	210,166	87,184	164,519	81,320	152,764	135,260	232,726
FLOORS	1.26	0.67	1.58	0.95	1.06	0.24	1.15	0.48	1.14	0.46	1.17	0.48
PARKING	57.19	121.99	34.39	89.77	96.18	162.65	71.85	140.20	57.90	104.94	79.42	157.83
X	37.04	5.36	41.92	0.25	32.87	0.15	39.76	0.17	42.43	0.26	26.15	0.10
Y	-106.74	14.42	-87.84	0.20	-96.96	0.24	-105.00	0.13	-83.28	0.26	-80.18	0.07
Binary Variables												
EXREPL	0.13		0.06		0.12		0.17		0.03		0.04	
EXRELQ	0.06		0.06		0.02		0.08		0.02		0.02	
RELQ_REPL	0.03		0.01		0.01		0.05		0.00		0.01	
EXCH	0.22		0.13		0.15		0.30		0.05		0.07	
CONDITION_BA	0.08		0.09		0.07		0.09		0.03		0.07	
CONDITION_A	0.70		0.77		0.44		0.59		0.88		0.77	
CONDITION_AA	0.22		0.15		0.50		0.32		0.09		0.16	
BUYEROUT	0.15		0.06		0.29		0.17		0.10		0.18	
SALELEASEBACK	0.03		0.03		0.05		0.04		0.02		0.02	
PORTSALE	0.03		0.01		0.08		0.05		0.05		0.04	
YR1999	0.05		0.05		0.05		0.04		0.08		0.06	
YR2000	0.18		0.19		0.18		0.17		0.19		0.26	
YR2001	0.17		0.27		0.11		0.21		0.19		0.19	
YR2002	0.18		0.18		0.17		0.21		0.19		0.13	
YR2003	0.20		0.18		0.28		0.14		0.20		0.14	
YR2004	0.17		0.11		0.16		0.15		0.13		0.19	
YR2005	0.05		0.02		0.05		0.07		0.02		0.02	

Table 18. Continued

	Houston		Las Vegas		Los Angeles		Oakland		Phoenix	
Retail	**Obs**	**479**	**Obs**	**426**	**Obs**	**2150**	**Obs**	**508**	**Obs**	**1208**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	3,386,795	6,043,097	3,003,188	4,419,804	2,497,678	4,973,999	1,764,776	3,895,942	3,325,548	5,465,216
AGE	17.14	15.54	13.83	15.07	40.45	23.85	47.05	24.71	16.44	15.12
SQFT	36,343	61,370	17,496	32,437	16,074	34,442	11,441	21,573	24,755	42,493
LANDSQFT	148,025	217,303	77,962	120,109	44,441	102,719	36,064	84,461	123,656	190,970
FLOORS	1.09	0.51	1.03	0.16	1.23	0.56	1.29	0.55	1.04	0.32
PARKING	104.27	169.06	91.97	135.59	41.20	95.61	31.66	87.70	69.43	135.55
X	29.80	0.16	36.13	0.10	34.05	0.15	37.81	0.13	33.49	0.14
Y	-95.44	0.17	-115.14	0.14	-118.25	0.19	-122.13	0.18	-112.00	0.19
Binary Variables										
EXREPL	0.16		0.30		0.14		0.13		0.05	
EXRELQ	0.03		0.06		0.08		0.09		0.02	
RELQ_REPL	0.02		0.03		0.04		0.03		0.01	
EXCH	0.21		0.39		0.26		0.25		0.08	
CONDITION_BA	0.09		0.10		0.08		0.12		0.05	
CONDITION_A	0.61		0.33		0.80		0.81		0.61	
CONDITION_AA	0.30		0.57		0.12		0.07		0.35	
BUYEROUT	0.27		0.52		0.03		0.03		0.47	
SALELEASEBACK	0.04		0.04		0.01		0.02		0.04	
PORTSALE	0.03		0.02		0.02		0.01		0.02	
YR1999	0.08		0.04		0.04		0.04		0.03	
YR2000	0.13		0.17		0.16		0.22		0.18	
YR2001	0.11		0.13		0.13		0.12		0.17	
YR2002	0.17		0.17		0.23		0.17		0.16	
YR2003	0.25		0.18		0.20		0.28		0.21	
YR2004	0.24		0.25		0.17		0.13		0.19	
YR2005	0.02		0.07		0.06		0.03		0.07	

Table 18. Continued

	Riverside /San Bernardino		San Diego		San Francisco		Seattle		Tucson	
Retail	**Obs**	**429**	**Obs**	**638**	**Obs**	**339**	**Obs**	**943**	**Obs**	**406**
Variable	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
PRICE	3,443,945	6,400,585	3,104,985	5,680,510	1,720,856	3,461,331	2,269,765	4,717,861	1,981,372	3,567,048
AGE	20.09	17.56	31.03	20.72	73.74	27.28	37.34	27.28	23.62	17.43
SQFT	28,994	53,552	21,303	43,002	8,079	19,008	16,935	36,226	17,724	36,612
LANDSQFT	122,360	206,666	78,581	151,654	9,960	62,657	66,683	139,353	94,710	176,835
FLOORS	1.08	0.28	1.23	0.66	2.27	1.08	1.23	0.56	1.06	0.48
PARKING	83.40	147.94	62.54	132.70	5.89	42.48	55.14	122.77	70.46	131.64
X	34.01	0.25	32.87	0.20	37.73	0.09	47.56	0.29	32.23	0.09
Y	-117.20	0.47	-117.12	0.12	-122.41	0.06	-122.29	0.13	-110.93	0.07
Binary Variables										
EXREPL	0.28		0.21		0.12		0.21		0.19	
EXRELQ	0.05		0.09		0.18		0.08		0.03	
RELQ_REPL	0.07		0.06		0.07		0.04		0.02	
EXCH	0.40		0.36		0.37		0.33		0.24	
CONDITION_BA	0.01		0.05		0.09		0.13		0.15	
CONDITION_A	0.75		0.83		0.84		0.61		0.67	
CONDITION_AA	0.24		0.12		0.07		0.26		0.18	
BUYEROUT	0.05		0.04		0.02		0.10		0.30	
SALELEASEBACK	0.02		0.01		0.01		0.03		0.05	
PORTSALE	0.01		0.02		0.02		0.04		0.10	
YR1999	0.04		0.04		0.10		0.05		0.02	
YR2000	0.10		0.14		0.40		0.14		0.14	
YR2001	0.10		0.18		0.10		0.20		0.11	
YR2002	0.22		0.18		0.11		0.18		0.14	
YR2003	0.24		0.24		0.15		0.21		0.20	
YR2004	0.21		0.17		0.10		0.19		0.26	
YR2005	0.09		0.06		0.05		0.03		0.12	

Oakland, Phoenix, Riverside/San Bernardino, San Diego, San Francisco, Seattle and Tucson. Los Angeles is once again the largest market represented in the sample, based on number of observations (2,150). The second largest represented market is Chicago, with 2,069 retail sales. The smallest sample represents the San Francisco metropolitan area with 339 observations.

Based on inspection of the summary statistics by market reported in Table 18, I notice that property characteristics display substantial variation by market. For example, properties in some markets tend to be much older than in others. Average property age is 74 years in San Francisco, 48 years in Chicago, 47 years in Oakland and 40 years in Los Angeles. In contrast, properties in Las Vegas are only 14 years old on average, while properties in Phoenix and Dallas are only 16 years old on average. The data indicate that retail properties are the oldest in San Francisco, but also the smallest, having on average only 8,079 sq. ft. of improvements and 9,960 sq. ft. of land. Naturally, the older San Francisco properties are associated with limited parking – only 5.89 spaces, compared to an average for the entire retail sample of 57.19. The vintage effect discussed with apartments and offices is strongly expressed in the San Francisco market, where on average the price per square footage of improvements is $213. In contrast, across all markets the average price per square foot is $126, while the lowest mean price/sq. ft. of $88 is observed in Detroit. Houston contains the largest retail properties with an average of 36,343 sq. ft. of improvements and 148,025 sq. ft. of land. Houston, however, is the second cheapest market in the sample, after Detroit, with an average price of $93 per sq.ft. The market with the newest retail properties sold once again Las Vegas, which is

also the second most expensive market after San Francisco, with an average price per sq. ft. of $172.

Approximately 13 percent of the retail transactions involve the purchase of a replacement property to complete an exchange; six percent involve the sale of the relinquished property in an exchange; and three percent represent a sale of relinquished property that is also a replacement property in a separate exchange. This distribution of exchanges is similar to the one observed for office properties and suggests that there are multiple properties used by taxpayers in the upleg portion of the exchange. On average, the data suggests for one relinquished property there are two replacement properties. In addition, in several markets the number of replacement exchanges far outnumbers the relinquished property sales. For example, in Tucson the ratio of replacement to relinquished sales is 6.3; in the Dallas / Forth Worth area this ratio is 6. In Houston and Las Vegas the ratios are each 5.3. In San Francisco, however, relinquished sales outnumber replacement property purchases by a factor of 1.5. These ratios also can be used as indicators of which markets have been preferred by investors for investment once they dispose of their relinquished properties.

Approximately 15 percent of all buyers reside out-of-state; out of 12,015 retail sales 1,850 involved an out-of-state buyer. This percentage is very similar to the 16 percent share of out-of-state buyers observed in the office sample. The markets with the highest share of buyers that are out of state are: Las Vegas, 52 percent; Phoenix, 47 percent; Tucson, 30 percent; Dallas/Forth Worth, 29 percent; and Houston, 27 percent. Other markets of potential interest when quantifying the effect of having a buyer that is out-of-state include Fort Lauderdale with 18 percent out-of-state buyers; Denver with 17

percent; Detroit, 10 percent; Seattle, 10 percent; Chicago, 6 percent; and Los Angeles, 3 percent.

Approximately three percent of all retail sales represent sale-leaseback transactions. This yields 340 sale-leaseback transactions in the retail sample, which is similar to the number of such transactions observed with office sales (342). Because of the small number of sale-leaseback transactions and their relatively equal distribution across markets there are only two markets where I can expect to observe results that are statistically meaningful. These markets are Chicago, where a total of 56 sale-leasebacks are observed and Phoenix, which has 50 such transactions.

Finally, portfolio sales represent on average 3 percent of all retail sales. This yields a sample of 347 portfolio transactions. In contrast there were only 222 portfolio sales in the office sample. The market with the largest percentage of portfolio sales is Tucson, where these transactions represent 10 percent of all observations. Another market with a relatively high percentage of bulk purchases is Dallas / Forth Worth, where portfolio sales represent 8 percent of all sales. Finally, there are four additional markets with larger numbers of portfolio sales: Denver (33 observations), Detroit (30 observations), Los Angeles (40 observations) and Seattle (37 observations).

Table 19 presents t-tests for differences between the mean price of retail properties in a comparison group composed of all properties not associated with any conditions or atypical motivation, and the groups of properties that are the subject of interest. The *EXREPL* group represents properties that are part of replacement exchange only and that are not associated with other conditions of sale. The *EXRELQ* group represents relinquished exchanges only; *RELQ_REPL* is a group of properties that were part of two

separate exchanges; *BUYEROUT* contains sales to out-of-state buyers only; the *SALELEASEBACK* group includes sale-leaseback transactions only and *PORTSALE* represents portfolio sales.

Table 19. Differences in Mean Prices of Control Sample and Identified Groups of Interest for Retail Properties

Retail	Observations	Mean Value of Sales Price	Standard Error	T-test Value
Control Group	7,932	1,655,211	38,984	
EXREPL	1,232	2,919,869	131,304	-11.33
EXRELQ	691	2,045,297	126,705	-2.84
RELQ_REPL	47	3,639,787	630,065	-3.78
BUYEROUT	1,166	5,773,483	263,312	-28.75
SALELEASEBACK	146	1,649,350	173,243	0.02
PORTSALE	177	3,323,456	582,685	-6.07

The table illustrates that the null hypothesis that on average replacement exchanges have the same price as properties that are not associated with any sale conditions is rejected at less than the one percent level. The average price of replacement properties is almost twice the average price in the control group. Relinquished properties and sales that are part of two separate exchanges have likewise significantly higher average prices, although the t-test values associated with the corresponding mean differences tests are considerably lower. The *BUYEROUT* group and *PORTSALE* group also have significantly higher prices than the properties of the control group. With sale-leasebacks the null hypothesis is not rejected.

Next, regressions are performed based on estimating equation (18) for each of the 15 markets. A backward stepwise method of estimation is applied, in which the only

subjects to the selection procedure are the submarket dummy variables. The procedure starts with a full model which includes all submarket dummies for the specified market, and then selectively removes dummy variables from the model that are not significant at a specified level (0.1) or do not influence the fitness of the model. All other dependent variables are not subject to the procedure. Standard errors are adjusted to account for potential heteroskedasticity.

Table 20 reports coefficient estimates and p-values for each variable by markets. R-squares are on average 10 percent lower than the R-squares of the same model with office commercial real estate. R-squared varies from 71 percent for the Chicago market to 84 percent for the Denver and Phoenix markets. The reported coefficients for structural characteristics are also different (although not substantially) from the estimated coefficients in the office regressions.

The most notable difference is with respect to the coefficients on year dummies, which illustrate a different trend of property appreciation in the retail real estate market, when compared to the office real estate market.

The reported results in Table 20 show that the estimated coefficients on the structural attributes are of the predicted sign and statistically significant in all of the market regressions (with the exception of the coefficient on square footage of land in San Francisco). The coefficient on *AGE* is negative and significant in all of the models. The coefficient on *AGE2* is positive, as predicted, and also significant in all of the markets. The coefficients on *SQFT*, *SQFT2*, *LANDSQFT*, and *LANDSQFT2* are all positive and highly significant, in all models but one (San Francisco).

These results represent the strongest results with respect to age, square footage and square footage of land in the regressions based on the three different property types: apartment, office and retail. San Francisco, as illustrated by the summary statistics is a very different market from the other 14 retail markets studied. It has older properties that also tend to be very small. Properties built on larger lot sizes tend to be newer and do not carry the premium of "vintage" properties. Also older properties are most likely located in or close to the business center, while newer properties tend to be built further away from the business center. The coefficient estimates in San Francisco indicate a positive concave relationship with square footage, and a negative convex relationship with square footage of land.

The coefficient on the variable representing the number of parking spaces, *PARKING*, is positive, but it is significant in only four of the markets. The coefficient on the variable representing the number of floors, *FLOORS*, is positive and significant in four of the markets, and negative and significant in Houston. Houston is the market with the largest average retail property size and also the lowest price per square footage. The coefficient on the variable representing below average condition, CONDITION_*BA*, is generally negative and significant in 9 out of the 15 markets. The coefficient on the variable representing above average condition, *CONDITION_AA*, is positive and significant in all but one of the models.

The estimated coefficient on the variable of interest, indicating whether the sale was part of a replacement property exchange (*EXREPL*) is positive and significant in 13 out of the 15 regressions. The estimated coefficients tend to be similar in magnitude to the coefficients estimated in the office regressions and much larger than the estimated

Table 20. Regression Statistics for OLS Model with Structural Characteristics and Submarket Dummies by Retail Markets

Market	Chicago	Dallas/ Fort Worth	Denver	Detroit	Ft. Lauderdale	Houston	Las Vegas	Los Angeles
Observations	**2069**	**566**	**699**	**639**	**516**	**479**	**426**	**2150**
EXREPL	0.373	0.255	0.259	0.209	0.242	0.245	0.140	0.202
	0.00	***0.00***	***0.00***	***0.13***	***0.04***	***0.00***	***0.01***	***0.00***
EXRELQ	0.200	0.034	0.085	0.141	-0.133	0.244	0.163	0.158
	0.00	***0.81***	***0.21***	***0.32***	***0.50***	***0.06***	***0.17***	***0.00***
RELQ_REPL	0.395	0.423	0.363	0.217	0.060	0.310	0.185	0.204
	0.00	***0.01***	***0.00***	***0.04***	***0.84***	***0.10***	***0.07***	***0.00***
AGE	-0.021	-0.029	-0.024	-0.015	-0.034	-0.032	-0.027	-0.025
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.01***	***0.00***	***0.00***	***0.00***
SQFT	0.027	0.015	0.020	0.022	0.017	0.019	0.019	0.031
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.00***
LANDSQFT	0.003	0.004	0.003	0.003	0.004	0.002	0.005	0.003
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.02***	***0.00***	***0.00***	***0.00***	***0.00***
PARKING	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
	0.80	***0.28***	***0.26***	***0.07***	***0.51***	***0.79***	***0.08***	***0.74***
FLOORS	0.044	0.005	0.111	0.054	0.094	-0.158	0.080	0.005
	0.04	***0.96***	***0.03***	***0.39***	***0.29***	***0.03***	***0.65***	***0.85***
CONDITION_BA	-0.200	-0.192	-0.130	-0.034	-0.142	-0.082	0.113	-0.216
	0.00	***0.02***	***0.04***	***0.79***	***0.14***	***0.31***	***0.21***	***0.00***
CONDITION_AA	0.300	0.164	0.275	0.337	0.313	0.275	0.253	0.139
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
BUYEROUT	0.238	0.403	0.220	0.204	0.069	0.358	0.098	-0.096
	0.00	***0.00***	***0.00***	***0.01***	***0.37***	***0.00***	***0.04***	***0.27***
SALELEASEBACK	0.165	-0.065	-0.030	0.313	-0.160	0.024	0.216	0.101
	0.01	***0.53***	***0.69***	***0.04***	***0.17***	***0.89***	***0.03***	***0.28***
PORTSALE	-0.037	0.247	-0.090	0.159	-0.139	0.408	-0.034	-0.066
	0.75	***0.00***	***0.40***	***0.02***	***0.46***	***0.06***	***0.81***	***0.45***
YR2000	0.026	-0.132	0.150	0.000	-0.005	0.127	-0.130	-0.058
	0.60	***0.19***	***0.21***	***1.00***	***0.96***	***0.32***	***0.29***	***0.31***

Table 20. Continued

Market	Chicago	Dallas/ Fort Worth	Denver	Detroit	Ft. Lauderdale	Houston	Las Vegas	Los Angeles
YR2001	0.090	-0.146	0.175	0.176	0.077	0.285	-0.057	0.128
	0.07	***0.16***	***0.14***	***0.03***	***0.41***	***0.04***	***0.67***	***0.04***
YR2002	0.182	-0.013	0.202	0.091	0.177	0.345	-0.081	0.233
	0.00	***0.89***	***0.09***	***0.28***	***0.10***	***0.01***	***0.54***	***0.00***
YR2003	0.326	-0.001	0.371	0.288	0.478	0.419	0.106	0.454
	0.00	***0.99***	***0.00***	***0.00***	***0.00***	***0.00***	***0.43***	***0.00***
YR2004	0.551	0.057	0.466	0.390	0.605	0.584	0.185	0.646
	0.00	***0.59***	***0.00***	***0.00***	***0.00***	***0.00***	***0.15***	***0.00***
YR2005	0.549	0.029	0.547	0.467	0.811	0.943	0.145	0.829
	0.00	***0.83***	***0.00***	***0.00***	***0.00***	***0.00***	***0.36***	***0.00***
CONST	14.289	13.467	13.890	12.646	13.519	13.095	13.186	15.023
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
R-squared	**0.71**	**0.83**	**0.84**	**0.73**	**0.81**	**0.81**	**0.78**	**0.78**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is LNPRICE – Log of selling price; EXREPL – Binary variable set equal to one if transaction represents sale of a replacement property. EXRELQ – Binary variable set equal to one if transaction represents sale of a relinquished property; RELQ_REPL – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. AGE – Age of the building(s) in years; AGE2 – Age squared; SQFT – Square footage of total improvements; SQFT2 – Square footage of total improvements squared; landsqft – Square footage of land; landsqft2 – Square footage of land squared; PARKING – Parking, defined as number of parking spaces; floors – Number of floors; CONDITIONi – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; buyerout – Binary variable set equal to one if buyer lives out of state; saleleaseback – Binary variable set equal to one if transaction was part of sale-leaseback; portsale – Binary variable set equal to one if transaction was part of portfolio sale; YRn – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; SDUMi – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

Table 20. Continued

Market	Oakland	Phoenix	Riverside /San Bernardino	San Diego	San Francisco	Seattle	Tucson
Observations	**508**	**1208**	**429**	**638**	**339**	**943**	**406**
EXREPL	0.320	0.086	0.245	0.254	0.192	0.122	0.216
	0.00	***0.17***	***0.00***	***0.00***	***0.02***	***0.00***	***0.00***
EXRELQ	0.223	-0.027	0.092	0.177	0.118	0.173	0.070
	0.00	***0.78***	***0.46***	***0.01***	***0.03***	***0.01***	***0.61***
RELQ_REPL	0.328	0.134	0.302	0.362	0.141	0.290	0.206
	0.01	***0.47***	***0.00***	***0.00***	***0.12***	***0.00***	***0.13***
AGE	-0.024	-0.030	-0.030	-0.028	-0.011	-0.023	-0.038
	0.00	***0.00***	***0.00***	***0.00***	***0.02***	***0.00***	***0.00***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.03***	***0.00***	***0.00***
SQFT	0.042	0.016	0.012	0.027	0.142	0.026	0.013
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	-0.002	0.000	0.000
	0.01	***0.00***	***0.01***	***0.00***	***0.00***	***0.00***	***0.09***
LANDSQFT	0.004	0.005	0.005	0.004	-0.002	0.003	0.006
	0.02	***0.00***	***0.00***	***0.00***	***0.84***	***0.00***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.10	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
PARKING	-0.002	0.000	0.001	0.000	0.001	0.000	0.000
	0.12	***0.90***	***0.08***	***0.30***	***0.82***	***0.00***	***0.83***
FLOORS	0.094	0.081	0.135	0.045	-0.035	0.012	0.055
	0.05	***0.14***	***0.17***	***0.24***	***0.17***	***0.75***	***0.04***
CONDITION_BA	-0.176	-0.310	-0.274	-0.094	-0.280	-0.197	-0.020
	0.01	***0.00***	***0.10***	***0.18***	***0.00***	***0.00***	***0.77***
CONDITION_AA	0.161	0.258	0.148	0.205	0.141	0.326	0.294
	0.11	***0.00***	***0.04***	***0.00***	***0.10***	***0.00***	***0.00***
BUYEROUT	-0.006	0.217	0.136	0.013	-0.121	0.313	0.155
	0.96	***0.00***	***0.29***	***0.91***	***0.37***	***0.00***	***0.01***
SALELEASEBACK	0.177	0.161	-0.001	0.002	0.314	0.111	0.031
	0.23	***0.00***	***0.99***	***0.99***	***0.18***	***0.23***	***0.79***
PORTSALE	0.003	-0.056	0.088	-0.062	-0.134	-0.212	0.195
	0.99	***0.57***	***0.59***	***0.67***	***0.09***	***0.01***	***0.03***
YR2000	0.181	0.008	0.043	-0.056	0.155	0.182	-0.069
	0.10	***0.93***	***0.70***	***0.17***	***0.04***	***0.02***	***0.63***

Table 20. Continued

Market	Oakland	Phoenix	Riverside /San Bernardino	San Diego	San Francisco	Seattle	Tucson
YR2001	0.372	0.060	0.261	0.038	0.367	0.179	0.126
	0.00	***0.47***	***0.04***	***0.73***	***0.00***	***0.02***	***0.43***
YR2002	0.428	0.029	0.318	0.233	0.454	0.305	0.129
	0.00	***0.73***	***0.00***	***0.04***	***0.00***	***0.00***	***0.39***
YR2003	0.640	0.214	0.439	0.303	0.453	0.299	0.194
	0.00	***0.01***	***0.00***	***0.01***	***0.00***	***0.00***	***0.18***
YR2004	0.750	0.399	0.646	0.600	0.524	0.375	0.447
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
YR2005	0.606	0.589	0.839	0.802	0.674	0.694	0.521
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
CONST	13.874	13.273	12.959	12.582	66.312	13.330	13.257
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
R-squared	**0.81**	**0.84**	**0.83**	**0.83**	**0.82**	**0.80**	**0.81**

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers.

coefficients with the apartment models. The lowest estimated significant coefficient is in Las Vegas – 0.14, while the highest estimated coefficient for replacement exchanges is observed, just as with the office regressions, in the Chicago model – 0.37. This represents additional evidence that buyers of replacement properties are paying statistically significant price premiums in the markets examined in the regressions.

The coefficient estimates of the variable representing a sale as part of a relinquished exchange, *EXRELQ*, are positive in 13 models and significant in 7 markets. However, these coefficient estimates generally are significantly smaller than coefficient estimates on the variable, indicating a sale that is part of a replacement exchange, *EXREPL.* These results are similar to the findings with office regressions.

The coefficients on the variable representing a sale part of the seller's relinquished exchange and the buyer's replacement exchange, *RELQ_REPL*, are positive and generally of higher magnitude than the coefficients on the variable representing a replacement exchange only (*EXREPL*). The coefficients are positive and significant in 11 out of the 15 markets.

The coefficient on the variable representing a purchase by out-of-state buyer, *BUYEROUT*, is significant in all five of the markets with highest percentage of out-of-state buyers: Las Vegas, 52 percent; Phoenix, 47 percent; Tucson, 30 percent; Dallas/Forth Worth, 29 percent; and Houston, 27 percent. This coefficient is also significant in Denver, Detroit, Seattle and Chicago. Thus, the coefficient on the variable representing a purchase by an out-of-state buyer is significant in 9 of the 11 markets with large number of sales to out-of-state buyers. These findings present strong evidence that out-of-state buyers are associated with a price premiums.

The coefficient of the variable representing that the sale is part of a sale-leaseback transaction, *SALELEASEBACK*, is generally positive and significant in four markets: Chicago, Detroit, Las Vegas, and Phoenix. The preliminary analysis indicated that there were only two markets with larger number of sale-leaseback transactions. These markets are Chicago with 56 sale-leasebacks and Phoenix with 50 such transactions. In both of the markets the coefficient of the variable representing a sale-leaseback transaction is positive and significant. These results present additional evidence supporting our hypothesis that sale-leasebacks are associated with higher transaction prices.

The coefficient of the variable representing a portfolio sale, *PORTSALE*, is positive and statistically significant in three markets: Dallas, Detroit, and Tucson; and negatively significant in Seattle. Tucson and Dallas represent the two markets with the largest percentage of portfolio sales observed. In the four additional markets with large number of portfolio sales (Denver, Detroit, Los Angeles and Seattle), I observe a statistically significant and positive coefficient on *PORTSALE* in Detroit, and a negatively significant coefficient on this variable in Seattle. In conclusion, the regression results present mixed evidence that portfolio sales are associated with price premiums.

The estimated year dummies are generally positive and significant. The magnitude and significance of the year dummy coefficients reveal substantial price appreciation after 2001. Oakland, San Francisco and San Diego are the markets with the most dramatic price appreciation, as illustrated by the dummies. The coefficient of 0.67 for the dummy variable signifying sales in year 2005 in San Francisco, translates to 96 percent higher prices, all else equal, than in 1999. The same coefficient for the markets of Seattle,

San Diego and Riverside, indicates a price appreciation since 1999, all else equal, of 100 percent, 123 percent, and 131 percent, respectively.

Submarket dummy variables are not reported in the regression outputs, but they serve for achieving best possible control of relative location in the metropolitan market and their inclusion improves significantly the fitness of all models.

Next, I present a second model for the retail properties, OLS Model II, which is identical in its specification to the second model used with the office properties sample. The model adds to the model specification, given by equation (18) a third order expansion of the latitude and longitude coordinates, which has the objective of effectively controlling for the absolute location of the property. The third order expansion, rather than a simple linear form, is entered in the equation to draw a price surface based on location. The model specification is given by equation (23).

Table 21 presents regression statistics from OLS Model II. Controlling for absolute location improves the R-squares of market regressions by 0.5 to 1 percent. No significant changes in the estimated coefficients are observed. With respect to the key variables of interest results are re-confirmed. The coefficient on the variable representing a replacement exchange, *EXREPL*, is positive and significant in 13 of the 15 regressions. The magnitude of the estimated coefficients remains largely unchanged. This reconfirms the evidence that buyers of replacement properties are paying significant price premiums in the majority of the markets. Results with respect to relinquished exchanges, *EXRELQ*, and a combination of relinquished and replacement exchanges, *RELQ_REPL*, remain the same.

The coefficient on the variable representing a purchase by an out-of-state buyer,

Table 21. Regression Statistics for OLS Model with Structural Characteristics, Submarket Dummies and Longitude, Latitude Coordinates by Retail Markets

	Chicago	**Dallas/ Fort Worth**	**Denver**	**Detroit**	**Ft. Lauder-dale**	**Houston**	**Las Vegas**
Observations	***2069***	***566***	***699***	***639***	***516***	***479***	***426***
EXREPL	0.369	0.244	0.259	0.211	0.212	0.248	0.131
	0.00	***0.00***	***0.00***	***0.13***	***0.07***	***0.00***	***0.01***
EXRELQ	0.204	0.031	0.085	0.142	-0.080	0.228	0.166
	0.00	***0.82***	***0.20***	***0.33***	***0.68***	***0.07***	***0.15***
RELQ_REPL	0.391	0.401	0.360	0.225	0.039	0.299	0.162
	0.00	***0.01***	***0.00***	***0.04***	***0.89***	***0.13***	***0.11***
AGE	-0.021	-0.029	-0.024	-0.015	-0.036	-0.031	-0.023
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT	0.027	0.015	0.020	0.022	0.017	0.019	0.019
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***		***0.00***	***0.02***
LANDSQFT	0.003	0.004	0.003	0.003	0.004	0.002	0.005
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.02***	***0.00***	***0.00***	***0.00***
PARKING	0.000	0.000	0.000	0.001	0.000	0.000	0.001
	0.79	***0.23***	***0.27***	***0.08***	***0.57***	***0.80***	***0.09***
FLOORS	0.042	-0.011	0.111	0.055	0.075	-0.163	0.140
	0.05	***0.92***	***0.03***	***0.38***	***0.38***	***0.03***	***0.40***
CONDITION_BA	-0.200	-0.188	-0.127	-0.036	-0.094	-0.079	0.102
	0.00	***0.03***	***0.05***	***0.78***	***0.32***		***0.26***
CONDITION_AA	0.301	0.152	0.275	0.337	0.307	0.281	0.213
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
BUYEROUT	0.239	0.414	0.222	0.198	0.079	0.363	0.094
	0.00	***0.00***	***0.00***	***0.01***	***0.31***	***0.00***	***0.04***
SALELEASEBACK	0.160	-0.054	-0.033	0.320	-0.193	0.022	0.217
	0.02	***0.62***	***0.66***	***0.03***	***0.12***	***0.90***	***0.02***
PORTSALE	-0.031	0.255	-0.089	0.157	-0.143	0.406	-0.119
	0.79	***0.00***	***0.41***	***0.02***	***0.43***	***0.06***	***0.40***
YR2000	0.027	-0.132	0.155	0.001	-0.040	0.134	-0.126
	0.58	***0.21***	***0.20***	***0.99***	***0.63***	***0.29***	***0.30***

Table 21. Continued

	Chicago	Dallas/ Fort Worth	Denver	Detroit	Ft. Lauder-dale	Houston	Las Vegas
YR2001	0.090	-0.141	0.178	0.172	0.036	0.285	-0.037
	0.07	***0.18***	***0.13***	***0.04***	***0.70***	***0.04***	***0.78***
YR2002	0.181	-0.016	0.206	0.088	0.124	0.354	-0.085
	0.00	***0.87***	***0.08***	***0.30***	***0.23***	***0.01***	***0.51***
YR2003	0.329	-0.001	0.373	0.286	0.441	0.427	0.119
	0.00	***1.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.37***
YR2004	0.557	0.045	0.470	0.386	0.576	0.592	0.204
	0.00	***0.68***	***0.00***	***0.00***	***0.00***	***0.00***	***0.11***
YR2005	0.547	0.024	0.551	0.474	0.822	0.928	0.173
	0.00	***0.86***	***0.00***	***0.00***	***0.00***	***0.00***	***0.26***
X3	0.000	0.025	-0.003	-0.006	0.075		
	0.05	***0.13***	***0.66***	***0.52***	***0.14***		
Y3	0.000	-0.002	0.000	0.000	-0.005	0.001	-0.002
	0.02	***0.14***	***0.66***	***0.52***	***0.16***	***0.81***	***0.14***
XY2	0.000	-0.008	0.001		-0.024	0.004	-0.014
	0.06	***0.13***	***0.66***		***0.15***	***0.80***	***0.15***
YX2				-0.005		0.007	-0.023
				0.52		***0.80***	***0.15***
CONST	25.823	28.413	4.718	12.772	69.724	-1.313	-93.981
	0.00	***0.17***	***0.74***	***0.08***	***0.00***	***0.95***	***0.00***
R-squared	***0.72***	***0.83***	***0.84***	***0.73***	***0.82***	***0.81***	***0.79***

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – Latitude of property; *Y* – Longitude of property.

Table 21. Continued

	Los Angeles	Oakland	Phoenix	Riverside /San Bernardino	San Diego	San Francisco	Seattle	Tucson
Observations	***2150***	***508***	***1208***	***429***	***638***	***339***	***943***	***406***
EXREPL	0.204	0.310	0.085	0.247	0.254	0.187	0.117	0.201
	0.00	***0.00***	***0.17***	***0.00***	***0.00***	***0.02***	***0.01***	***0.01***
EXRELQ	0.164	0.214	-0.031	0.090	0.177	0.139	0.172	0.062
	0.00	***0.00***	***0.75***	***0.47***	***0.01***	***0.01***	***0.01***	***0.65***
RELQ_REPL	0.204	0.287	0.136	0.306	0.360	0.137	0.282	0.171
	0.00	***0.02***	***0.46***	***0.00***	***0.00***	***0.14***	***0.00***	***0.21***
AGE	-0.025	-0.024	-0.029	-0.029	-0.027	-0.008	-0.023	-0.039
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.07***	***0.00***	***0.00***
AGE2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.11***	***0.00***	***0.00***
SQFT	0.031	0.043	0.016	0.013	0.027	0.133	0.026	0.013
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
SQFT2	0.000	0.000	0.000	0.000	0.000	-0.002	0.000	0.000
	0.00	***0.03***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.08***
LANDSQFT	0.003	0.005	0.005	0.005	0.004	0.005	0.003	0.006
	0.00	***0.01***	***0.00***	***0.00***	***0.00***	***0.65***	***0.00***	***0.00***
LANDSQFT2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		0.02	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
PARKING	0.000	-0.002	0.000	0.000	0.000	0.000	0.000	0.000
	0.68	***0.04***	***0.88***	***0.08***	***0.29***	***1.00***	***0.93***	***0.82***
FLOORS	0.002	0.092	0.079	0.132	0.048	-0.020	0.013	0.058
	0.96	***0.06***	***0.14***	***0.16***	***0.21***	***0.41***	***0.73***	***0.04***
CONDITION_BA	-0.224	-0.171	-0.304	-0.295	-0.105	-0.243	-0.195	-0.014
	0.00	***0.01***	***0.00***	***0.14***	***0.14***	***0.00***	***0.00***	***0.83***
CONDITION_AA	0.139	0.144	0.258	0.139	0.208	0.144	0.322	0.290
	0.00	***0.15***	***0.00***	***0.06***	***0.00***	***0.10***	***0.00***	***0.00***
BUYEROUT	-0.089	0.023	0.211	0.119	0.012	-0.081	0.310	0.150
	0.32	***0.81***	***0.00***	***0.36***	***0.91***	***0.53***	***0.00***	***0.01***
SALELEASEBACK	0.101	0.216	0.147	-0.012	-0.010	0.341	0.098	0.010
	0.29	***0.13***	***0.01***	***0.94***	***0.95***	***0.10***	***0.30***	***0.93***
PORTSALE	-0.074	0.008	-0.049	0.046	-0.053	-0.200	-0.224	0.167
	0.40	***0.97***	***0.61***	***0.77***	***0.72***	***0.03***	***0.01***	***0.06***
YR2000	-0.054	0.175	0.010	0.017	-0.056	0.132	0.189	-0.064
	0.33	***0.11***	***0.91***	***0.88***	***0.63***	***0.06***	***0.02***	***0.67***

Table 21. Continued

	Los Angeles	Oakland	Phoenix	Riverside /San Bernardino	San Diego	San Francisco	Seattle	Tucson
YR2001	0.132	0.336	0.056	0.240	0.039	0.332	0.177	0.124
	0.03	***0.00***	***0.51***	***0.05***	***0.73***	***0.00***	***0.02***	***0.46***
YR2002	0.232	0.419	0.028	0.307	0.233	0.427	0.310	0.120
	0.00	***0.00***	***0.74***	***0.00***	***0.03***	***0.00***	***0.00***	***0.45***
YR2003	0.457	0.645	0.212	0.420	0.303	0.406	0.302	0.179
	0.00	***0.00***	***0.01***	***0.00***	***0.01***	***0.00***	***0.00***	***0.24***
YR2004	0.644	0.719	0.399	0.624	0.599	0.494	0.379	0.432
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***
YR2005	0.826	0.619	0.587	0.813	0.800	0.659	0.689	0.503
	0.00	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
X3	-0.036	-0.195	0.007		-0.008		-0.008	-0.022
	0.00	***0.00***	***0.34***	***0.45***	***0.69***		***0.06***	***0.22***
Y3	0.002	0.012	0.000	0.001	0.000	0.000	0.001	0.001
	0.00	***0.00***	***0.33***	***0.57***	***0.68***	***0.00***	***0.06***	***0.21***
XY2	0.009	0.057	-0.002	-0.003	0.002	0.001	0.004	0.005
	0.00	***0.00***	***0.35***	***0.09***	***0.69***	***0.00***	***0.06***	***0.23***
YX2				-0.004				
				0.10				
CONST	-17.075	139.120	-10.912	-1177.571	34.638	-93.551	30.259	69.135
	0.09	***0.00***	***0.26***	***0.46***	***0.22***	***0.05***	***0.03***	***0.01***
R-squared	***0.78***	***0.82***	***0.84***	***0.83***	***0.83***	***0.84***	***0.80***	***0.81***

All standard errors are adjusted for potential heteroskedasticity. P-values are reported under the coefficient estimates and are in bold and italics. Dependent Variable is *LNPRICE* – Log of selling price; *EXREPL* – Binary variable set equal to one if transaction represents sale of a replacement property. *EXRELQ* – Binary variable set equal to one if transaction represents sale of a relinquished property; *RELQ_REPL* – Binary variable set equal to one if transaction represents both sale of relinquished property and purchase of a replacement property. *AGE* – Age of the building(s) in years; *AGE2* – Age squared; *SQFT* – Square footage of total improvements; *SQFT2* – Square footage of total improvements squared; *LANDSQFT* – Square footage of land; *LANDSQFT2* – Square footage of land squared; *PARKING* – Parking, defined as number of parking spaces; *FLOORS* – Number of floors; $CONDITION_i$ – Physical condition of the property based on inspection. The categories include below average, average and above average. The omitted category is average; *BUYEROUT* – Binary variable set equal to one if buyer lives out of state; *SALELEASEBACK* – Binary variable set equal to one if transaction was part of sale-leaseback; *PORTSALE* – Binary variable set equal to one if transaction was part of portfolio sale; YR_n – Yearly time periods from 1999 through 2005. Each year is included as a binary variable except 1999, which is suppressed; $SDUM_i$ – Binary variable signifying the submarket in which the property is located, as defined by CoStar brokers; *X* – Latitude of property; *Y* – Longitude of property.

BUYEROUT, remains significant and positive in 9 out of the identified 11 markets of interest. These findings reconfirm the strong evidence that retail property out-of-state buyers pay price premiums.

The coefficient of the variable representing a sale-leaseback transaction, *SALELEASEBACK*, remains positive and significant in the markets of Chicago, Detroit, Las Vegas, and Phoenix. It is also now significant in San Francisco at the 10 percent level. These results reconfirm the evidence supporting our hypothesis that sale-leasebacks are associated with higher transaction prices.

Finally, results remain unchanged with respect to the coefficient on the variable representing a portfolio sale, *PORTSALE*.

Based on OLS Model II, the percentage sales price changes corresponding to the estimated and statistically significant coefficients for replacement exchanges, *EXREPL*, relinquished exchanges, *EXRELQ,* relinquished and replacement exchanges*, RELQ_REPL,* purchases by out-of-state buyers, *BUYEROUT*, sale-leasebacks, *SALELEASEBACK*, and portfolio sales, *PORTSALE*, are presented in Table 22 by market.

Table 22 indicates that the percentage price effect of replacement property exchange is economically significant and varies from 12.46 percent in Seattle to 44.61 percent in Chicago. Note that the markets with the lowest and highest premiums associated with replacement exchanges are the same for retail and office properties.

The average price premium paid when a property is used to complete a replacement exchange is 26.06 percent. This premium is similar to the premium paid with office

replacement property exchanges and is larger than predicted net benefits from a tax-deferred exchange, based on the simulation analysis in Chapter 5.

In contrast, based on the simulation analysis with a holding period of less than 10 years, both for the relinquished and the replacement property, the net benefit from exchange is 8.46 percent of price, at most. This value is achieved when assuming annual appreciation of 20 percent, and 20 percent capital gain tax rate. Increasing both holding periods to 20 years yields a maximum price benefit of less than 12 percent. Finally, if an investor exchanges a fully depreciated property and holds the replacement property for another 39 years, the price benefit of this strategy is only about 14 percent. This clearly shows that investors pay a premium in exchanges that is larger than any predicted benefit, especially when they have a short-term investment horizon.

The implied percentage effects of relinquished exchanges on selling price are on average 19.57 percent. The implied price effects, when this variable is significant are smaller than the effects associated with replacement exchanges. The price premium associated with a sale being part of both replacement and relinquished exchanges ranges from 22.65 percent in Los Angeles to 49.39 percent in Dallas.

Retail purchases by out-of-state buyers are associated with a price premium ranging from 9.82 percent in Las Vegas to 51.21 percent in Dallas. Dallas is also the market with the highest price premium associated with out-of-state buyers of office real estate. The average price premium associated with this type of transaction is 28.29 percent. The coefficient is significant in 9 out of the identified 11 markets of interest. These results present strong evidence that there is a significant price premium associated with purchases by out-of-state buyers.

Table 22. Marginal Effects for Significant Coefficients for Variables of Interest in Retail Regressions

Market	**Obs**	***EXREPL***	***EXRELQ***	***RELQ_ REPL***	***BUYER OUT***	***SALE LEASE BACK***	***PORT SALE***
Chicago	2069	44.61%	22.60%	47.79%	27.00%	17.31%	
Dallas/ Fort Worth	566	27.65%		49.39%	51.21%		29.04%
Denver	699	29.54%		43.32%	24.84%		
Detroit	639			25.19%	21.89%	37.76%	17.01%
Ft. Lauderdale	516	23.60%					
Houston	479	28.19%			43.76%		
Las Vegas	426	14.01%			9.82%		
Los Angeles	2150	22.69%	17.86%	22.65%			
Oakland	508	36.36%	23.91%				
Phoenix	1208				23.55%	15.81%	
Riverside /San Bernardino	429	27.99%		35.79%			
San Diego	638	28.90%	19.37%	43.39%			
San Francisco	339	20.55%	14.88%				
Seattle	943	12.46%	18.78%	32.64%	36.34%		-20.04%
Tucson	406	22.27%			16.20%		18.22%

Sale-leasebacks are associated with an average price premium of 23.63 percent. Price effects from sale-leaseback transactions range from 15.82 percent in Phoenix to 37.76 percent in Detroit. These results are of statistical and economic significance and support the evidence that there is a price premium associated with sale-and-leaseback transactions.

Portfolio sales are associated with a price premium of 17.01 percent in Detroit and 29.04 percent in Dallas, and a price discount of 20.04 percent in Seattle. These results present mixed evidence of a price premium (discount) associated with portfolio transactions.

The next chapter summarizes the results and offers concluding remarks.

CHAPTER 10
CONCLUSION

I study the role that buyer and seller motivations play in determining sales prices in commercial real estate markets. Various conditions of sale, which can be viewed as distinct motivations, appear to be quite common in commercial real estate transactions. I examine several conditions of sale which represent distinct motivations that are frequently seen in comparables sales data and also could influence sales price. In particular, I focus attention on the use of tax-deferred exchanges nationwide and their effect on observed transaction prices. I also examine the pricing of properties that are purchased by out-of-state buyers, as well as sales that are part of condominium conversions, portfolio transactions or sale-leaseback transactions.

This dissertation finds several interesting results that have not been discussed in previous published work.

First, this dissertation represents the first work that quantifies the size of the exchange market nationwide, as well as defines conceptually and empirically the magnitude of possible effects of exchanges on transaction prices in different markets across the country.

Second, I find a significant positive marginal effect related to replacement property exchanges, which is consistent with the Tax Capitalization Hypothesis and the Imperfect Substitute Hypothesis interpretations. This effect is robust across the 15 markets studied in the apartment, office and retail properties samples. More importantly, the price effect differs substantially across residential and non-residential properties, as well as across

markets. I document an average price premium of 10.5 percent for apartment replacement exchanges, 28.3 percent for office replacement exchanges, and 26.1 percent for retail replacement exchanges. The results demonstrate that many investors pay a price premium in exchanges that is significantly larger than the expected tax benefit of the exchange, especially if they have a short-term investment horizon. Based on the comparison with the simulation model results and observed significance in the majority of the studied markets, it is clear that replacement exchanges are associated with price premiums that are of statistical and economic significance.

The observed percentage price effects of replacement exchanges, combined with the predictions from the theoretical model have important implications for decision making regarding 1031 exchanges and suggest that participants in tax-delayed exchanges that have a short-term investment horizon need to be careful, since the value they pay in the form of a higher replacement property price may offset, in part or in whole, the gain from the deferment of taxes.

Third, the analysis of the price effect associated with purchases by out-of-state buyers suggests that significant price premiums are often paid by out-of-state buyers. These premiums differ substantially across residential and non-residential properties, as well as across geographic markets. On average, the price premium paid by out-of-state buyers is 16.7 percent in apartment markets, 23.5 percent in office markets and 28.3 percent in retail markets.

Fourth, I study the effect that sale-leaseback transactions have on price. I find that the coefficient on the variable, indicating a sale-leaseback is generally positive and significant in the markets of potential interest. Sale-leasebacks are associated with a 28.3

percent price premium in office markets and a 23.6 percent price premium in retail markets[1]. These results present evidence supporting the hypothesis that sale-leasebacks are associated with higher transaction prices.

Fifth, I study the extent to which portfolio sales are associated with higher prices. Portfolio sales are associated with price discounts in two markets: apartments in San Francisco and retail properties in Seattle. When I exclude these two results, apartment and retail portfolio sales are associated with price premiums of 12.5 and 21.4 percent, respectively. These results present mixed evidence that portfolio sales are associated with price premiums.

Sixth, I also study the potential price impact of apartment sales, motivated by condo converters. The analysis shows that condo conversions are associated with a price premium of 16.4 percent in San Diego.

In summary, the results demonstrate that exchanges, as well as various other investor motivations, have different impacts on transaction prices in commercial real estate across different markets and property types. The results of this dissertation are especially important for the real estate discipline. Because of the exhaustive nature of the dataset and my comprehensive analysis of fifteen of the largest metropolitan markets in the United States, this work can be used as an important reference by appraisers for the adjustment of prices when a sales comparison approach is used.

1 Sale-leasebacks in San Diego are associated with a discount of 14 percent, but they are not included in the calculation of average impact, since the result may be driven by outliers.

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