The Economic Impact of Repealing or Limiting Section 1031 Like-Kind Exchanges in Real Estate

by

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March 2015

Revised June 22, 2015

We thank Ryan McCormick of the Real Estate Roundtable for suggestions and guidance throughout the process of finalizing this report. This paper has also benefitted from the valuable feedback by many members of the Real Estate Roundtable. We also thank Suzanne Baker, John Harrison, Rachel Hughes, Robert Rozen, Amirhossein Yousefi and Jeffrey Fisher for their helpful suggestions. We gratefully acknowledge the Real Estate Like-Kind Exchange Coalition for providing financial support for this project. We thank Michael Cohen, Iolaire McFadden and Ozlem Yanmaz for providing us with the CoStar data used in this study and Jeff Fisher and the National Council of Real Estate Investment Fiduciaries for providing access to the NCREIF data. Finally, we thank Steve Williams, Doug Murphy, and Bob White of Real Capital Analytics for providing us with the RCA data used in this study. All remaining errors are our own.

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Executive Summary

We examine the economic effects of repealing Section 1031 for real estate exchanges. After documenting the widespread use of real estate like-kind exchanges, we develop a model that quantifies the present value (cost) of an exchange to the owner (Treasury). We estimate that the static present value of lost Treasury revenues from real estate exchanges ranged from a low of $200 million to a high of $3 billion in 2011, although these estimates overstate lost Treasury revenue because they assume taxpayers would have disposed of their properties in fully-taxable sales in the absence of the option to exchange.

We also develop a "typical project model" to estimate the range of short-run declines in prices that would be necessary to offset the increased tax burden of eliminating like-kind exchanges. In local markets where investors are moderately taxed, we estimate that prices on typical office, industrial, retail and other commercial properties would have to decline eight to 12 percent to maintain required investment returns. In the longer run, rents would need to increase from eight to 13 percent to offset the effects of elimination. Price and rent effects would be more pronounced in high-tax states.

Our empirical analyses demonstrate that replacement like-kind exchanges are associated with a higher investment of approximately $305,000 (33 percent of value) compared to acquisitions by the same investor following the sale of their property. Properties used in like-kind exchanges tend to be larger, newer and have lower vacancy rates. In addition, the use of 1031 exchanges and investment in like-kind exchanges varies considerably with the real estate market conditions. We also observe evidence that capital expenditures in replacement exchange properties tend to be higher by about $0.27/sf-$0.40/sf.

In addition to using some of the deferred gains to increase the size of their investment in subsequent properties, investors in like-kind exchanges use less leverage than ordinary investors to acquire replacement properties. Furthermore, holding periods for properties acquired through 1031 exchanges tend to be shorter. In summary, like-kind exchanges are associated with increased investment, reduced leverage that reduces system-wide risk, and shorter holding periods.

In contrast to the common view that replacement properties in an exchange are frequently disposed of in a subsequent exchange to potentially avoid capital gain and depreciation tax liability indefinitely, we find that in 88 percent of the cases in our dataset investors dispose of properties acquired in a 1031 exchange through a taxable sale. The

estimated taxes paid when an exchange is followed by a taxable sale are on average 19 percent higher than taxes paid when an ordinary sale is followed by an ordinary sale.

Overall, our analysis suggests that the cost of like-kind exchanges is likely largely overestimated, while their benefits are overlooked. The elimination of real estate exchanges will likely lead to a decrease in prices in the short-run, followed by an increase in rents in the longer run. These negative effects will be more pronounced in high tax states. Elimination will also likely produce a decrease in real estate investment, increase in investment holding periods, and an increase in the use of leverage.

Introduction and Summary of Results

Although Congress has frequently altered the taxation of accrued capital gains, Section 1031 of the Internal Revenue Code has permitted taxpayers to defer the recognition of taxable gains on the disposition of business-use or investment assets since 1921. However, recent tax reform proposals from the chairman of Congressional tax-writing committees would eliminate this deferral option on asset dispositions.

The benefits that the option to exchange provides owner/operators in local commercial real estate markets are numerous and significant. By deferring tax liabilities, exchanges can help preserve scarce investment capital. Investors can use this capital to acquire larger properties, upgrade portfolios, and make capital improvements. In competitive rental markets, these benefits are shared with tenants in the form of improved space and reduced rents. The equity preserved by an exchange may also lead to the use of lower leverage, thereby reducing investor (and system-wide) risk. Section 1031 exchanges can also be used to consolidate or diversify properties or to substitute depreciable real property for non-depreciable real property. Tax-deferred exchanges also improve the marketability of highly illiquid commercial real estate. This increased liquidity is especially important to the many non-institutional investors in relatively inexpensive properties that typically dominate the market for real estate like-kind exchanges.

From the perspective of the overall economy, allocative and macroeconomic effects favor continuation of real estate like-kind exchanges. The taxation of nominal capital gains at disposition creates a potential "lock-in" effect in real estate and other asset markets. Rather than disposing of a suboptimal asset with a lower expected before-tax return and reinvesting the proceeds in a more productive (higher return asset), investors with accrued capital gains may choose to continue to hold the less productive asset rather than realize the taxable gains. This suboptimal allocation of scarce investment capital exacts a cost on the economy as well as on the taxpayer. By eliminating potential lock-in effects, the option to exchange increases the ability of investors to redeploy capital to other uses and/or geographic areas, upgrade and expand the productivity of buildings and facilities, and otherwise engage in more income and job creating spending. This has positive spillover effects in directly related industries such as construction, title insurance, and mortgage lending.

We first document the widespread use of real estate like-kind exchanges and the extent to which their use varies across states and metropolitan areas. California dominates other states

in the use of exchanges. However, Colorado, Oregon, and Arizona, all states with relatively high state income tax rates, also account for a disproportionate share of real estate like-kind exchanges.

We next develop a "micro" model that quantifies the present value (cost) of an exchange to the owner (Treasury). In addition to capturing the benefit of immediate tax deferral, this model incorporates the corresponding tax disadvantages of an exchange from the investor's perspective; in particular, reduced depreciation deductions in the replacement property and increased capital gain and depreciation recapture taxes at sale.

The incremental value (cost to the Treasury) of a commercial property exchange as a percentage of the investor's deferred tax liability ranges from 10 percent to 62 percent, depending on the holding period of the relinquished property, the amount of price appreciation experienced by the relinquished property, and the amount of time the investor expects to hold the replacement property before disposition in a fully taxable sale. The value of an exchange as a percentage of deferred taxes for residential income producing property is similar. Assuming deferred gains from real estate account for 30 percent of the $70.8 billion total reported by Treasury in 2011, we estimate that the static present value of lost tax revenue from 2011 real estate exchanges ranged from $0.2 billion to $1.4 billion. The $1.4 billion estimate is only four percent of total deferred gains reported by the Treasury in 2011. Moreover, the behavioral responses of investors to elimination of like-kind exchanges would push estimates of increased Treasury revenue even lower.

Although the present value of tax revenue losses associated with real estate like-kind exchanges is relatively small in magnitude, the elimination of exchanges would disrupt many local property markets and harm both tenants and owners. We use a "typical project model," sometimes referred to as a "user cost of capital" model, to quantify the short-run declines in property prices that would be necessary to offset the increased tax burden on investors. The typical project model is also used to solve for the long-run increase in market rents that would be required to offset the elimination of real estate like-kind exchanges.

In local markets where moderately-taxed exchange motivated taxpayers are the marginal (price determining) investors, we estimate that prices on office, industrial, and retail properties would have to decline eight to 12 percent to maintain required investment returns for investors expecting to use like-kind exchanges when disposing of properties. In the longer run, real rents would need to increase from eight to 13 percent before construction would be viable. These higher rents would reduce the affordability of CRE space for both large and

small tenants. Similar to our estimated price declines, rents would need to increase less in markets where the marginal buyer of commercial real estate places a low probability on using an exchange to dispose of real estate.

The price and rent effects of eliminating real estate like-kind exchanges would likely be more pronounced in high-tax states, such as California, Colorado, Oregon, and Arizona. In these states, which also account for a disproportionate share of real estate like-kind exchanges, the typical investor is more likely to place a higher probability on using a like-kind exchange to dispose of an acquired property in subsequent years. We estimate that price declines ranging from 23 to 27 percent would be required to offset the elimination of exchanges in high-tax states, all else equal. In the longer run, we estimate rents would have to increase 30 to 38 percent to restore equilibrium in local property markets. These represent large potential short-run price and long-run rent changes in high-tax markets.

In addition to conducting an analysis based on our "user cost of capital" model, we employ data from Costar and NCREIF to examine the economic benefits of like-kind exchanges in real estate and some potential effects from the proposed removal of Section 1031 exchanges. Our empirical analyses demonstrate that like-kind exchanges are associated with higher investment, shorter holding periods and less leverage. More specifically, replacement like-kind exchanges are associated with an investment in subsequent properties that is on average $305,000 (33 percent of value) greater than when a replacement property is purchased following a fully taxable sale. This increased investment is robust over time and by state, although it tends to be larger in strong markets and in states with higher tax rates. Capital expenditures (specifically building improvements) for replacement exchange properties tend to be higher by about $0.27/sf-$0.40/sf. This difference is $0.18/sf-$0.24/sf for building improvements[1].

Furthermore, investors in like-kind exchanges tend to use less leverage to acquire replacement properties than investors involved in ordinary acquisitions. More specifically, replacement properties involved in an exchange have median loan-to-value ratios of 63-64 percent, while the median loan-to-value ratio for properties acquired in non-exchanges is 70 percent. Holding periods for properties acquired through 1031 exchanges tend to be shorter. The average holding periods for exchanges vs. non exchanges are 3.5 and 4.0 years,

[1] The difference of capital expenditures in replacement properties vs. properties acquired in a taxable sale is not statistically significant at conventional levels. The p-value of a one-tailed test is equal to 0.2, which implies that the hypothesis that the difference is larger than zero is rejected on average 20% of the time.

respectively. Using a matched sample of exchange and non-exchange properties, we obtain similar results.

Our results imply that the elimination of exchanges would lead to a decrease in investment, an increase in investment holding periods and possibly an increase in leverage. These micro effects are likely to have macroeconomic consequences as well. For example, a reduction in real estate activity, resulting from lower investment and prices decreases, would lead to slower growth rate in employment, especially in the markets where like-kind exchanges are commonly used.

When analyzing the potential cost of 1031 exchanges in real estate, we note that in 34 percent of the cases in our dataset the replacement property is less expensive than the relinquished property, which implies that in approximately one-third of the cases some taxes are paid in the year the exchange is executed. Furthermore, we show that 88 percent of the investors in our sample that complete an exchange subsequently dispose of the replacement property in a fully taxable sale. That is, like-kind exchanges are not typically used to permanently *exclude* capital gain and depreciation recapture income from taxation; rather, they allow investors to temporality *defer* the recognition of such income. Moreover, the reduced depreciation deductions in the replacement property that accompany an exchange significantly offset the value of immediate tax deferral. Our analysis suggests that the estimated taxes paid in an exchange which is followed by a taxable sale are on average 19 percent higher than when an ordinary sale is followed by an ordinary sale. These results reinforce our conclusion that the many "micro" and "macro" benefits of providing investors with the flexibility to dispose of highly illiquid, capital intensive assets via an exchange exceed the costs.

Background on Tax-Deferred Exchanges

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 simultaneity severely limited the usefulness of Section 1031 as a tax deferral tool due to the difficulty of synchronizing the close of two or more complex transactions. In response to an earlier court decision related to the "Starker" case (Starker vs. United States, 602 F. 2d 1341 (9th Cir., 1979)), Congress amended the original regulations in 1984 to allow taxpayers more time to complete an exchange. Nevertheless, the Section 1031 exchange market did not fully evolve until 1991 when the

Internal Revenue Service (IRS) issued final "safe harbor" regulations for initiating and completing delayed Section 1031 exchanges.

A like-kind 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. When the replacement property is subsequently disposed of in a fully taxable sale, the realized gain will equal the deferred gain on the relinquished property plus any additional taxable gain accrued since the acquisition of the replacement property.[2] However, if the subsequent disposition of the replacement property is also structured in the form of a Section 1031 exchange, the realized gain on the first property can again be deferred, perhaps indefinitely.

In order for the exchanging taxpayer to completely avoid the immediate recognition of the accrued taxable gain, he or she must acquire a property (or properties) of equal or greater value than the relinquished property. In addition, the taxpayer must use all of the net cash proceeds generated from the disposition of the relinquished property to purchase the replacement property. The transaction is potentially 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.

The ability to defer recognition of accrued capital gains, in whole or in part, when disposing of an asset via a tax-deferred exchange confers a potential benefit to owners of eligible assets (including commercial real estate) relative to assets that are not eligible for such deferred recognition of accrued gains. However, the appropriate tax treatment of capital gains is not obvious.[3] Some would argue that gains should be taxed fully at ordinary rates (no exclusion) as they accrue, not upon realization. Others would argue for favorable tax treatment, although not necessarily for exclusion, because the deferral advantage of taxation upon realization might be a sufficient advantage, at least for longer holding periods. Still others would choose the taxation of real (not nominal) gains only, accompanied by the deduction of only real mortgage interest expense. Moreover, the optimal taxation of deferred

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[2] In sharp contrast, since May 6, 1997 when the Taxpayer Relief Act of 1997 became law, if a single taxpayer has owned and lived in her home as her principal residence for at least two of the five years prior to the sale, she can permanently exclude up to $250,000 of her capital gain from taxation. For married couples, filing jointly, the exclusion is $500,000. This exclusion is potentially far more valuable to a home owner than the potential tax deferral available to owners of income-producing property under Section 1031.

[3] See, for example, Follain, Hendershtt, and Ling (1987).

capital gains would vary with the rate of inflation; in particular, higher rates of inflation should be accompanied by lower rates of capital gain taxation, all else equal.

Although Congress has frequently altered the taxation of accrued capital gains on most asset classes, Section 1031 has permitted taxpayers to defer the recognition of taxable gains on the disposition of business-use or investment assets since 1921. From the perspective of the overall economy, there are allocative and macroeconomic effects that favor continuation of real estate like-kind exchanges. It is well known that the taxation of nominal capital gains at disposition creates a potential "lock-in" effect in real estate and other asset markets.[4] Rather than selling a suboptimal asset with a lower expected before-tax return and reinvesting the proceeds in a more productive (higher expected return) asset, investors with accrued capital gains may choose to continue holding the less productive asset to avoid realizing the taxable gains. This suboptimal allocation of scarce investment capital exacts a cost on the economy as well as on the taxpayer.

The macroeconomic issues that favor the continuation of like-kind exchanges are capital formation and investment. Exchanges increase the ability of investors to redeploy capital to other uses and/or geographic areas, upgrade and expand the productivity of buildings and facilities, and engage in more income and job creating spending. Section 1031 requires investors to redeploy the capital from relinquished U.S. property within the U.S. It is difficult to accurately assess the negative effects that elimination of like-kind exchanges would have on real GDP growth because of the general equilibrium effects such a change would engender in both the short and long-run. Nevertheless, elimination would surely have a negative effect on the economy, especially in states and metropolitan areas in which like-kind exchanges are widely used.[5]

From the perspective of the investor, there are numerous motivations for the use of like-kind exchanges. First, by deferring tax liabilities, exchanges can help preserve investment capital. Investors can use this capital to acquire larger properties, upgrade portfolios (Fickes, 2003), and make capital improvements. Section 1031 exchanges can also be used to

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[4] Papers that address the lock-in effect in non-real estate markets include: Holt and Shelton (1962), Malkiel and Kane (1963), Yitzhaki (1979), Auten and Cordes (1991), Klein (1999), Mackie (2002), and Daunfeldt, Praski-Ståhlgren, and Rudholm (2010). Papers that analyze the lock-in effect in real estate markets include: Yamazaki (1996), Sinai and Gyourko (2004), Ferreira (2010), and Ihlanfeldt (2011).

[5] Ernst and Young (2015) estimates that if the increased tax revenues from eliminating like-kind exchanges were used to finance a revenue neutral reduction in corporate income tax rates, elimination would reduce GDP by $8.1 billion each year and reduce labor income by $1.4 billion.

consolidate or diversify properties or to substitute depreciable real property for non-depreciable real property (Wayner, 2005a and 2005b).

Tax-deferred exchanges also improve the marketability of highly illiquid commercial real estate assets as investors do not have an incentive to retain their properties to avoid paying capital gain and depreciation recapture taxes. This liquidity is especially important to the many non-wealthy investors in relatively inexpensive properties that often dominate the market for real estate like-kind exchanges.[6] Like-kind exchanges are not available to owners of assets that are readily convertible to cash, such as publicly-traded securities and inventory. The reduction in transactions induced by the elimination of real estate like-kind exchanges would depress job growth in directly related industries such as construction, title insurance, and mortgage lending; thereby spilling over into the general economy.

Despite the potential advantages of tax-deferral, Section 1031 exchanges have several drawbacks that limit their attractiveness. First, the larger the amount of tax-deferral, the smaller is the depreciable basis in the replacement property and, therefore, the smaller is the allowable annual deduction for depreciation. Moreover, the larger the amount of tax-deferral, the larger will be the realized gain when the replacement property is subsequently disposed of in a fully taxable sale.

Another disadvantage is that the transaction costs (both monetary and non-monetary) associated with initiating and completing an exchange will likely exceed the transaction costs of a fully taxable sale. The additional costs may include intermediary fees, accountant and attorney fees (Wayner 2005b). 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 or non-like kind property received from the sale is generally fully taxable as boot.

The Mechanics of Tax-Deferred Exchanges

Realized gains from the sale of real property must generally be recognized for federal and state income tax purposes in the year of sale. In general, the realized gain is equal to the

[6] Data from the exchange industry indicates that the majority of exchanges involve properties worth less than $1,000,000.

net selling price of the property minus the adjusted tax basis. The adjusted basis of the property in the year of sale is equal to the original cost basis of the property, plus additional real or personal property capital expenditures, minus the cumulative amount of tax depreciation taken since the property was placed in service as a rental property. The original cost basis of an existing property at acquisition is equal to the original acquisition price—land, building(s), and personal property—plus acquisition expenses (e.g., attorney fees, appraisal fee, and survey costs). Calculation of the adjusted basis, which is sometimes referred to as the "book value" or the "depreciated value" of the property, is summarized below:

	Cost of land
+	Cost of building(s) (including personal property)
+	Acquisition expenses
=	Original cost basis
+	Additional capital expenditures
-	Accumulated depreciation
=	Adjusted tax basis

For tax purposes, the total realized gain or loss on the sale of the property is equal to the net sale proceeds minus the adjusted basis. Any excess of the net sale proceeds over the adjusted basis results in a taxable gain; any deficit results in a taxable loss.

As displayed below, if the net sale proceeds exceed the undepreciated cost basis, the taxable gain on the sale of depreciable real estate has two components, each of which is taxed at different rates. The depreciation recapture component of the taxable gain is equal to the total amount of depreciation taken on real property since purchase.[7] Assuming the property has been held for at least 12 months, the remainder of the taxable gain is the capital gain component. Note that the capital gain is the amount, by which the property has increased in value (net of selling expenses) since acquisition, relative to the original acquisition price and subsequent capital expenditures. Total taxes due on sale are equal to the capital gain tax

[7] More formally, depreciation recapture income associated with real property is unrecaptured Section 1250 gain. If the tax basis includes personal property, which can generally be depreciated at accelerated rates (relative to a straight-line), the excess of total depreciation minus allowable straight-line depreciation is taxed (recaptured) at ordinary tax rates.

liability plus the recapture tax on accumulated depreciation.[8] Under the tax code in place in 2015, capital gains are subject to a maximum federal tax rate of 23.8 percent.[9] In contrast, the maximum federal rate on depreciation recapture income and ordinary income are 28.8 percent and 39.6 percent, respectively.[10] State income tax burdens can significantly increase effective marginal rates.

	Net sale proceeds
-	Adjusted tax basis
=	Total realized gain
-	Depreciation recapture income
=	Capital gain
	Capital gain tax (max. 23.8% federal rate)
+	Depreciation recapture tax (max. 28.8% federal rate)
=	Total taxes due on sale

Under Section 1031 of the IRC, real estate owners who dispose of their investment property and reinvest the net proceeds in other "like kind" property are able to defer recognition of some or all of the realized gain on the sale of the relinquished property. As discussed in detail in the appendix, if the exchanging taxpayer is not required to pay cash or boot to acquire the replacement property, her basis in the replacement property is equal to her basis in the relinquished property.[11] Moreover, her annual depreciation deduction in the replacement property is equal to the deduction she would be allowed had she maintained

[8] Technically, this portion of the total gain is the unrecaptured Section 1250 gain.

[9] The maximum capital gain rate is the sum of the 20 percent maximum statutory capital gain tax rate plus the 3.8 percent Net Investment Income Tax (NIIT) surcharge under I.R.C. §1411 that, since January 1, 2013, applies to households with AGI in excess of $450,000. From 1997 to May 6, 2003, the maximum capital gain tax rate was 20 percent. From May 6, 2003 to January 1, 2013, the maximum capital gain tax rate was 15 percent. For most taxpayers who own interests in real property, the rental income and income from sale is "passive" income, which is subject to the 3.8 percent tax. "Real estate professionals" who spend substantial time working in activities related to rental real estate may be able to avoid the 3.8 percent tax.

[10] The 28.8 percent maximum rate of tax on depreciation recapture income includes the 3.8 percent NIIT surcharge.

[11] The payment of cash or other non-like-kind property (i.e., "boot") will generally be required if the taxpayer's equity in the relinquished property is less than the equity required to obtain the replacement property.

ownership of the relinquished property. This "carry-forward" of basis and depreciation deductions can be a significant disadvantage of exchanging into the property when (if) the replacement property is subsequently disposed of in a fully taxable sale. That is, the realized gain will be larger to the extent of any gain deferred by the exchange. 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.

Most Section 1031 transactions are "delayed" exchanges that involve the use of a qualified intermediary (QI). 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 selling taxpayer. This first phase of the delayed exchange is often referred to as the taxpayer's "down-leg." The cash paid by the buyer of the relinquished property is "parked" with the QI until the taxpayer is able to identify and acquire a replacement property.

The taxpayer must identify in writing the replacement property within 45 days of the sale of the relinquished property. 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.[12] The taxpayer must acquire one or more of the identified replacement properties within 180 calendar days of the date of the closing of the relinquished property; that is, the 45 and 180 day periods run concurrently (Internal Revenue Code Section, Title 26, Section 1031). There are no exceptions to these time limits and failure to comply will convert the transaction to a fully taxable sale.[13] 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 is often referred to as the taxpayer's "up-leg."

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 liability company. Both the relinquished property and the replacement property must be held for

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[12] The taxpayer may identify up to three properties of any value or may identify any number of properties so long as the combined fair market values of the properties does not exceed 200 percent of the value of relinquished property. If the first two requirements are violated, the taxpayer can salvage deferred tax treatment by acquiring, within the 180 day exchange period, 95 percent of the value of all properties identified.

[13] The time period may be less than 180 days if the due date for filing the taxpayer's return (including extensions) is less than 180 days from the closing date of the relinquished property.

productive use in a 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. A holding period 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.

Evidence on the Use of Real Estate Like-Kind Exchanges

Ideally, we would like to have information on every CRE real estate transaction that has taken place in the U.S. over the last 15-20 years, including detailed information on whether the buyer/seller used the acquisition/disposition of the property to initiate or complete a like-kind exchange. Although the public recording of CRE transactions is common, it is not ubiquitous and it has not resulted in centralized databases.

Evidence from Transaction Databases

Currently, the most comprehensive database of CRE sale/purchase transactions is available from CoStar. The *CoStar COMPS* database includes historical information on CRE transactions in over 878 core based statistical areas (CBSAs) dating back to 1989.[14] To assure reliability of the data, CoStar requires agents to physically inspect the site and record and verify a variety of property characteristics and transaction details. The *CoStar COMPS* database includes historical information on 1,609,711 confirmed CRE transactions from 1997 through 2014.[15] Figure 1 provides information on Costar's market coverage by property type over the 1997-2014 period. CoStar's coverage of retail, office, industrial, and multifamily transactions included less than 100 CBSAs during the late 1990s and early 2000s. Beginning in 2006, its CBSA coverage of the four major property types increased significantly. By 2008, CoStar's coverage exceeded 500 CBSAs for all four property types. By 2014, Costar had expanded its retail, office, and industrial coverage to over 800 CBSAs while its coverage for multifamily transactions was approaching 800 CBSA.

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[14] A Core Based Statistical Area (CBSA) is a U.S. geographic area defined by the Office of Management and Budget (OMB) that centers on an urban center of at least 10,000 people and adjacent areas that are socioeconomically tied to the urban center by commuting. Areas defined on the basis of these standards applied to Census 2000 data were announced by OMB in June 2003. As of 2012, OMB has defined 917 CBSAs for the U.S. The OMB defines a Core Based Statistical Area as one or more adjacent counties or county equivalents that have at least one urban core area of at least 10,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.

[15] More information on *CoStar COMPS* is available at: www. http://www.costar.com/products/costar-comps.

CoStar COMPS has a separate attribute field that indicates whether the buyer, seller, or both are using the property to initiate or finalize a Section 1031 real estate like-kind exchange. *CoStar COMPS* 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 text searches of these notes, each property sale involving an exchange is placed into one of the following categories:

1. Seller's relinquished property in delayed (Starker) exchange (down leg)
2. Buyer's replacement property in delayed exchange (up leg)
3. Both seller's relinquished and buyer's replacement property in delayed exchange

The distribution of the 1,609,711 verified CoStar sale transactions over the 1997-2014 study period is displayed in Table 1. The total transaction volume associated with these sales is $4.8 trillion, unadjusted for inflation. Sales in which one or more of the parties were engaged in a like-kind exchange total 81,104, or five percent of total sales. By sales volume, exchange-related sales represent six percent of total transaction volume.

It is important to note that these percentages understate the percentage of CRE transactions that involved an exchange motivated investor. First, CoStar flags a transaction as exchange related only if it is able to independently verify that one or more of the parties were engaged in a like-kind exchange. Second, the growth in the number of CBSAs covered by CoStar expanded rapidly in 2007-2010. Much of this growth in coverage was accomplished by the purchase of competing data collection companies and it is not clear how many of the companies tracked exchange-related transactions prior to being acquired by CoStar. However, Ling and Petrova (2008) use CoStar Data from 1999 through June of 2005 in an exchange study and found that 32 percent of all apartment transactions and 20 percent of all office transactions involved an exchange. In their CoStar sample, the percentage of apartment transactions that involved an exchange in San Diego, Seattle, Oakland, San Francisco, Denver, Portland, San Jose, and Sacramento ranged from 46 percent to 65 percent. Note that the CoStar sample used by Ling and Petrova (2008) preceded the rapid growth in CoStar coverage that began in 2007.

The percentage of total CoStar sales associated with an exchange prior to 2007 ranged from seven to nine percent. Based on dollar transaction volume, this percentage ranged from six to 11 percent. During this period, CRE prices in the U.S. generally increased rapidly. For

example, according to CoStar, nominal "constant-quality" CRE prices across all U.S. property types and markets increased 103 percent from 2000Q1 to a peak in 2007Q2.[16] This steep rise in prices and potential capital gain tax liabilities increased the attractiveness of deferring capital gains through an exchange.

In contrast, nominal CRE prices declined 35 percent on average from their peak in 2007Q2 to 2011Q2. This sharp decline in market values was associated with a notable decline in the number and dollar volume of sale transactions. According to *CoStar COMPS*, CRE transaction volume plunged from $576 billion in 2007 to $128 billion in 2009, a 78 percent decline. At $520 billion, total sales volume in 2014 was still below its peak value in 2007. The number of sale transactions associated with an exchange declined more rapidly than overall transaction volume; the percentage of all transactions involving an exchange fluctuated in the one-two percent range from 2009 through 2013. The sharp widespread decline in CRE prices that began in 2007 reduced the tax benefits of disposing properties via an exchange for many investors.

The distribution of the 1,609,711 CoStar verified sale transactions by property type is displayed in Table 2. Sales of retail properties account for 26 percent of total transactions, but just 17 percent of total dollar volume. Land sales account for 20 percent of all transactions and 12 percent of dollar volume. In contrast, office sales account for 15 percent of transactions, but 28 percent of dollar volume. Similarly, sales of multifamily properties with 10 or more units represent 10 percent of all CoStar transactions but 20 percent of total dollar volume.

Twenty-three percent of the 81,104 sale transactions from 1997-2014 involving an exchange were retail properties. Multifamily properties containing 10 or more units also constitute 23 percent of all exchange related transactions, followed by office properties (14 percent), industrial properties (13 percent), and small multifamily properties (12 percent). The importance of office property exchanges is more pronounced in dollar volume of sales. Although accounting for just 14 percent of exchange transactions, office properties represent 24 percent of the dollar volume of exchanges. Large apartment exchanges also constitute a larger percentage of exchange transactions based on dollar volume. In contrast, small apartment properties account for a much smaller share of dollar volume (3 percent) than number of sales involving exchanges (12 percent) in the CoStar database.

[16] More information on CoStar price indices is available at: http://costargroup.com/costar-news/ccrsi.

Table 3 reports the percentage of CoStar transactions by property type that involved a like-kind exchange. Whether based on the number of transactions or dollar volume, multifamily properties, both large and small, are the property type most frequently acquired or disposed of with an exchange. For example, 12 percent of large multifamily transactions involved an exchange-motivated participant; the corresponding number based on dollar volume is eight percent. Similarly, 10 percent of small multifamily transactions (11 percent by dollar volume) involved an exchange. This is consistent with the widely held belief that many "small" rental housing investors make significant use of like-kind exchanges.

The middle panel of Table 3 provides additional evidence that, during the period of rising prices prior to 2008, exchanges accounted for a much larger percentage of sale transactions than after the onset of the financial and real estate crisis. For example, 16 percent of large multifamily transactions from 1997-2077 involved an exchange; this percentage declined to just five percent during 2008-2014. During the earlier sub-period, eight percent of office transactions involved an exchange; this percentage plunged to two percent during the 2008-2014 period. Similarly, the percentage of retail transactions associated with an exchange decreased from seven percent during the first sub-period to two percent during the 2008-2014 period.

Clearly the motivation for engaging in a like-kind exchange is highly correlated with recent property price appreciation. However, the use of real estate like-kind exchanges varies significantly by state and metropolitan area. The first four columns in Table 4 display the distribution of all 1,609,711 CoStar transactions by CBSA. The remaining four columns contain the corresponding CBSA distribution of our 81,104 exchange-related transactions. The LA-Long Beach-Anaheim CBSA accounts for eight percent of all transactions; nine percent based on dollar volume. However, 19 percent of all exchanges in the CoStar database occurred in the LA-Long Beach-Anaheim CBSA (16 percent based on dollar volume). Thus, the LA-Long Beach-Anaheim CBSA is disproportionately represented in our exchange sample. The percentage of the 81,104 exchange-related transactions in the San Francisco-Oakland-Hayward, Seattle-Tacoma-Bellevue, and San Diego-Carlsbad CBSA is also disproportionately large relative to the total transaction activity in these CBSAs.

The percentage of all CoStar exchanges that occurred in each state is displayed in Table 5. California clearly dominates our sample of exchange transactions as 46.5 percent of all CoStar-verified exchanges occurred there. Based on dollar transaction volume, California accounts for 39.7 percent of all exchange transactions. High marginal state tax rates in

California contribute to the widespread use of exchanges. The state of Washington accounts for 9.1 percent of all exchange transactions; 7.3 percent based on dollar transaction volume. The next three most active states by percentage of exchange transactions are also Western states: Colorado, Oregon, and Arizona. Although our sample of 81,104 exchanged-related transactions is disproportionately weighted toward California CBSAs, it is clear from Tables 4 and 5 that real estate like-kind exchanges are used throughout the U.S.

The impact of exchange-motivated buyers and sellers on negotiated transaction prices is likely to vary over time and by local market. For example, exchange motivated buyers are more likely to affect negotiated prices if exchanges are frequently used in the local market. Table 6 is constructed to provide more information on the importance of real estate like-kind exchanges in the major CBSAs. To do so, the number (dollar volume) of exchange-related transactions in each MSA is divided by the total number (dollar volume) of Costar transactions in that CBSA.

Eighteen percent of all Costar transactions recorded in the Portland-Vancouver-Hillsboro CBSA involved an exchange-motivated investor. The corresponding percentages for the San Diego-Carlsbad, Seattle-Tacoma-Bellevue, Santa Rosa, San Francisco-Oakland-Hayward, and LA-Long Beach Anaheim CBSAs range from 12 percent to 17 percent. Although not separately tabulated, these percentages are significantly higher prior to the onset of the financial crisis in 2008. Six of the seven remaining CBSAs with exchange percentages greater than eight percent are located in California or Colorado. In contrast, the average exchange percentage across all CBSAs is five percent. Similar patterns emerge when CBSA exchange percentages are based on dollar sales volumes. Table 7 reports the percentage of CoStar verified sales in each state that involved an exchange. Based on both the number of sales and dollar transaction volumes, Oregon taxpayers make the most frequent use of like-kind real estate exchanges. In Washington state, 15.0 percent of the transactions included an exchange, followed by California (11.6%), Nevada (8.6%), Utah (8.5%), and Colorado (8.4%). It is clear from Tables 6 and 7 that the use of exchanges in Western cities and states is more widespread than in other parts of the country.

Real Capital Analytics (RCA; rcaanalytics.com) also collects detailed information on commercial real estate sales, refinancings, and foreclosures in its proprietary property transaction database. RCA tracks all transactions involving a sale price in excess of $2.5 million and attempts to determine whether the buyer or seller are initiating or completing a like-kind exchange. Data are available from RCA for 2001-2014. Many exchange transactions

involve properties with sale prices less than $2.5 million. Thus, relative to CoStar, we expect a smaller percentage of RCA transactions involved the use of an exchange. Overall, 1.9 percent of RCA's transactions were known to involve an exchange; based on dollar sales volume the percentage is 2.1 percent. However, similar to the CoStar data, the CBSAs in which the use of exchanges is most common are largely located in the West and Southwest. More specifically, the 10 CBSAs with the highest percentage of exchange-related sales include Seattle, Portland, Phoenix, Tucson, Denver, Colorado Springs, "All Other" CBSAs in the Northwest, and "All Other" CBSAs in the Southwest.

Evidence from IRS Data

Taxpayers making use of a like-kind exchange in a given tax year must include a completed Form 8824 with their federal tax return.[17] This information is compiled and distributed by the U.S. Treasury. Table 8 summarizes select aggregated information from Form 8824 for 2005-2011. The fair market value (FMV) of all like-kind property received by individual, corporate, and partnership taxpayers disposing of property in a like-kind exchange totaled $70.8 billion in 2011 (Form 8824, line 17). The average over the 2005-2011 period is $139.2 billion. The receipt of this property generates a realized gain or loss for the taxpayer (Form 8824, line 19). The amount of the realized gain subject to taxation (recognized) in the year of the exchange is equal to the realized gain minus the deferred gain. The total amount of deferred gains on like-kind exchanges (Form 8824, line 24) was $33.7 billion in 2011.

Total deferred gains reported annually by the Treasury include deferred gains on exchanges involving vehicles and equipment used in agriculture, mining, construction, manufacturing, and other industries, in addition to real estate. The majority of like-kind exchange transactions, based on dollar amount, are performed by corporations, accounting for 61 percent Form 8824s filed in 2011. However, the Treasury has limited information about the share of exchanges that involved real property. For individual taxpayers, the most recent data on the distribution of like-kind exchanges across industries dates back to 2007.[18] These data indicate that 66 percent of all exchanges in 2007 involved real property assets.[19] Given that

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[17] Form 8824 is available at http://www.irs.gov/pub/irs-access/f8824_accessible.pdf. Information about Form 8824 and its separate instructions can be found at www.irs.gov/form8824.

[18] According to a letter from the Joint Committee on Taxation (JCT) to Congressman Renacci dated December 2, 2014, the JCT expects to receive 2012 data on the use of exchanges by industry sometime in 2015.

[19] See page 3 of "The Tax Treatment of Like-Kind Exchanges," Office of Tax Analysis, U.S. Department of the Treasury, 2014.

2007 was at or near the height of the CRE price boom, this 66 percent share likely overstates the percentage of real estate exchanges in more recent tax years. Nevertheless, we use 66 percent as an upper bound in our estimation of the dollar amount of deferred gain from exchanges attributable to the real estate industry. As displayed in Table 8, this assumption implies deferred real estate gains totaled $22.2 billion in 2011 and averaged $43.1 billion from 2005-2011. If we instead assume the real estate industry accounts for 30 percent of total deferred gains (bottom panel of Table 8), deferred real estate gains would have totaled $10.1 in 2011 and averaged $19.6 billion from 2005-2011.

The deferred gains reported in Form 8824 are only the starting point for estimating the true cost of real estate exchanges to the U.S. treasury. We estimate that deferred real estate gains in 2011 would have been taxed at an average federal rate of 21 percent in a fully-taxable sale.[20] This assumption implies the total dollar amount of deferred real estate tax liabilities was at most $4.7 billion in 2011 and averaged $9.1 billion from 2005-2011 assuming deferred gains from the real estate industry were 66 percent of the total reported each year by the Treasury. If deferred gains from real estate were 30 percent of the total, the total dollar of deferred tax liabilities was just $2.1 billion in 2011 with an average of $4.1 billion from 2005-2011. However, even these estimates significantly overstate the true cost of tax deferred real estate exchanges to the Treasury because they do not incorporate an estimate of the higher future taxes that will be collected subsequent to the exchange due to smaller annual tax depreciation deductions. Moreover, these estimates do not incorporate the higher capital gain and depreciation recapture taxes that will be paid on the sale of the replacement property in a fully taxable sale. Our analytical model of the net tax benefits of CRE exchanges incorporates these important future tax impacts and allows us to estimate the economic loss to the Treasury reported in Table 8.

Estimating the Magnitude of Exchange Tax Benefits

If a taxpayer successfully completes a simultaneous, delayed, or reverse exchange, all or a portion of the realized taxable gain 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 the taxpayer receives unlike kind property (i.e., "boot"). The present value of income tax deferral is therefore a

[20] This is the weighted average of an assumed 20 percent capital gain tax rate and a 25 percent depreciation recapture tax rate.

function of the magnitude of the deferred capital gain, the expected length of time before the replacement property is disposed of in a fully taxable sale (if ever), and the applicable discount rate.

All else equal, taxpayers should exchange into the replacement property if the present value of the exchange strategy exceeds the present value of the sale-purchase strategy. The incremental net present value (NPV) of the exchange strategy is fully developed analytically in the Appendix. However, the incremental NPV of an exchange, $INCNPV_t$, can be summarized as follows:

$INCNPV_t$ = *deferred tax liability in year t*

– *reduced PV of annual depreciation deductions*

– *increased depreciation recapture tax on taxable sale of replacement property*

– *increased capital gain taxes on a taxable sale of replacement property* (1)

The first term in the above expression captures the immediate net benefit of tax deferral. It is this benefit that is often the focus of discussion concerning the tax advantages of real estate like-kind exchanges. However, the value of immediate tax deferral is significantly offset by three disadvantages of using an exchange to acquire a replacement property instead of a taxable sale-purchase strategy. The first disadvantage is that the tax basis in the replacement property is set equal to the taxpayer's basis in the relinquished property (i.e., the "exchange" basis), plus net boot paid.[21] Moreover, the exchange basis carried forward from the relinquished property is depreciated over the remaining cost recovery period of the relinquished property. This ensures that the annual depreciation deduction on the replacement property is equal to the deduction that would be taken had the taxpayer maintained ownership of the relinquished property. If nominal price appreciation has occurred since the acquisition of the relinquished property, the annual depreciation deduction after the exchange is less than it would be in a sale-purchase, all else equal. The second term in equation (1) captures the cumulative present value of the foregone depreciation deductions under an exchange over the expected holding period of the replacement property.

If no boot is paid to acquire the replacement property, the depreciation recapture portion of the total gain on a fully taxable sale of the replacement property is equal to the amount of

[21] Equivalently, the tax basis the replacement property is equal to the value of the replacement property minus the amount of the taxable gain deferred by the exchange. Note that to the extent an exchange is more costly to execute than a fully taxable sale, the additional cost of the exchange must be netted against the positive deferral benefits.

depreciation recapture income originally deferred by the exchange plus the tax depreciation deducted since the exchange.[22] Although the annual depreciation deduction taken after the exchange is lower than what would be allowed had a sale-purchase strategy been employed to acquire the replacement property, depreciation recapture income when the replacement property is disposed of in a fully taxable sale will generally be larger than with a sale-purchase strategy due to the deferred recapture income.[23] This increased depreciation recapture tax under an exchange, represented by the third term in equation (1), reduces the incremental benefit of an exchange.

Finally, because the deferred gain associated with an exchange reduces the tax basis in the replacement property on a dollar-for-dollar basis, the taxable capital gain due on the disposition of the replacement property in a fully taxable sale will be larger with an exchange relative to a sale-purchase strategy. The negative effect of the increased capital gain tax liability on the incremental NPV of an exchange is captured by the fourth term in the equation (1).

Equation (A1) in the appendix, summarized by equation (1) above, is used to estimate the magnitude of the incremental NPV of an exchange, $INCNPV_t$, under a number of plausible assumptions. Simulated values of $INCNPV_t$ are then divided by (1) the price of the relinquished/replacement property; (2) the deferred taxable gain in the year of the exchange; and (3) the deferred tax liability to determine the economic magnitude of exchange tax benefits. These simulations are intended to quantify the magnitude of tax revenue forgone by the U.S. Treasury and the maximum benefits taxpayers can obtain from a real estate like-kind exchange.

Model Assumptions

Before calculating the magnitude of the exchange benefit under different assumptions, we first calculate the magnitude of the deferred gain. This amount is comparable to the deferred gain on an exchange reported by the taxpayer on line 24 of Form 8824. To numerically solve for the realized gain, the taxes due with a fully-taxable sale, the deferred gain, and the incremental NPV of an exchange, the following base-case assumptions are employed:

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[22] This ignores potential complications that arise if some of the depreciable basis consists of personal property.

[23] If the holding period of the replacement property is sufficiently long relative to the holding period of the relinquished property, it is possible for depreciation recapture income under the sale-purchase strategy to be greater than under an exchange strategy.

- Price of relinquished and replacement property are equal
- Mortgage debt: same for relinquished and replacement property
- Selling cost of a fully taxable sale: 3 percent of the relinquished property's sale price
- Exchange costs: equal to selling costs of a fully taxable sale
- Ordinary income tax rate: 39.6 percent
- Depreciation recapture tax rate: 25 percent
- Capital gain tax rate: 23.8%
- After-tax discount rate: 6 percent
- Non-depreciable land portion of the relinquished and replacement property's original tax basis: 20 percent (no personal property)
- Relinquished and replacement property are both non-residential real property

We assume for simplicity that the nominal price (value) of the replacement property is equal to the price of the relinquished property and that the remaining mortgage balance on the relinquished property is equal to the amount of debt used to finance the replacement property. These assumptions allow us to abstract from the effects unequal equity positions would have on deferred gains, depreciation deductions, and the taxes due on sale when the replacement property is disposed of in a fully taxable sale. The basis of non-residential real property is depreciated on a straight-line basis over 39 years. The analysis is also performed on residential income property, which is depreciated on a straight-line basis over 27.5 years.[24]

The other key assumptions in the quantification of deferred gains and net exchange benefits are (1) the discount rate (2) the number of years since acquisition of the relinquished property ($HOLD^1$), (3) the annualized rate of nominal price appreciation since acquisition of the relinquished property (π^1), and (4) the expected holding period of the replacement property ($HOLD^2$). An after-tax discount rate of six percent is initially assumed to value the incremental tax benefits of an exchange relative to a sale/purchase strategy. It is important to note that this rate is not intended to reflect the riskiness of an equity investment in commercial real estate, including uncertainty about future rents, operating expenses, and

[24] An income-producing property is considered a "residential" property for income tax purposes if at least 80 percent of the gross rental income is derived from the leasing of nontransient dwelling units (hotels and motels are not residential property). The real property associated with mixed-use properties may be depreciated over a 27½-year recovery period so long as the rental income from the retail and/or office tenants does not exceed 20 percent of total rental income.

resale prices. These operating and sale cash flows will not vary with the choice of disposition strategy because under both strategies the taxpayer is assumed to acquire the same (replacement) property. Therefore, the discount rate needs only to capture uncertainty about the relative tax savings of an exchange, which are arguably more certain than the changes in rents and sale prices. We examine the sensitivity of our results to changes in the assumed discount rate.

Deferral Benefits as a Percentage of Price

To quantify the economic significance of the incremental NPV from an exchange, we first divide the incremental NPV by the dollar value of the relinquished and replacement property. Figure 2 presents our base-case results for nonresidential real property. Figure 2A displays the tax savings assuming the relinquished property was acquired five years ago. The three curves in Figure 2A capture the NPV of the tax savings assuming the price of the relinquished property has increased by three percent, six percent, and nine percent, respectively, since its acquisition. One pattern is especially noteworthy: the incremental value of an exchange is unambiguously positively related to the holding period of the relinquished property. For example, assuming $HOLD^1$ = 5, $HOLD^2$ = 5, and π^1 = 6 percent, $INCNPV_t$ is equal to 1.2 percent of the value of the relinquished property. As $HOLD^1$ increases to 10 (Figure 2B), the value of tax deferral assuming $HOLD^2$ = 5, rises from 1.2 percent to 2.1 percent. Assuming $HOLD^1$ = 20 (Figure 2D), the value of tax deferral increases further to 3.3 percent. In short, the relative attractiveness of the exchange strategy is unambiguously positively related to the magnitude of the accumulated gain on the relinquished property. The relation between $INCNPV_t$ and π^1 for a given $HOLD^1$ is also positive. For example, assuming $HOLD^1$ = 5, increased price appreciation prior to the exchange produces small but consistent increases in $INCNPV_t$.

All else equal, the value of tax deferral relative to price increases with the expected holding period of the replacement property. However, Figures 2A-2D indicate that *INCNPVt* increases with $HOLD^2$, but at a decreasing rate. Overall, the benefits of tax deferral range from 0.5 percent to 10.4 percent of property value.

It is clear from Figure 2 that the incremental value of an exchange increases with the holding period of the relinquished property and the rate of price appreciation on the relinquished property. However, the value of tax deferral rarely exceeds eight percent of property value even if the replacement property is assumed to be held for over 30 years before being disposed in a fully taxable sale. This is because of two directly offsetting effects. The

immediate value of tax deferral increases as the holding period of the relinquished property and/or the rate of price appreciation on the relinquished property increases. However, such increases also reduce the tax basis in the replacement property relative to what it would be with a sale/purchase strategy. This, in turn, reduces the allowable depreciation deduction relative to a sale/purchase strategy. This offsetting loss in the value of depreciation deductions going forward significantly limits the value of tax deferral.

Our base-case assumptions can also be used to calculate the incremental internal rate of return (IRR) on the exchange strategy. Although not separately tabulated, these incremental IRRs range from 0.76 percent to 1.76 percent, with a mean of 1.14 percent, using our base-case assumptions. These seemingly low incremental IRRs result from the negative effects of "taking your old basis with you" into the replacement property, a disadvantage often overlooked in discussions of like-kind exchanges.

Exchange Benefits as a Percentage of Deferred Gains

We next divide the incremental NPV of an exchange by the magnitude of the deferred gain. This allows us to better understand the net tax benefits of the exchange to the taxpayer and the true cost to the Treasury relative to the magnitude of the deferred gain reported by the taxpayer on line 24 of Form 8824. Figure 3 presents our base-case results for non-residential real property. Figure 3A displays the tax savings under the assumption that the relinquished property was placed in service five years ago. The three curves in Figure 3A capture *INCNPVt* assuming the price of the relinquished property has increased by three percent, six percent, and nine percent, respectively, since its acquisition. If the replacement property is subsequently sold in a fully-taxable sale two years after being acquired in an exchange and its nominal price has increased three percent annually over that two year period, *INCNPVt* as a percentage of the deferred gain at the time of the exchange is just 2.2 percent. *INCNPVt* increases at a decreasing rate as the holding period of the replacement property ($HOLD^2$) increases from 2 to 34 years. By year 34, the relative value of the tax savings has increased from 2.2 percent to 15.3 percent of the deferred gain. Beyond 34 years, *INCNPVt* decreases slightly.[25]

[25] As the holding period of the replacement property increases, the present value of the increased taxes due on sale associated with a fully taxable sale of the replacement property decrease. In contrast, the present value of the reduced depreciation tax savings associated with the exchange increases as the holding period of the replacement property increases. In fact, by year 34, the depreciation deductions on the replacement property would have been exhausted, if the relinquished property had been held for five years. This reflects the remaining 34-year cost recovery period on this nonresidential property in the year of the exchange (39-5), minus the 34 years of depreciation subsequent to the exchange.

As the assumed rate of price appreciation over the five years since the acquisition of the relinquished property increases to six percent, the incremental NPV of the exchange increases for every holding period of the replacement property. However, the magnitude of the deferred gain also increases with increased price appreciation. As a result, $INCNPV_t$ as a percentage of the deferred gain does not increase with π^1; in fact, the ratio of $INCNPV_t$ to the deferred gain actually declines slightly as π^1 increases.

Overall, the data displayed in Figures 3A-3D allow us to put into context the magnitude of the deferred gains associated with real estate like-kind exchanges reported by the Treasury. First, the incremental benefit of an exchange to taxpayers and the cost to the U.S. Treasury in forgone taxes, as a percentage of the investor's deferred gain is largely insensitive to the length of time the relinquished property has been held by the taxpayer. $INCNPV_t$ scaled by the deferred gain actually decreases slightly as the amount of price appreciation realized by the relinquished property increases. However, $INCNPV_t$ increases as the length of time the replacement property is held before sale increases. More specifically, we find that $INCNPV_t$ (as a percentage of the deferred gain) ranges from approximately 2 percent to 15 percent. Clearly the application of a tax rate to the total amount of deferred gains reported on line 24 of Form 8824 dramatically overstates the benefits of exchanges to taxpayers and the true cost to the U.S. Treasury.

Exchange Benefits as a Percentage of Deferred Tax Liabilities

The initial cost to the Treasury of an exchange relative to a fully-taxable sale is the dollar amount of the deferred tax liability, not the deferred gain. As discussed above, in most situations the deferred gain on real property has two components: the portion of the taxable gain due to nominal price appreciation that is taxed at capital gain rates and the portion due to the use of straight-line depreciation that is taxed at depreciation recapture rates. Thus, the deferred tax liability is generally equal to the deferred gain times a weighted average of the taxpayer's capital gain and deprecation recapture tax rates. However, as discussed above, the value of immediate tax deferral is significantly offset by lower depreciation deductions as a result of the basis carry-forward and larger depreciation recapture and capital gain income when the replacement property is disposed of in a fully taxable sale. The true economic benefit to the exchanger (and cost to the Treasury) is therefore equal to the deferred tax liability minus the present value of reduced depreciation deductions minus the present value of increased taxes due on the disposition of the replacement property in a fully taxable sale.

Figure 4 presents our base-case results for non-residential real property. Figure 4A displays $INCNPV_t$ as a percentage of the deferred tax liability assuming the relinquished property was placed in service five years ago. If the replacement property is sold in a fully-taxable sale two years after being acquired in an exchange and its nominal price has increased three percent annually over that two-year period, the NPV of tax savings is 9.6 percent of the deferred tax. Said differently, the present value of increased taxes is equal to 90.4 percent (100%-9.6%) of the deferred tax liability. $INCNPV_t$ as a percentage of the deferred tax increases at an increasing rate as the holding period of the replacement property ($HOLD^2$) increases. For holding periods greater than 26 years, $INCNPV_t$ is equal to 60 percent of the deferred tax liability. However, $INCNPV_t$ as a percentage of the deferred tax decreases as price appreciation over $HOLD^1$ increases. Figures 4B-4D display $INCNPV_t$ as a percentage of the deferred tax assuming $HOLD^1$ equals 10, 15, and 20 years, respectively. It is important to note that the incremental benefit of an exchange continues to vary little in response to changes in $HOLD^1$ and π^1. However, $INCNPV_t$ does increase with $HOLD^2$, although at a decreasing rate.

Sensitivity to the Assumed Discount Rate

From the perspective of the taxpayer, the tax deferral benefit produced by an exchange is immediate. In contrast, the foregone depreciation deductions and the increased future capital gain and depreciation tax liabilities occur in subsequent years. Thus, the present value of these future exchange costs is reduced by a higher discount rate. To examine the sensitivity of our results to higher discount rates, we repeat the analysis using an eight percent discount rate in place of the six percent base-case rate. We then subtract the incremental NPVs using an eight percent discount rate from the corresponding six percent $INCNPV_t$ holding constant the rest of our base-case assumptions.

Figure 5 presents these differences for non-residential real property. The increase in tax savings as a percentage of the deferred tax liability associated with the use of an eight percent discount rate increases at an increasing rate as $HOLD^2$ increases. For example, if $HOLD^2 = 8$, the increase in NPV is 8.8 percentage points assuming $HOLD^1=5$ (Figure 5A). For holding periods greater than 11 years, the increase in the relative NPV of tax savings exceeds nine percent. Thus, the use of a higher discount rate increases the maximum benefits of an exchange strategy from approximately 60 percent to 70 percent of the deferred tax liability. In contrast, a discount rate less than six percent unambiguously reduces the incremental NPV of an exchange strategy to the taxpayer. Figures 5B-5D reveal that changes in relative $INCNPV_t$ from a higher discount rate are largely insensitive to changes in $HOLD^1$ and π^1.

Residential versus Nonresidential Real Property

Residential real estate, including large apartment complexes and small rental properties, may be depreciated on a straight-line basis over 27.5 years rather than 39 years. All else equal, this more rapid depreciation increases the amount of depreciation recapture income subject to tax at sale and thereby increases the immediate benefit of tax deferral from an exchange. However, this increased depreciation benefit is significantly offset by the decreased tax depreciation associated with the carry-forward of basis and depreciation deductions into the replacement property.

Figure 6 presents our results for residential real property with the same set of tax rate assumptions used for nonresidential property. Figure 6A displays $INCNPV_t$ as a percentage of the deferred tax liability assuming the relinquished property was placed in service five years ago. If the replacement property is sold in a fully-taxable sale two years after being acquired in an exchange and its nominal price has increased by three percent annually over that two-year period, the NPV of tax savings is 9.3 percent. Equivalently, the present value of increased taxes is equal to 90.7 percent (100%-9.3%) of the deferred tax liability. $INCNPV_t$ as a percentage of the deferred tax liability increases at an increasing rate as $HOLD^2$ increases. For example, if $HOLD^2$ = 23, $INCNPV_t$ is 53.0 percent of the deferred tax liability. For holding periods greater than 23 years, $INCNPV_t$ decreases slightly.

Figures 6B-6D display incremental exchange NPVs assuming $HOLD^1$ equals 10, 15, and 20 years, respectively. All else equal, $INCNPV_t$ as a percentage of the deferred tax liability decreases as the amount of price appreciation realized on the relinquished property increases. This is because the NPV of tax savings increases with π^1 but the rate of increase in the deferred tax liability produced by the increased price appreciation is also larger. As with nonresidential property, $INCNPV_t$ as a percentage of the deferred tax liability generally increases with $HOLD^2$ and ranges from 8.0 percent ($HOLD^1$=20; π^1=9%; $HOLD^2$=2) to 53.0 percent ($HOLD^1$=5; π^1=3%; $HOLD^2$=23).

Estimated Loss in Treasury Revenue

As discussed above, the most recent data on the distribution of like-kind exchanges across industries is from 2007, which indicate that 66 percent of all exchanges in 2007 involved real property assets. As displayed in Table 8, this assumption implies deferred real estate gains totaled $22.2 billion in 2011. If we assume the real estate industry accounted for 30 percent of total deferred exchange gains, deferred real estate gains would have totaled just $10.1 in 2011. Assuming that deferred real estate gains in 2011 would have been taxed at an average

federal rate of 21 percent in a fully-taxable sale implies the total dollar of deferred real estate tax liabilities was at most $4.7 billion in 2011. However, if deferred gains from real estate exchanges were 30 percent of the total, the dollar amount of deferred tax liabilities from real estate exchanges was just $2.1 billion in 2011.

Although significantly less than the Form 8824 deferred gains reported by the Treasury, these deferred tax liabilities estimates nevertheless overstate the true cost of tax deferred real estate exchanges to the Treasury because they do not incorporate income tax consequences subsequent to the year of the exchange. As displayed in Figure 4, given the range of assumptions for $HOLD^1$; π^1; *and* $HOLD^2$, the incremental value of an exchange strategy as a percent of the deferred tax liability using our base-case assumptions ranges from a low of 9.2 percent to a high of 64 percent, assuming both the relinquished and replacement property are non-residential.

Assuming deferred gains from real estate account for 66 percent of the total reported by Treasury in 2011, this implies that the static present value of lost tax revenue from exchanges ranged from a low of $0.4 billion to a high of $3.0 billion (see the middle panel of Table 8). Over the 2005-2011 period, we estimate that the minimum, average, and maximum annual revenue loss to the Treasury with these assumptions to be $0.8 billion, $4.1 billion, and $5.8 billion, respectively. If deferred real estate gains represent 30 percent of the total reported by Treasury in 2011, the static present value of lost tax revenue from exchanges ranged from a low of $0.2 billion to a high of $1.4 billion. The minimum, average, and maximum estimated annual loss to the Treasury during 2005-2011 equals $0.4 billion, $1.9 billion, and $2.6 billion, respectively. These estimated average static revenue losses are a small fraction of the average total deferred gain of $65.4 billion reported by the Treasury over the 2005-2011 period.

However, it is important to emphasize that our estimates of lost Treasury revenue for 2005-2011 assume taxpayers would have disposed of their properties in fully-taxable sales even in the absence of the option to exchange. Our static estimates of forgone Treasury revenue are therefore inflated as many investors would have delayed disposing of their properties if a tax-deferred exchange were not available. According to the JCT staff, the tax expenditure estimate for like-kind exchanges is $98.6 billion over five years.[26] However, this estimate does not capture likely taxpayer responses to elimination of exchanges. The JCT's

[26] Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2014-2018, (2014), August 5, page 26.

revenue estimate from elimination, which does take into account behavioral responses such as delaying transactions, is just $9.3 billion over the five year period from 2015 – 2019.[27]

Estimating the Effects of Elimination of Like-Kind Exchanges in Real Estate on Property Values and Rents

A tool frequently employed to analyze the impact of tax reform upon real estate markets is the "typical project model." This discrete-time model measures and values cash flows to the equity investor(s) after all operating, finance, and tax expenses (savings) have been paid. In one application to proposed or actual tax changes, the model solves for the current price that equates the marginal investor's expected net present value to zero under both old and new tax law parameters. The short-run effect of the tax law change on property values is estimated as the percentage change in the marginal investor's maximum bid price (value). This effect can be calculated holding all other assumptions constant; alternatively, expected general equilibrium effects of the tax law change, such as changes in the level of economy-wide interest rates, can also be included in the estimated effects.[28]

The equity investor's annual cash inflows and outflows associated with the acquisition of an existing commercial property can represented by the following expression:

$$V_0 = \sum_{t=1}^{n} \frac{(R_t - OE_t)(1-\tau_{OI})}{(1+k)^t} + \sum_{t=1}^{n} \frac{DEP_t \tau_{OI}}{(1+k)^t} - \sum_{t=1}^{n} \frac{CAPX_t}{(1+k)^t} + \frac{P_n(1-SC_n) - TDS_n}{(1+k)^n}$$

$$L_0 - \frac{L_n}{(1+k)^n} - \sum_{t=1}^{n} \frac{PMT_t}{(1+k)^t} + \sum_{t=1}^{n} \frac{INT_t \tau_{OI}}{(1+k)^t}. \qquad (2)$$

V_O is the present value of the expected after-tax cash flows to the marginal investor at time "zero." R_t and OE_t are, respectively, expected gross rental income and deductible operating expenses in year t. Annual rental income net of operating expenses is taxed at the investor's marginal ordinary rate, τ_{OI}. DEP_t is the annual depreciation deduction and $DEP_t \tau_{OI}$ captures the annual tax savings associated with these deductions. $CAPX_t$ represents expected capital expenditures in year t. Unlike operating expenses, capital expenditures are defined as cash

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[27] "Estimated Revenue Effects of the Tax Reform Act of 2014", Joint Committee on Taxation, February 26, 2014.

[28] The project model approach is "partial equilibrium" in nature because tax-induced changes in market interest rates and risk premiums, for example, are determined exogenously. A general equilibrium approach would treat real estate as just one of many capital and financial assets in the national economy (see, for example, Hendershott and Won, 1992, and Goulder, 1989). Follain, Hendershott, and Ling (1987) discuss the relative advantages and disadvantages of the two approaches.

outflows that increase the market value of the property. Such expenditures are not deductible against ordinary income in the year in which they are incurred; rather, they are added to the property's tax basis and then systemically expensed through annual depreciation deductions.

The fourth term in equation (2) represents the present value of the after-tax cash flows from sale of the property in year n calculated before repayment of the outstanding mortgage balance. The market value of the property is expected to increase to P_n over the n-year holding period, at which time proportional selling costs equal to SC_n will be incurred. Taxes due on sale in year n (TDS_n) are projected to be:

$$TDS_n = \frac{[P_n(1-SC_n)-P_O]\tau_{CG}+[P_O-\sum_{t=1}^{n}DEP_t]\tau_{DR}}{(1+k)^n}.$$

The difference between the selling price in year n net of expenses and the original price of the property, P_o, is the expected nominal price appreciation that will be taxed at the investor's marginal capital gain tax rate, τ_{CG}, assuming a holding period of at least one year. The portion of the positive gain on sale that results from cumulative depreciation deductions $[P_O-\sum_{t=1}^{n}DEP_t]$ is taxed at the investor's marginal depreciation recapture tax rate, τ_{DR}.

The remaining four terms in equation (2) capture the cash flow effects of debt financing. L_o represents the initial amount of the mortgage loan and L_n the expected remaining mortgage balance at sale. The two sums are the present value of mortgage payments (including principal amortization) and the present value of tax savings from mortgage interest deductions, respectively.

A change in tax law that increases the taxation of CRE investments will, at least in the short-run, reduce the prices investors are willing to pay per dollar of first-year (in-place) net rental income, holding constant their required rate of return. These price reductions are necessary in competitive asset markets to offset the increased tax burden. If property values in a local market fall below the cost to replace the property with new construction as a result of the negative change in tax law, some combination of reduced construction, growth in the demand for leasable space, and the steady obsolescence of the existing rental stock are required to push market rental rates back to their equilibrium level. Only then will developers be able to recover construction costs from the sale of new properties and thereby earn a rate of return comparable to what might be earned on alternative investment of similar risk. To the

extent investors anticipate these tax-induced increases in real rents in subsequent years, investment values will decline less than the amount needed to fully offset the negative tax changes.

If the supply of space could instantaneously adjust to changes in tax law, current rents in a competitive rental market would always result in equality between property values and replacement construction costs. The project model depicted in equation (2) can also be used to solve for this required long-run increase in market rents, and therefore capitalization rates, required to offset the elimination of real estate like-kind exchanges. This is analogous to calculating the change in the user cost of capital (rent/price ratio) induced by the tax change. The estimated impact of the change in tax law is obtained by comparing the equilibrium level of rent under current law to that required after the elimination of like-kind exchanges. In this computation, real estate value is assumed to equal its presumably unchanged construction (replacement) cost.

Model Assumptions

We first use the project model to estimate the reductions in after-tax internal rates of return and increases in effective tax rates (ETRs) that would be produced by the elimination of like-kind exchanges, holding other assumptions constant. We then estimate the required reductions in CRE values/prices. We focus first on nonresidential properties, such as office, industrial, and retail properties, which are currently depreciated on a straight-line basis over 39 years. We also provide a separate analysis of multifamily (apartment) properties.

The first step in the parameterization of the project (user cost) model is the assumption of the equilibrium capitalization rate. The cap rate is defined as the property's estimated net operating income (NOI) in the first year after acquisition (R_t - OE_t, - $CAPX_t$), divided by the acquisition price (value). According to a survey of CRE investors, lenders, fee appraisers, and managers conducted by the Real Estate Research Corporation (RERC) in the fourth quarter of 2014, cap rates on "first tier" office, industrial, and retail properties averaged 7.25 percent.[29] We therefore use 7.25 percent as our base-case equilibrium cap rate for commercial CRE.

[29] These cap rate results are from the *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 27. The *Real Estate Report* is published quarterly by the Real Estate Research Corporation. The survey results summarize information on current investment criteria, such as acquisition cap rates, required rates of return on equity, and expected holding periods from a sample of participants in the CRE market. "First-tier" investment properties are defined by RERC as new or newer quality construction in prime to good locations. These properties are considered a notch below the quality of the highest quality (class A) properties typically desired by institutional investors, such as pension and endowment funds, and therefore have higher average cap rates. For more information, see http://store.rerc.com/collections/real-estate-report.

Additional required assumptions include the expected holding period of the marginal investor, the expected rate of growth in rental rates, and the required return on equity. Based on the 4th quarter 2014 RERC survey, we assume the marginal (typical) investor in existing CRE assets expects to hold the property for nine years, expects gross rental income and operating expenses to increase 2.8 percent annually, and requires an 8.75 percent unlevered, before-tax, internal rate of return on such investments.[30]

The acquisition price is assumed to be financed with 35 percent equity and 65 percent debt. According to a survey conducted in the first quarter of 2015 by realtyrates.com, interest rates on fixed-rate permanent financing for industrial, office, and retail properties averaged 5.00 percent, 5.38 percent, and 5.14 percent, respectively. We use an average of these three rates, or 5.17 percent, as our base-case mortgage interest rate. Loan payments are assumed to be made monthly. According to the results of the 2015Q1 realtyrates.com survey, amortization periods for fixed-rate CRE loans averaged 26 years. For simplicity, we also assume a loan term of 26 years and no up-front financing fees or expenses. The levered, after-tax, equity discount rate (k in equation (2)) implied by these assumptions is 10.78 percent, which we round to 11.00 percent.[31]

Vacancy and collection losses are assumed to equal five percent of gross rental income. Operating expenses and capital expenditures in the first year of operations consume 41 percent and five percent, respectively, of effective gross income (gross income minus vacancy). For simplicity and comparability across property types, we assume "gross" leases in which the owner pays all operating expenses. Based on the 4th quarter 2014 RERC survey,[32] we assume gross rental income and operating expense are expected to grow 2.8 percent per year. Annual capital expenditures are expected to increase 4.6 percent per year.

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[30] See RERC's *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 27. The 8.75 percent is a simple average of the required unlevered returns on office, industrial, and retail properties.

[31] The unlevered, before tax, return of 8.75 percent obtained from the most recent RERC survey is a weighted-average of the before-tax mortgage interest rate and the levered before-tax required return on equity, k^{BT}; that is, $8.75\% = 0.65(5.15\%) + 0.35(k^{BT})$. Solving for k^{BT} produces a levered before-tax required return on equity of 15.40 percent. The effective tax rate on a CRE investment is a weighted average of the ordinary tax rate, the capital gain tax rate, and the depreciation recapture tax rate. This weighted average will be influenced by the expected holding period of the investment and the amount of nominal price appreciation expected over the holding period. With an eight year holding period, the effective tax rate averages 30 percent over a number of simulations. With an effective tax rate of 30 percent, the required levered, after-tax, equity discount rate (k) is $10.78\% = (1-0.30)15.40\%$, which we round to 11.00 percent.

[32] See RERC's *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 10.

It is standard practice in CRE markets to estimate the selling price in year *n* by dividing the property's net operating income in year *n*+1 by an assumed going-out (terminal) cap rate. To reflect the economic depreciation and functional obsolescence that will likely occur after the property is acquired, the terminal cap rate for stabilized properties is typically assumed to be 50-100 basis points greater than the cap rate at acquisition. According to RERC's 4th quarter 2014 survey results, the terminal cap rate on first-tier industrial, office and retail properties is, on average, 63 basis points higher than the average going-in cap rate.[33] We assume this average cap rate differential applies to RERC's nine-year expected holding period. We therefore assume the going-out cap rate increases seven basis point per year (63/9) from the going-in rate of 7.25 percent. This produces a terminal cap rate in year nine that is 63 basis point greater than the going-in rate, which is consistent with the differential observed in the latest RERC survey.[34]

We assume land represents 20 percent of the acquisition price. Thus, 80 percent of the acquisition price is real property depreciable over 39 years using straight-line depreciation.[35] Finally, we assume the marginal investor in this market faces a combined federal and state tax rate of 39.6 percent on ordinary income. However, the investor expects to dispose of the property with a like-kind exchange and to use an exchange again if the replacement property is subsequently disposed. Thus, we assume the investor expects her effective tax rates on capital gain and depreciation recapture income to be zero. Collectively, these assumptions produce an 11.00 percent levered, after-tax, return on equity and an effective tax rate of 23.0 percent, assuming a nine-year holding period.[36] The after-tax internal rate of return on equity and effective tax rates for holding periods of 1-20 years are displayed in Figure 7A. The ETR is equal to 22 percent for holding periods of 3-7 years and increases to 26 percent with longer holding periods.

Estimated Nonresidential Price and Rent Effects of Elimination of Like-kind Exchanges

To quantify the potential price effects of eliminating real estate like-kind exchanges, we first assume that with elimination of like-kind exchanges the marginal investor expects to

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[33] See the RERC's *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 10.

[34] By year 15, the terminal cap rate has increased to 8.30 percent; by year 20, the terminal cap rate is 8.65 percent.

[35] We are, therefore, assuming no personal property is associated with the investment.

[36] The effective tax rate (*ETR*) = (*BTIRR* - *ATIRR*)/*BTIRR*, where *BTIRR* and *ATIRR* are, respectively, the before-tax and after-tax internal rate of return on equity. With our base-case assumptions and a nine year holding period, ETR = (14.28% - 11.00%)/14.28% = 22.95 percent.

pay a capital gain tax rate of 23.8 percent and a depreciation recapture tax rate of 25 percent when disposing of the property, along with a 39.6 percent rate on ordinary income. These assumptions are intended to reflect a moderately taxed CRE investor. Holding other assumptions constant, this increased taxation at sale pushes down the nine-year after-tax internal rate of return (IRR) from 11.0 percent to 10.0 percent and increases the effective holding period tax rate from 23.0 percent to 30.0 percent. The revised after-tax rates of return and effective tax rates for holding periods of 1-20 years are displayed in Figure 8A.

The percentage point increase in effective tax rates and decrease in after-tax returns, assuming no adjustment in acquisition prices or rental income, are displayed in Figure 9A. For expected holding periods of three to four years, the decline in expected after-tax returns is 138 basis points (1.38 percentage points). As the expected holding period increases, the reduction in the total return gradually decreases, reaching a decline of 46 basis points for a 20 year holding period. For an expected holding period of three years, the ETR increases 10 percentage points, holding rents and prices constant. The ETR increases gradually decline as investment holding periods increase. For investors with an expected holding period of nine years, the increase in ETR is more than seven percentage points.

To offset the increased taxation on disposition and the resulting negative effect on investment valuations, competitively determined acquisition prices must decline, all else equal. The acquisition price would have to decline 7.7 percent to compensate an investor with an expected nine-year holding period. As displayed in Figure 10A, the required price declines range from 7.5 percent to 11.6 percent over expected holding periods of three to twenty years. These price declines would reduce the wealth of a large cross-section of households and slow or stop construction in many local markets, thereby putting downward pressure on employment and state and local tax receipts. In local markets in which the marginal (price determining) investor was not expecting to dispose of the property with an exchange, the magnitude of price declines required to restore required rates of return after the elimination of exchanges would be reduced.

As discussed above, the project model depicted in equation (2) can also be used to solve for the long-run increase in market rents required to offset the increased taxation associated with the elimination of real estate like-kind exchanges. Without such an increase, developers would have little incentive to bring new product to the market. The impact of the change in tax law is estimated by comparing the equilibrium level of rent under current law to that required after the elimination of like-kind exchanges, holding all other assumptions constant.

Figure 11A displays required rent increases for expected holding periods of one to twenty years. Assuming a nine-year holding period, rents would have to increase 8.4 percent to offset the taxation of capital gain and depreciation recapture income at rates of 23.8 percent and 25 percent, respectively. With an expected holding period of three years, rental rates would need to increase 11.9 percent in order for the investor to continue to earn an 11 percent expected return at acquisition. Over holding periods of three to twenty years, required rental rate increases range from 8.1 percent to 13.2 percent.[37] These new equilibrium rents would reduce the affordability of CRE space for both large and small tenants. As with estimated price declines, rents would need to rise less in markets in which the marginal buyer of CRE places a low probability on using an exchange to dispose of the property.

Estimated Nonresidential Price and Rent Effects of Elimination of Like-kind Exchanges in High-Tax Markets

The use of real estate like-kind exchanges varies significantly across states and CBSAs, as discussed above. California dominates other states in the use of exchanges. Colorado, Oregon, and Arizona, all states with relatively high state income tax rates, also account for a disproportionate share of real estate like-kind exchanges. It is in these high-tax states where the marginal CRE investor is more likely to be determining competitive transaction prices. Thus, the negative effects from the elimination of exchanges are likely to be significantly larger in these high-tax states and metropolitan areas.

To estimate the differential effects of the elimination of exchanges in these high-tax states, we add the 13.3 percent maximum tax rate on ordinary income that high income California investors must pay to the maximum statutory federal rate of 39.6 percent. Thus, we assume a 52.9 percent tax rate on ordinary income. At 33 percent, California also has the highest combined state and federal marginal tax rate on capital gain income in 2014.[38] We assume the maximum rate on depreciation recapture income is 38 percent, which is five percentage points higher than the maximum capital gain tax rate.

The after-tax rate of return and effective tax rates for holding periods of one to twenty years assuming ordinary income is taxed at 52.9 percent are displayed in Figure 7B. We

[37] The corresponding required increases in capitalization rates are nearly identical to required rental rate increases.

[38] The 33 percent maximum capital gain tax rate assumption for California is obtained from the Tax Foundation (www.taxfoundation.org). The maximum capital gain rates estimated by the Tax Foundation take into account the state deductibility of federal taxes, local income taxes, the phase-out of itemized deductions, and any special treatment of capital gains income.

assume here that the marginal investor expects to avoid capital gain and depreciation recapture taxes by using an exchange. Relative to a 39.6 percent tax rate on ordinary income, the assumed 52.9 percent rate systematically produces lower expected returns and pushes up ETRs, holding all else constant (Figure 7B). For example, the ETR always exceeds 29 percent and reaches 35 percent for holding periods of 19 and 20 years, even in the absence of capital gain and depreciation recapture taxes.

To quantify the potential price effects of eliminating real estate like-kind exchanges in high-tax states, we next assume the investor expects to pay a capital gain tax rate of 33 percent and a depreciation recapture tax rate of 38 percent, along with a 52.9 percent rate on ordinary income. Holding other assumptions constant, this increased taxation pushes down the nine-year after-tax internal rate of return (IRR) to 8.3 percent and increases the effective tax rate to 41.9 percent. The revised after-tax rates of return and ETRs for holding periods of 1-20 years are displayed in Figure 8B. The percentage point decrease in after-tax returns and corresponding increase in effective tax rates, assuming no adjustment in acquisition prices or rental income, are displayed in Figure 9B. For expected holding periods of 2-5 years, the decline in expected returns range from 201 to 276 basis points. As the expected holding period increases, the reduction in the total return steadily deceases, but still equals 151 basis points for an expected holding period of nine years. For expected holding periods less than 10 years or less, the increase in the ETR ranges from 11.2 percentage points to 15.3 percentage points, holding rents and prices constant.

To offset the significant increase in taxation on disposition and the resulting negative effect on investment valuations, acquisition prices would have to decline more dramatically than in lower cost states and CBSAs. We estimate acquisition prices would have to decline 22.4 percent to compensate an investor with an expected nine-year holding period. The corresponding decrease with our base-case (moderate tax) assumptions is 7.7 percent. As displayed in Figure 10B, the required price declines range from 23.0 percent to 27.0 percent over expected holding periods of 3-20 years. These represent massive potential declines in the investment value of CRE in high-tax states.

Figure 11B displays the corresponding rent increases for expected holding periods of 1-20 years. Assuming a nine year holding period, first-year rents would have to increase 28.9 percent to offset the taxation of capital gain and depreciation recapture income at rates of 33 percent and 38 percent, respectively. Over holding periods of 3-20 years, required rental rate increases range from 28.9 percent to 36.8 percent. Clearly, the potential negative effects

associated with elimination of real estate like-kind exchanges are large, especially in high-tax states where exchanges are widely used.

Estimated Price and Rent Effects of Elimination of Like-kind Exchanges for Residential Properties

According to the *Real Estate Report*, cap rates on "first tier" apartment properties averaged 6.00 percent in the fourth quarter of 2014.[39] The typical apartment market participant expects gross rental income to increase 2.8 percent annually, operating expenses to increase 2.9 percent annually, capital expenditures to increase 4.6 percent, and required a 7.8 percent unlevered, before-tax, internal rate of return on such investments. The assumed loan-to-value ratio and other loan terms are identical to our nonresidential assumptions.[40] The levered, after-tax, equity discount rate (k) implied by these assumptions is 8.88 percent, which we round to 9.00 percent.[41] Similar to nonresidential properties, vacancy and collection losses are assumed to equal five percent of gross rental income; operating expenses and capital expenditures in the first year of operations consume 41 percent and five percent, respectively, of effective gross income. Eighty percent of the acquisition price is real property depreciable over 27.5 years, using straight-line depreciation.

According to RERC's most recent survey results, the average terminal cap rate on first-tier apartment properties was 80 basis points higher than the average going-in cap rate.[42] Assuming that the terminal cap rate increases nine basis points per year produces a terminal cap rate in year nine that is 80 basis points greater than the going-in rate. We first assume the marginal investor faces a 39.6 percent tax rate on ordinary income and expects to dispose of the property with a like-kind exchange and to use an exchange again if the replacement property is subsequently disposed. Collectively, these assumptions produce a 9.00 percent levered, after-tax, return on equity and an effective tax rate of 23.0 percent, assuming a nine-year holding period.

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[39] These cap rate results are from the *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 27. For more information, see http://store.rerc.com/collections/real-estate-report.

[40] The acquisition price is financed with 35 percent equity and 65 percent debt. The mortgage interest rate is 5.17 percent with monthly payments. The loan term and amortization period are 26 years. There are no up-front financing fees or expenses.

[41] The 7.80 percent return is a weighted-average of the mortgage interest rate and the levered required return on equity, k^{BT}; that is, $7.80\% = 0.65(5.15\%) + 0.35(k^{BT})$. Solving for k^{BT} produces a levered before-tax required return on equity of 12.68 percent. With an effective tax rate of 30 percent, the required levered, after-tax, equity discount rate (k) is $8.88\% = (1\text{-}0.30)12.68\%$, which we round to 9.00 percent.

[42] See the RERC's *Real Estate Report*, Winter 2015, Vol. 43, No. 4, page 10.

To quantify the potential price effects of eliminating residential like-kind exchanges, we next assume that the investor expects to pay a capital gain tax rate of 23.8 percent and a depreciation recapture tax rate of 25 percent, along with a 39.6 percent rate on ordinary income. To offset this increased taxation on disposition and the resulting negative effect on investment valuations, acquisition prices would have to decline 10.6 percent, assuming a nine-year holding period. The corresponding decline for non-residential property with these moderate tax rate assumptions is 7.8 percent. As displayed in Figure 12A, the required price declines range from 9.9 percent to 16.8 percent over expected holding periods of three to twenty years.

Figure 13A displays required rent increases for expected holding periods of one to twenty years. Assuming a nine-year holding period, rents would have to increase by 11.8 percent to offset the taxation of capital gain and depreciation recapture income at rates of 23.8 percent and 25 percent, respectively. The corresponding increase for nonresidential property is 8.4 percent. Over holding periods of three to twenty years, required gross rent ranges from 10.7 percent to 20.1 percent.[43]

Acquisition prices of residential property would have to decline more dramatically in high-tax states and CBSAs. We estimate the acquisition price on residential property would have to decline by 22.7 percent to compensate a high-tax investor with an expected nine-year holding period. As displayed in Figure 12B, the required price declines range from 22.0 percent to 27.1 percent over expected holding periods of 3-20 years. These represent massive declines in the investment value of CRE. Figure 13B displays required rent increases for expected holding periods of 1-20 years. Assuming a nine year holding period, rents would have to increase by 29.2 percent to offset the taxation of capital gain and depreciation recapture income at rates of 33 percent and 38 percent, respectively. Over holding periods of 3-20 years, required rental rate increases range from 27.8 percent to 38.0 percent.

[43] Again, the corresponding required increases in capitalization rates are nearly identical to required rent increases.

Economic Benefits of 1031 Exchanges – Empirical Evidence

The analyses in the previous sections show that the cost to the Treasury of the 1031 exchange program in real estate is relatively small. However, based on our "user cost of capital" model, we estimate that the elimination of like-kind exchanges would produce commercial real estate prices declines of 8 to 12 percent and real rents increases of 8 to 13 percent in the long run. In this section, we turn to empirical evidence to determine the economic benefits of real estate like-kind exchanges and the impact their elimination would likely have on investment, leverage and liquidity.

Impact of Like-kind Exchanges on Investment

To completely avoid a recognized gain, a seller using a 1031 exchange has the incentive to invest the full amount of proceeds from the sale of the relinquished property to acquire the replacement property(s). This full investment of sale proceeds can be accomplished by acquiring replacement property that is equal to or greater in value to the relinquished property. Since CoStar provides data on the seller's and buyer's identities and the type of exchange, we are able to match replacement exchange transactions to the original relinquished property based on the investor's identity and a search within 180 days from the sale date of the relinquished property. Our analysis does not necessary identify all relinquished-replacement property complete exchanges. However, we are able to provide statistics on the average difference in price between the relinquished and replacement properties as well as the frequency of cases where exchanges are associated with immediate tax liability because the replacement property(s) is less expensive than the relinquished property.

We analyze price differences between relinquished and replacement property prices for like-kind exchanges and ordinary sales by the same investor, when the replacement property acquisition is completed within 180 days of the closing of the relinquished property. These results are displayed in Table 9. Panel A presents the statistics for investors in both like-kind exchanges and ordinary sales for all round-trip (sale followed by an acquisition) transactions. To eliminate the effect of very large price differences we also trimmed and winsorized price differences at the 5% level in both tails of the distribution.[44] Furthermore, we use a modified 1-step Huber estimation approach to remove the effect of outliers.

[44] Trimming eliminates observations from both tails of the distribution, while winsorizing sets the values of all observations lower than the 5th percentile value (higher than the 95th percentile value) to that value.

We observe that, on average, exchange investors acquire a replacement property that is $305,000 to $422,000 more expensive than their relinquished property. In contrast, this difference is typically negative and averages -$125,000 to $22,893 when an ordinary sale is followed by a purchase of a replacement property. The t-test statistics for the differences in means between the two samples indicate that these differences are statistically significant.

Next, we examine how frequently the price difference between the replacement property and relinquished property is positive ($P_{replacement}$-$P_{relinquished}$>0). This difference is positive in 66 percent of the like-kind exchanges and in 51 percent of the non-tax motivated transactions. This indicates that taxes are not fully deferred in 34 percent of the like-kind exchanges. Panel B presents the corresponding statistics for only those cases where the replacement property is more expensive than the relinquished property. This difference, $P_{replacement}$-$P_{relinquished}$, is also generally larger for like-kind exchanges when we require the replacement property to be more expensive than the relinquished property. The median differences in prices are $792,500 and $605,000 for like-kind exchanges and ordinary sales, respectively.

However, the results in panel B are weaker than those reported in Panel A and suggest that trimming and winsorization at 5 percent do not fully eliminate the effect of outliers. However, the modified 1-step Huber estimation approach yields statistics that are consistent with the reported median price differences. Price differences for downleg-upleg exchange transactions and ordinary sale-acquisition transactions are $790,597 and $617,323, respectively. These differences are statistically and economically significant. Finally, Panel C presents the results when the replacement property is less expensive than the relinquished property. Consistent with the results in the previous panels, like-kind exchanges are associated with a smaller reduction in investment when $P_{replacement}$-$P_{relinquished}$ is negative.

Table 9 presents strong evidence that like-kind exchanges are associated with a larger investment in subsequent acquisitions. However, these results could be driven by differences in the prices paid for properties involved in like-kind exchanges and ordinary sales. To address this concern we examine price differences expressed as a percentage of the sale price of the relinquished property. The results are displayed in Table 10. The statistics for the full sample (Panel A) are consistent with our previous findings and show significantly larger price differences between replacement and relinquished property prices for exchanges. This difference ranges from 8 to 33 percent depending on the method employed to eliminate the effect of outliers.

In Panel B, however, we observe that when replacement properties are more expensive than relinquished properties the price difference in percentage terms is greater for ordinary sales. This difference is largely driven by outliers, since adjustment using modified 1-step Huber estimation yields a difference of only 7%, as opposed to 36 to 57 percent with other correction methods. Finally, the statistics reported in Panel C of Table 10 are consistent with the pattern revealed by Panel C in Table 9 and show that the price difference ($P_{replacement}$-$P_{property}$) is a smaller negative percentage for exchanges when we require that $P_{replacement}$-$P_{property}$ is negative. Overall, the results in Table 10 provide evidence that the increased investment we observe in exchanges is not driven by higher prices in our sample of exchange properties.

Table 11 examines the price difference, $P_{replacement}$-$P_{relinquished}$, by years. We report median price differences to eliminate any effect of outliers. We note that the price difference is larger for like-kind exchanges in all years except 2007. Generally, the difference is smaller during years of price declines or stagnant markets and larger during years of increasing real estate prices. In contrast, the price difference for ordinary sale and repurchase transactions is small each year and often negative. In Table 12 we report annual price differences expressed as a percentage of the price of the relinquished property. These results are consistent with those reported in Table 11 that do not consider the scale of investment.

In Table 13 we present similar price difference statistics by states. Panel A reports the results in dollars, while panel B presents the results as a percentage of the relinquished property value. We only include states for which we have a sufficient number of observations of like-kind exchanges dispositions followed by acquisitions of replacement properties. Overall, the results are consistent with our previous findings. Price differences for like-kind exchanges are positive for all states except Arizona; however, this difference is small and frequently negative in all states for non-tax motivated sales.

In summary, the results reported in Tables 9 through 13 support the notion that replacement properties in exchange transactions are associated with a larger investment. In addition, our analysis shows that in the majority of exchange transactions the replacement property has a higher price than the relinquished property. However, in over 30 percent of the cases the price of the replacement property is lower, which means that not all of the realized gain is being deferred.

Impact of Like-kind Exchanges on Leverage

Since drawing out some of the sale proceeds from an exchange transaction results in immediate tax liability, the exchange buyer in a replacement acquisition is more likely,

holding investment size fixed, to have a larger down payment compared to a non-tax-motivated buyer. We use CoStar data to determine differences in leverage between properties purchased to complete an exchange and ordinary acquisitions. We have leverage information on 719,906 acquisitions, of which 30,320 are replacement exchanges.[45] We analyze leverage for investors in replacement exchanges versus ordinary acquisitions, as well as for tax versus non-tax motivated buyers in similar properties, based on a one-on-one propensity score model matching.[46] The predictive model used for matching like-kind exchanges with ordinary sales is presented in Appendix 2. We control for size, age, age squared, parking ratio, number of parking spaces, vacancy rate, number of floors, location, timing and property type fixed effects. The results show that most of these variables significantly predict the type of the sale – replacement exchange vs. ordinary sale. Therefore, it is important to conduct the leverage analysis on a matched basis, as otherwise results will be subject to a selection bias.

Table 14 shows the initial leverage (at acquisition), defined as total mortgage debt divided by the purchase price, for a sample of both replacement exchanges and ordinary acquisitions. Panel A displays the leverage statistics for an unbalanced panel of replacement exchanges and ordinary acquisitions, while Panel B presents the results for a matched sample based on the model described in Appendix 2. The first two rows of each panel report leverage statistics for samples which contain all sales, including transactions with CoStar defined sale conditions (e.g. deferred maintenance, portfolio acquisition, sale-leaseback, distress sale, etc.). In rows 3 and 4 of each panel we report leverage statistics which exclude such conditions since they may be causing differences in leverage.[47]

We observe that like-kind exchanges in the unbalanced sample (Panel A) are associated with median leverage of 61-62 percent; for the ordinary acquisitions initial leverage is 64-66

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[45] Out of the original sample of 1,609,711 observations, leverage is available for 793,988 acquisitions. In 74,082 of the case leverage is either negative or larger than one. We drop these observations from the sample to avoid any bias due to outliers. This yields a sample of 809,691 observations of which 30,320 are replacement exchanges.

[46] Propensity score models address the issue of selection bias in the treatment group, rather than matching on a limited number of treatment group characteristics, by matching treated and untreated observations on the estimated probability of being treated (their propensity score). The propensity score is based on a discrete choice model, which controls for a number of variables that have a relationship to the treatment decision. If use of like-kind exchanges is random, there is no need for using a matching approach. However, our analyses suggest that exchanges are more likely to be used when prices are high and the property is located in a high-tax state. Furthermore, investors are more likely to dispose of a property in a like-kind exchange when its capital gain is higher (both in dollar and percentage terms). So, it is likely that properties that are disposed in 1031 exchanges are larger and due to the regulation faced by the exchangers, subsequent 1031 exchange replacement properties are also larger. To account for this selection issue we employ a propensity score matching approach.

[47] The leverage sample, excluding conditions, contains 522,574 non-exchanges and 24,365 replacement exchanges.

percent. This difference in leverage between replacement exchanges and ordinary acquisitions is not statistically significant. We also observe lower leverage for replacement properties in exchanges in the matched sample. The difference in initial leverage between replacement exchanges and ordinary acquisitions is approximately 6 percent, which is statistically and economically significant.

Table 15 shows the by year difference in initial leverage for replacement exchanges and non-exchanges for the matched sample that excludes transactions with sale conditions. The differences are negative in all years and vary between -12.3 and -2.6 percent. Similarly, the state-level results for the matched sample (excluding sales conditions) reported in Table 16 show negative differences in all states except Arizona, Maryland and North Carolina. Overall, these results strongly suggest that like-kind exchange acquisitions are associated with acquisitions of more expensive properties; however, these properties tend to be purchased with less leverage.

Impact of Like-kind Exchanges on Capital Expenditures

We next examine whether like-kind exchanges in real estate are also associated with higher capital expenditures during the holding period of the replacement property. The potential effect on capital expenditures is indirect. To the extent that less leverage is used to acquire replacement properties in like-kind exchanges, tax-motivated investors will have higher debt capacity to invest in building improvements.

We use National Council of Real Estate Investment Fiduciaries' (NCREIF) capital expenditure data at the property level. NCREIF produces several quarterly indexes tracking real estate performance returns, based on data provided by NCREIF's contributing members. In addition, NCREIF collects data on property level operating income and expenses. Detailed income and expense data is available on a quarterly basis from 2000.[48] By matching CoStar and NCREIF data we obtain detailed capital expenditure data for a sample of exchange and non-exchange properties. We require that at least one full year of capital expenditure data is available for analysis. Therefore, our analysis is based on the 2000-2013 period.[49]We conduct further statistical analysis to determine whether, all else equal, properties that have been

[48] NCREIF data covers the period from 2000 to 2012.

[49] Capital expenditure analysis is based only on selected markets, due to data availability. These markets include: Atlanta, Boston, Chicago, Washington D.C., Dallas, Denver, Detroit, Miami, Oakland, Phoenix, San Diego, Seattle, Tampa, Tucson, Washington, Los Angeles, NYC and San Francisco. The final sample contains 3502 observations, of which 99 are exchanges.

acquired to complete an exchange are associated with higher subsequent capital expenditures. The comparison group is a subset of properties acquired in an ordinary purchase.

In Panel A of Table 17, we report annualized total capital expenditures, tenant improvements, building improvements, building expansion and other capital expenditures (including intangible improvements to the property, such as free rent and buy-outs) for an unbalanced sample of replacement property exchanges and ordinary acquisitions. In Panel B we report the annualized capital expenditures and capital components for a matched sample of replacement exchanges and ordinary acquisitions. All capital expenditures are scaled by the square footage of the property. The results suggest that, overall, like-kind exchanges are associated with higher capital expenditures, with the effect being driven by increased investment in building improvements and other capital expenditures. The differences between capital expenditures, building improvements and other expenses are only marginally significant.[50] However, the difference between total capital expenditures for replacement exchanges and ordinary acquisitions represents 22.5 percent of the annual capital expenditures investment in ordinary acquisitions. This is a significant increase in economic terms and could lend support to the observation of Ling and Petrova (2008) that sale prices of properties acquired through like-kind exchanges are higher. If capital expenditures lead to higher investment returns through increases in rents and therefore prices (Petrova and Ghosh, 2015), then we can expect that like-kind exchange properties will have higher prices at disposition, all else equal.

Impact of Like-kind Exchanges on Holding Periods

To examine the potential "lock-in" effect on existing property owners of the repeal of tax-deferred exchanges, we compare the holding periods of properties acquired and disposed in ordinary sales to the holding periods of properties disposed in like-kind exchanges.[51] The optimal holding period of investment real estate depends on market liquidity, expected risk and return, and transaction costs (Chen, Lin and Liu, 2010). Multiple studies analyze optimal holding periods in commercial real estate and find that it is between 5-8 years, depending on the conditions discussed above (see for example Chen, Lin and Liu, 2010). Theoretically, eliminating tax-deferred exchanges will lead to longer investment holding periods and

[50] This is likely due to the small sample size.

[51] Properties disposed in like-kind exchanges may have been acquired either in an ordinary acquisition or as part of an exchange.

decreased liquidity for investors. Thus, property prices will be negatively impacted by reduced tax benefits and by reduced liquidity. We turn to CoStar data to examine differences in holding periods between exchange-motivated transactions and non-exchanges. Our results are presented in Table 18.

In order to compare holding periods for exchanges and non-exchanges, we are only able to use data for properties that were acquired and sold during the sample period, 1997-2014. This limits our analysis to a sample of "repeat sales." This sample includes 336,572 properties, of which 8,218 (2.4 percent) are sales of relinquished properties in an exchange. Note that four percent of the properties in our dataset that were sold prior to 2014 were acquired as part of an exchange. However, only 12 percent of these represent a replacement exchange property, sold through another exchange. That is, 88 percent of the properties acquired through a like-kind exchange are disposed through an ordinary sale. These statistics suggest that investors rarely roll over exchanges into a subsequent replacement property in order to continue to defer the gain not taxed on the sale of the relinquished property.

Due to the limited time window of our analysis, as well as the requirement that a property must have sold twice during our sample period to be included in the holding period analysis, the calculated holding periods will tend to be shorter than what is typically observed (5-8 years). Indeed, the average holding periods reported in Panel B (for the full sample of repeat sales) and Panel C (for a matched sample of repeat sales) vary between 3.4 and 4 years. For comparison purposes we also calculate the average holding period including properties that have not sold a second time prior to year-end 2014. For such properties the holding period is calculated as the difference in years between December 31, 2014 and the property's acquisition date. Note that even this assumption biases downward the average holding period.

Panel A of Table 18 shows that the average holding period of all acquisitions in the sample is 6.6 years. This is within the range of optimal holding periods reported in the literature. Overall, the results in Table 18 show that exchanges are associated with holding periods that are about half a year (Panel B) to a third of a year (Panel C) shorter. These differences are statistically significant.

Table 19 presents holding period summary statistics for each state with a sufficient number of exchanges (30 or more). We note that, in most states, exchange holding periods are shorter than for properties disposed through ordinary sales. Taken together, the results presented in Tables 18 and 19 suggest that exchanges are consistently associated with lower holding periods. The difference in holding periods is statistically significant and it is also

likely understated as it is only based on a sample of repeat sales over a limited window of time. Therefore, we conclude that eliminating like-kind exchanges will lead to increases in holding periods, all else being equal. This loss of liquidity will adversely affect investors and increase required risk premiums, thereby putting downward pressure on prices.

Like-kind Exchanges and Taxes

We next conduct property level analysis and demonstrate, that although theoretically an investor could defer taxes indefinitely through the use of 1031 exchanges, investors do frequently dispose of properties acquired through 1031 exchange in an ordinary sale. Using our sample of repeat sales from CoStar, we track when a replacement property is disposed by a taxpayer and whether this is done through a fully taxable sale or another exchange. We repeat this exercise each time a property is sold to obtain a full picture of frequency of the roll-over strategy in exchanges. As previously mentioned, four percent of the properties in our sample were originally acquired through a like-kind exchange. Out of these, 11 percent (0.5 percent of the total repeat sale sample) were sold through another exchange.

Summary statistics for the frequency of sale of like-kind exchange replacement properties by year are presented in Table 20. The percent of replacement property sales varies with real estate market conditions. In 2005, near the peak of the commercial real estate price boom, the sale of like-kind exchange replacement properties represented 7.8 percent of all repeat sales. In the same year, only 1.4 percent of all transactions were dispositions of exchange replacement properties through a roll-over exchange. In addition, since 2006 the percentage of repeated exchanges by the same investors has been decreasing and, since 2009, it has been virtually equal to zero. This analysis suggests that although 1031 exchanges offer the possibility for potential indefinite deferral of capital gain and depreciation recapture taxes, investors frequently do not roll over proceeds from the sale of the replacement property into another exchange.

Given that investors frequently sell their exchange replacement property in a fully taxable sale, we analyze differences in tax liabilities in a two-period window where we focus on the following scenarios:

1. the investor acquires a property, disposes of the property through a like-kind exchange, acquires a replacement property to complete the exchange, and then disposes of the property through another exchange;

2. the investor acquires a property through an ordinary sale, disposes of the property through a like-kind exchange, acquires a replacement property to complete the exchange, and sells the property in a fully taxable sale;

3. the investor acquires and then disposes of her property through a fully taxable sale, uses the net sale proceeds to acquire another property, which subsequently disposed of through a fully taxable sale.

We estimate capital gain and depreciation recapture taxes upon the disposition of the property based on the models described in Appendix 1. For example, for fully taxable sales the tax liability on the portion of the total gain arising from nominal appreciation in the value of the property is calculated as $\tau_{cg} CG_{t+n}^{2,s}$ and the tax liability on the "unrecaptured" Section 1250 gain is given by $\tau_{dr} RECAP_{t+n}^{2,s}$. $CG_{t+n}^{2,s}$ is the magnitude of the capital gain and $RECAP_{t+n}^{2,s}$ is the magnitude of depreciation recapture income on the sale of the replacement property in year $t+n$, conditional on a sale-purchase strategy in year t. $CG_{t+n}^{2,e}$ is the magnitude of the capital gain and $RECAP_{t+n}^{2,e}$ is the magnitude of depreciation recapture income on the sale of the replacement property in year $t+n$, conditional on an exchange in year t. In estimating capital gain and depreciation recapture taxes we use the maximum tax rate for capital gain and depreciation recapture income applicable in the year of sale.

Since taxes paid will be sensitive to the holding period, we annualize the realized tax liability to better compare taxes for different properties with different holding periods. We estimate the tax liability for each of these scenarios and report the results in Table 21. To calculate the tax liability in each of the scenarios we need to have two round trip transactions. For example, when an exchange is followed by an exchange, we first observe a purchase (in an ordinary transaction) and a disposition with a like-kind exchange, followed by a purchase of a replacement property and its disposition under a like-kind exchange. Thus, we are able to estimate appreciation and depreciation from the first exchange disposition.[52] Panel A reports the results over the holding period, while Panel B presents the annualized capital gain and depreciation recapture taxes for the three scenarios. In our dataset, properties are often sold at prices below their acquisition prices, which results in negative taxable income. However,

[52] We do not consider the case where the first transaction in the set of the two round trip transactions is a replacement exchange, since in this case we would need to have thee round trip transactions and be able to estimate deferred capital gain and depreciation recapture taxes from the first transaction.

we only examine transactions in which a taxable sale was used as the disposition strategy in both periods and the capital gain tax liability was greater than zero.

The results show that, on average, exchanges followed by an ordinary sale are associated with an annualized capital gain tax liability equal to 7.9 percent of the acquisition price and a depreciation recapture tax liability of 1.1 percent. When an ordinary sale is followed by another ordinary sale, these percentages are lower – 5.5 percent and 0.5 percent, respectively. These estimates suggest that investors using exchanges pay higher taxes in the long run compared to a non-exchange strategy of acquisition and disposition. The deferred gains when an exchange is rolled into another exchange are comparable to the recognized tax liabilities when an exchange is followed by a fully taxable sale. In summary, these results indicate that although IRS statistics suggest the cost of like-kind exchanges to the Treasury to be high, exchanges boost tax revenue in the long run.

Macro-economic Consequences of the Established Micro-economic Effects

Our empirical analyses demonstrate that like-kind exchanges are associated with higher investment, shorter holding periods, and less leverage. Therefore the removal of exchanges will lead to decrease in investment, an increase of holding periods, and an increase in the amount of leverage used to acquire properties. Furthermore, our theoretical analysis suggests that the repeal of like-kind exchanges would lead to decrease in prices in the short-run and an increase in rental rates in the longer run. These micro effects are likely to have significant macro-economic consequences as well. For example, a reduction in growth in commercial real estate markets, resulting from lower investment and decreases in prices, will lead to slower employment growth in sectors closely tied to like-kind exchanges, such as construction and financial services.

Furthermore, dynamic general equilibrium models of the U.S. economy have been used to estimate the effect of various tax reforms on the economy (Diamond and Zodrow, 2008; Diamond and Viard, 2008; Carroll, Cline, Diamond, Neubig and Zodrow, 2010; Zodrow and Diamond, 2013). General equilibrium models link the increase (decrease) of marginal tax rates to contraction (expansion) of the economy. For example a 2012 report by Carroll and Prante examining the long-run macroeconomic impact of increasing tax rates on high-income taxpayers demonstrates that the higher marginal tax rates are associated with a smaller economy, fewer jobs, less investment, and lower wages.

It is beyond the scope of our research to estimate similar macro effects from the repeal of like-kind exchanges. However, it is safe to conclude that the removal of like-kind exchanges

will increase marginal tax rates for many investors. This impact will be more pronounced in high tax states and in industries that make greater use of exchanges, such as commercial real estate, transportation, and warehousing. In addition to having direct economic effects through increases in the marginal tax rates and the cost of capital, secondary effects will include decreased employment in real estate and related sectors.

Conclusions

We examine the economic effects of repealing or limiting Section 1031 for real property exchanges. We first document the widespread use of real estate like-kind exchanges and the extent to which their use varies across states and CBSAs. We next develop a "micro" model that quantifies the present value (cost) of an exchange to the owner (Treasury). We find that the incremental value of an exchange as a percentage of the investor's deferred gain ranges from approximately 2 percent to 15 percent for commercial real estate. The value of an exchange as a percentage of deferred taxes for residential income producing property is similar.

Although the present value of tax revenue losses associated with real estate like-kind exchanges is relatively small in magnitude, the elimination of exchanges would disrupt many local property markets and harm both tenants and owners. We develop a "user cost of capital" model to quantify the short-run declines in property prices that would be necessary to offset the increased tax burden on investors of eliminating like-kind exchanges. In local markets where moderately-taxed exchange motivated taxpayers are the marginal (price determining) investors, we estimate that prices of office, industrial, and retail properties would have to decline to 12 percent to maintain required equity returns for investors expecting to use like-kind exchanges when disposing of properties. In the longer run, real rents would need to increase from 8 to 13 percent before new construction would be viable. The price and rent effects of eliminating real estate like-kind exchanges would be more pronounced in high-tax states, such as California, Colorado, Oregon, and Arizona.

Our empirical analysis demonstrates that like-kind exchanges are associated with increased investment, shorter holding periods, and lower leverage. Therefore the removal of exchanges will lead to a decrease in investment, an increase in holding periods (decrease in liquidity) and increase in the use of leverage to finance acquisitions. These micro effects are likely to have macro-economic consequences as well. For example, decreased construction and investment activity in commercial real estate markets will depress employment in sectors and markets where like-kind exchanges are commonly used.

Finally, in contrast to the common view that exchanges are frequently rolled over to potentially avoid capital gain and depreciation tax liability indefinitely, we show that in real estate in 88 percent of the cases investors dispose of properties acquired in a 1031 exchange through a taxable sale. In addition, the recognized tax liability when an exchange is followed by an ordinary sale is higher than when an investor acquires and disposes of real estate

through ordinary sales. This suggests that the cost of Section 1031 is significantly overstated as it ignores the frequency of exchanged properties sold through ordinary sales and the increase in tax liability due to reduced depreciation deductions.

Appendix 1: Estimating the Net Present Value of Tax Deferral[53]

Assume a taxpayer who owns real property has decided that the risk-return characteristics of her portfolio would be enhanced by disposing of the asset and reinvesting the equity into a replacement property located in a market with more growth potential. Assume also that the replacement property has 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 after-tax sale proceeds, along with additional equity capital if necessary, 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 some or all of the accrued taxable gain.

The present value of the sale-purchase strategy, $PVSALE_t$, assuming all-equity financing, can be represented as

$$PVSALE_t = (ATSP_t^1 - P_t^2) + \sum_{i=1}^{n} \frac{(1-\tau_o)NOI_i + \tau_o DEP_i^{2,s}}{(1+k)^i} + \frac{P_{t+n}^2 - SC_{t+n}^2 - \tau_{cg} CG_{t+n}^{2,s} - \tau_{dr} RECAP_{t+n}^{2,s}}{(1+k)^n} \quad \text{(A1)}$$

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;

NOI_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 tax depreciation on the replacement property in year i, conditional on a sale-purchase strategy;

k = the seller's required after-tax rate of return on unlevered equity;

P_{t+n}^2 = the expected sale 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 $t+n$;

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[53] This section builds on the model developed by Ling and Petrova (2008).

τ_{cg} = the expected tax rate on capital gain income;

$CG_{t+n}^{2,s}$ = the portion of the expected capital gain on the sale of the replacement property in year $t+n$, conditional on a sale-purchase strategy in year t, that will be taxed at the capital gain tax rate.

τ_{dr} = the expected tax rate on the depreciation portion of the capital gain reported as "recaptured" income.

$RECAP_{t+n}^{2,s}$ = the portion of the capital gain on the sale of the replacement property in year $t+n$, conditional on an n-year sale-purchase strategy, reported as recaptured income.

The first term on the right-hand-side of equation (A1) represents the equity capital required 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.[54] Note that $ATSP_t^1 = P_t^1 - SC_t^1 - TDS_t^1$, where SC_t^1 and TDS_t^1 represent sale costs and taxes due on sale, respectively. Therefore, if the price of the replacement property is equal to the price of the relinquished 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 (A1) represents the cumulative present value of the replacement property's net cash flows from annual operations, NOI_t, plus the present value of the annual tax savings generated by tax depreciation. Annual depreciation, $DEP_i^{2,s}$, under the sale-purchase strategy, is equal to

$$DEP_i^{2,s} = \frac{(1-L_t^2)P_t^2}{RECPER} \qquad \text{(A2)}$$

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,[55] and $RECPER$ is the allowable cost recovery period in years

54 The use of debt financing on both the relinquished and the replacement property would reduce the amount of after-tax sale proceeds from a taxable sale of the relinquished property and reduce the equity needed to acquire the replacement property.

55 We are assuming there is no personal property associated with the acquisition of the replacement property.

for the replacement real property.[56] Because the replacement property is purchased with the proceeds from a fully taxable sale, the initial 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 of the replacement property.

The third and final term on the right-hand-side of equation (A1) represents the expected after-tax cash proceeds from the disposition of the replacement property at the end of the assumed n-year holding period in a fully taxable sale. Deducted from the expected selling price at time $t+n$ are the following: expected selling costs (SC_{t+n}^2), the expected tax liability on the portion of the capital gain arising from nominal appreciation in the value of the property (τ_{cg} $CG_{t+n}^{2,s}$), and the expected tax liability on the "unrecaptured" Section 1250 gain (τ_{dr} $RECAP_{t+n}^{2,s}$). $RECAP_{t+n}^{2,s}$ is equal to the total amount of straight-line depreciation taken on the property since its acquisition. Henceforth, we will refer to the portion of the total gain on sale due to appreciation in the nominal value of the property as the "capital gain" and to the portion of the gain on sale that results from the use of straight-line depreciation as "depreciation recapture income." Under the tax code in place in 2015, capital gains are subject to a maximum tax rate of 23.8 percent.[57] In contrast, the maximum statutory federal rate on depreciation recapture income and ordinary income are 28.8 percent and 39.6 percent, respectively.[58]

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

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[56] Congressional legislation has repeatedly altered the period of time over which rental real estate may be depreciated. As of 2015, 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. The calculation of the allowable annual depreciation deduction for real property in the initial and final tax year is complicated by the "mid-month convention. This convention is ignored in the discussion and calculations that follow.

[57] The maximum capital gain rate is the sum of the 20 percent maximum statutory capital gain tax rate plus the 3.8 percent Net Investment Income Tax (NIIT) surcharge under I.R.C. §1411 that, since January 1, 2103, applies to households with AGI in excess of $450,000. From 1997 to May 6, 2003, the maximum capital gain tax rate was 20 percent. From May 6, 2003 to January 1, 2013, the maximum statutory capital gain tax rate was 15 percent.

[58] When the Medicare tax, the tax benefit of the Medicare tax (for self-employed), and the impact of phasing out personal exemptions and itemized deductions are included, the marginal rate for individuals in the top 39.6 percent statutory tax bracket can exceed 43 percent.

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

(A3)

where:

P_t^1 = the selling price of the relinquished property;

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

B_t = Additional non-like-kind property (i.e., cash or other "boot") paid at time t to acquire the replacement property(s)

$DEP_i^{2,e}$ = depreciation on the replacement property in year i, conditional on the use of an exchange at time t;

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

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

All other variables in equation (A3) are as previously defined.[59] If the exchanging taxpayer does not need to pay cash or other unlike-kind property to acquire the replacement property, then her tax basis in the replacement property at acquisition is equal to her basis in the relinquished property; moreover, her annual depreciation deduction in the replacement property, $DEP_i^{2,e}$, is equal to the deduction she would have been allowed had she maintained ownership of the relinquished property.[60] If property prices have increased in nominal terms since the acquisition of the relinquished property, this basis and depreciation carry forward is a disadvantage of exchanging into the property because a stepped-up depreciable basis is not

[59] For ease of exposition, this representation of the present value of the exchange strategy assumes the disposition of the relinquished property and the acquisition of the replacement property is simultaneous. However, most real estate like-kind exchanges are "delayed" exchanges, which allow the replacement property to be acquired up to 180 days after the disposition of the relinquished property.

[60] The tax basis in the relinquished property brought forward into the replacement property is sometimes referred to as the "exchange" basis. If the replacement property has a longer recovery period than the relinquished property, the exchange basis is recovered over the remaining life of the relinquished property utilizing the depreciation method of the replacement property. If cash/boot is required to exchange into a more expensive replacement property(s), this additional boot is added to the basis and separately depreciated beginning in the tax year of the exchange over the appropriate 27.5- or 39-year cost recovery period.

acquired. Similarly, if no boot is paid to acquire the replacement property, the depreciation recapture portion of the total gain on a fully taxable sale of the replacement proportion in year $t+n$, $RECAP_{t+n}^{2,e}$, is equal to the amount of depreciation recapture income that was deferred by the exchange, plus the tax depreciation deducted since the exchange. Although the annual depreciation deduction taken after the exchange, $DEP_i^{2,e}$, is lower than what would be allowed under a sale-purchase strategy (i.e., $DEP_i^{2,s}$), $RECAP_{t+n}^{2,e}$ will be generally be larger than $RECAP_{t+n}^{2,s}$ due to the deferred recapture income.[61]

All else equal, the taxpayer should exchange into the replacement property if the present value of the exchange strategy exceeds the present value of the sale-purchase strategy. Subtraction of equation (A1) from equation (A3) produces the following expression for the incremental NPV of the exchange strategy:

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

$$- \frac{\tau_{cg} (CG_{t+n}^{2,e} - CG_{t+n}^{2,s})}{(1+k)^n}. \qquad \text{(A4)}$$

The first term in equation (A4), $[SC_t^1 - EC_t + TDS_t^1 - B_t]$, captures the immediate net cash flow benefit of tax deferral. If the time t selling costs of the sale-purchase strategy (SC_t^1) and exchange strategy (EC_t) are equal, the immediate advantage of the exchange is equal to TDS_t^1, the deferred tax liability, minus boot paid. To the extent exchanges are more expensive to execute than fully taxable sales, $SC_t^1 - EC_t$ will be negative and this incremental cash outflow will be netted against the positive tax deferral benefits.

The second term in equation (A4) captures the cumulative present value of foregone depreciation tax savings over the n-year holding period of the replacement property. In no boot is paid to acquire the replacement property, the tax basis and annual depreciation deductions in the replacement and relinquished property are equal, as discussed above. If nominal price appreciation has occurred since the acquisition of the relinquished property, this insures that

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[61] If the holding period of the replacement property is sufficiently long relative to the holding period of the relinquished property, it is possible for $RECAP_{t+n}^{2,s} > RECAP_{t+n}^{2,e}$

$DEP_i^{2,s} > DEP_i^{2,e}$. The depreciation recapture portion of the total gain on a fully taxable sale of the replacement property in year $t+n$ will generally be larger if an exchange was used. This increase in depreciation recapture income, relative to a sale-purchase strategy, decreases the net benefit of the exchange strategy at time t.

Finally, because the tax deferral associated with an exchange reduces the tax basis in the replacement property, the taxable capital gain due on a fully taxable sale of the replacement property will be larger with an exchange. The negative effect of the increased capital gain tax liability on the incremental NPV of an exchange is captured by the fourth term in equation (A4).

Appendix 2: Predictive Model Used for Matching Like-kind Exchanges with Ordinary Sales

Appendix 2 presents the regressions statistics for the predictive model used for one-on-one p-score matching of like-kind exchanges with similar properties, sold in ordinary sales.

Dep. Variable = Repl. Exchange	Coef.	z	
LN of Square Feet	0.373	38.50	***
Age	(0.010)	(22.57)	***
Age Squared	0.000	6.16	***
Longitude	(0.046)	(72.55)	***
Latitude	0.009	5.42	***
Parking Ratio	0.042	7.33	***
Number of Parking Spaces	(0.002)	(17.88)	***
Vacancy at Sale	(0.442)	(10.47)	***
Number of Floors	0.001	0.30	
1998	0.174	3.25	***
1999	0.444	9.01	***
2000	0.576	11.96	***
2001	0.617	12.59	***
2002	0.606	12.61	***
2003	0.581	12.12	***
2004	0.432	8.92	***
2005	0.472	9.63	***
2006	0.473	9.33	***
2007	0.152	2.88	***
2008	0.006	0.10	
2009	(0.578)	(8.15)	***
2010	(1.187)	(14.38)	***
2011	(1.374)	(16.39)	***
2012	(1.580)	(17.77)	***
2013	(1.103)	(14.90)	***
2014	(0.810)	(12.65)	***
Property Type Fixed Effects		YES	
Constant	(11.115)	(79.65)	***
Pseudo R2		**0.131**	
LR chi2 (34)		**18943.88**	
Prob>chi2		**0.000**	

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Figure1: CoStar coverage for major property types

As of 2012, the Office of Management and Budget has defined 917 core business statsitical areas (CBSAs) in the U.S. CBSAs are defined in footnote 14). The vertical axis in each graph represents the number of CBSAs covered by the CoStar COMPS database.

Figure 1A: General Retail

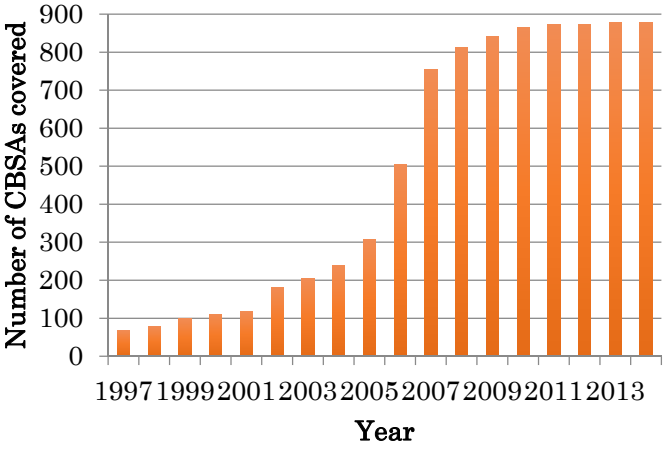

Figure 1B: Office

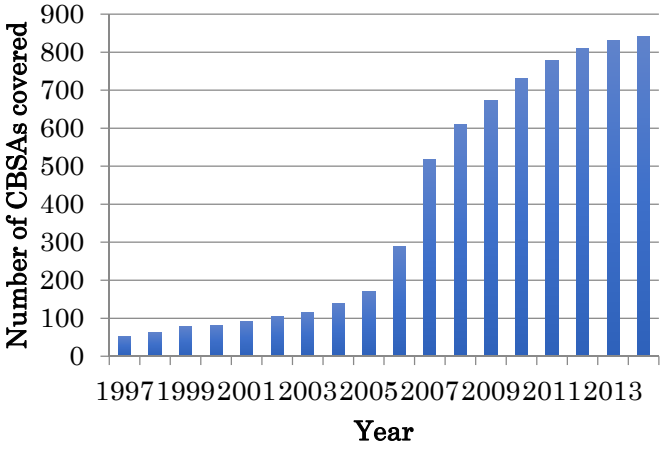

Figure 1C: Industrial

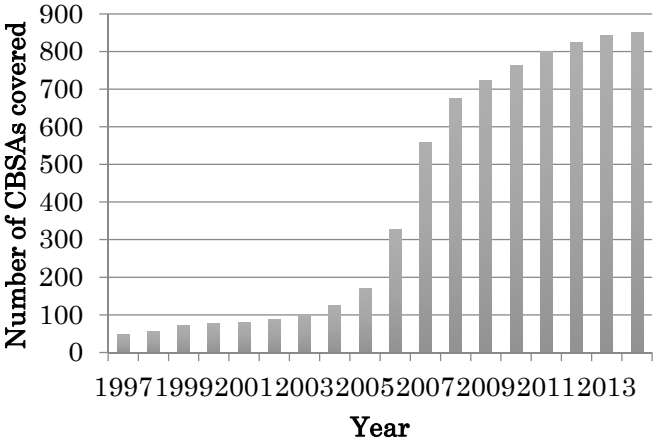

Figure 1D: Multi Family

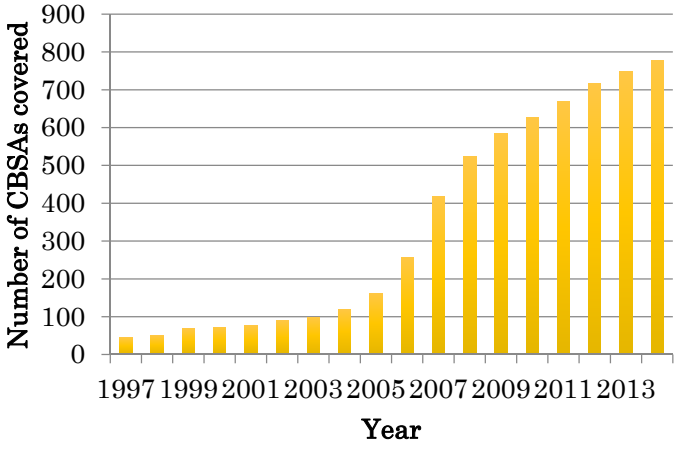

Figure 2: Incremental NPV of exchange as a percentage of property value

Assumptions: price of relinquished and replacement nonresidential property are equal; selling cost of a fully taxable sale and exchange costs are three percent of the relinquished property's sale price; ordinary income tax rate: 39.6 percent; depreciation recapture tax rate: 25 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 6 percent; non-depreciable land portion of the relinquished property's and replacement property's original tax basis: 20 percent (no personal property); The incremental NPV of the exchange, *INCNPVt*, is calculated per equation (A4) in the appendix. π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

Figure 2A: 5 years since acquisition of relinquished property

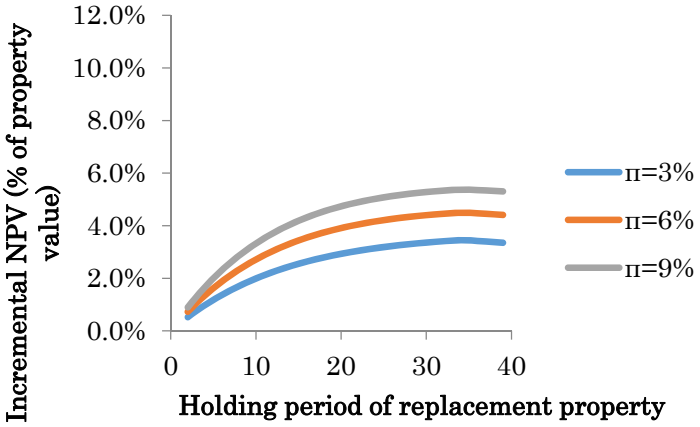

Figure 2B: 10 years since acquisition of relinquished property

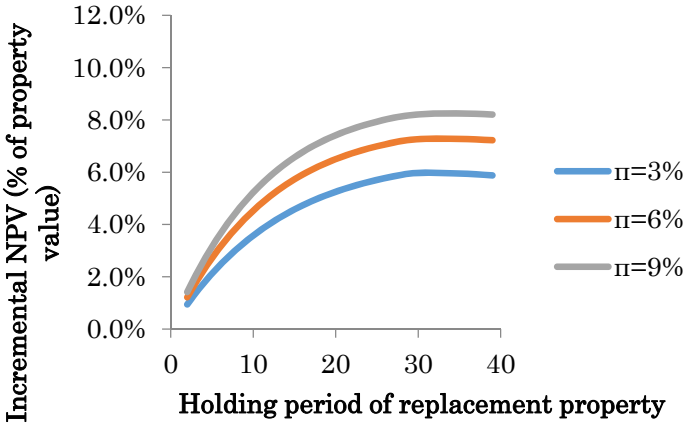

Figure 2C: 15 years since acquisition of relinquished property

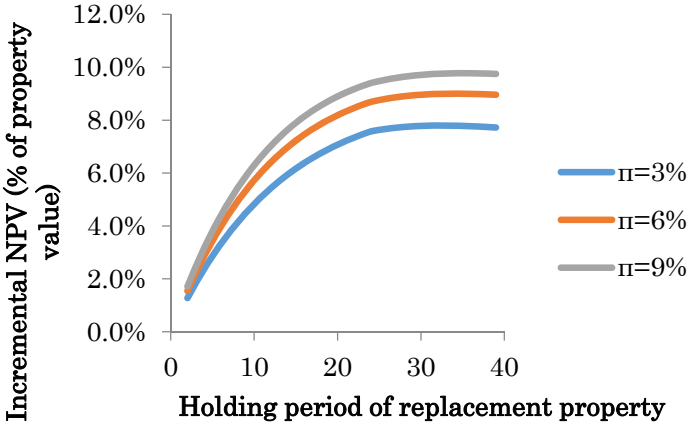

Figure 2D: 20 years since acquisition of relinquished property

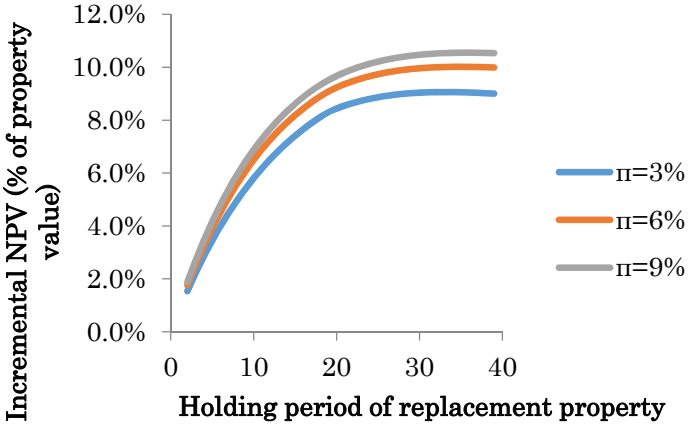

Figure 3: Incremental NPV of nonresidential exchange as a percentage of deferred gain

Assumptions: price of relinquished and replacement nonresidential property are equal; selling cost of a fully taxable sale and exchange costs are three percent of the relinquished property's sale price; ordinary income tax rate: 39.6 percent; depreciation recapture tax rate: 25 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 6 percent; non-depreciable land portion of the relinquished property's and replacement property's original tax basis: 20 percent (no personal property); The incremental NPV of the exchange, *INCNPVt*, is calculated per equation (A4) in the appendix. π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

Figure 3A: 5 years since acquisition of relinquished property

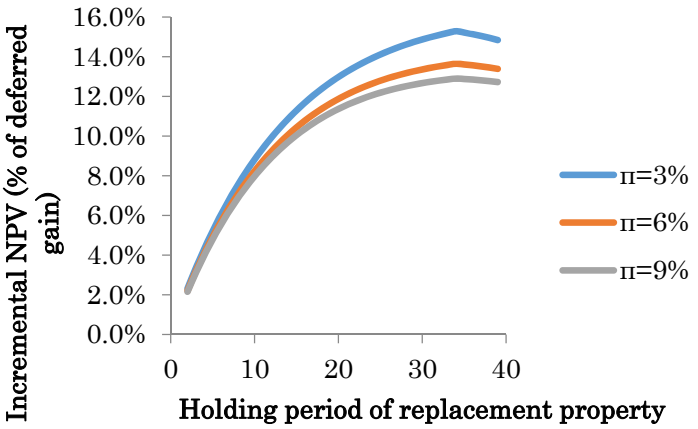

Figure 3B: 10 years since acquisition of relinquished property

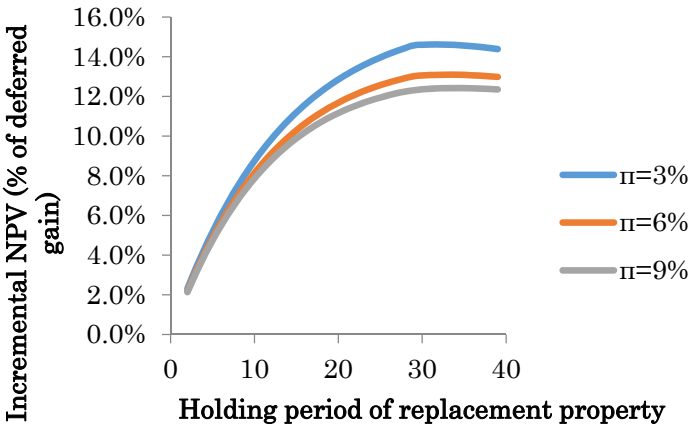

Figure 3C: 15 years since acquisition of relinquished property

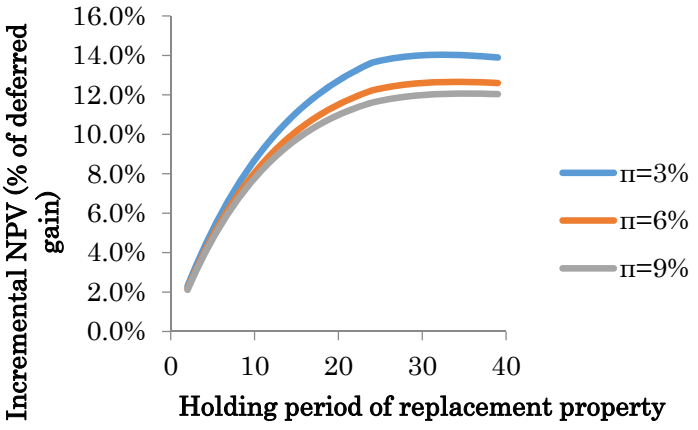

Figure 3D: 20 years since acquisition of relinquished property

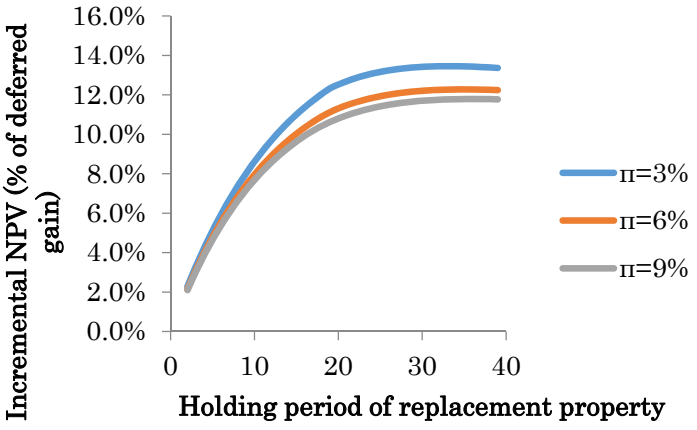

Figure 4: Incremental NPV of exchange as a percentage of deferred taxes

Assumptions: price of relinquished and replacement nonresidential property are equal; selling cost of a fully taxable sale and exchange costs are three percent of the relinquished property's sale price; ordinary income tax rate: 39.6 percent; depreciation recapture tax rate: 25 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 6 percent; non-depreciable land portion of the relinquished property's and replacement property's original tax basis: 20 percent (no personal property); The incremental NPV of the exchange, *INCNPVt*, is calculated per equation (A4) in the appendix. π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

Figure 4A: 5 years since acquisition of relinquished property

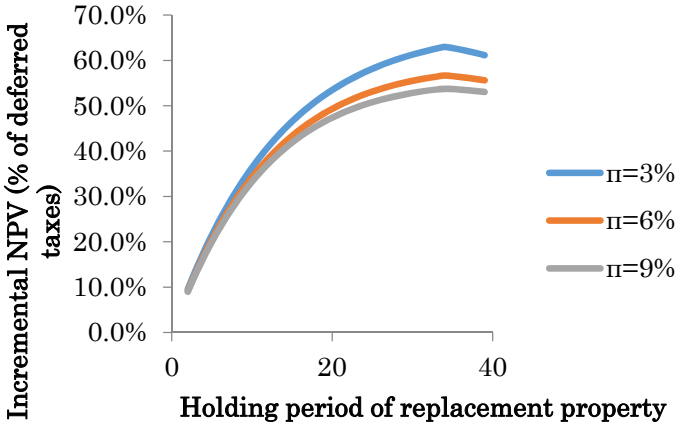

Figure 4B: 10 years since acquisition of relinquished property

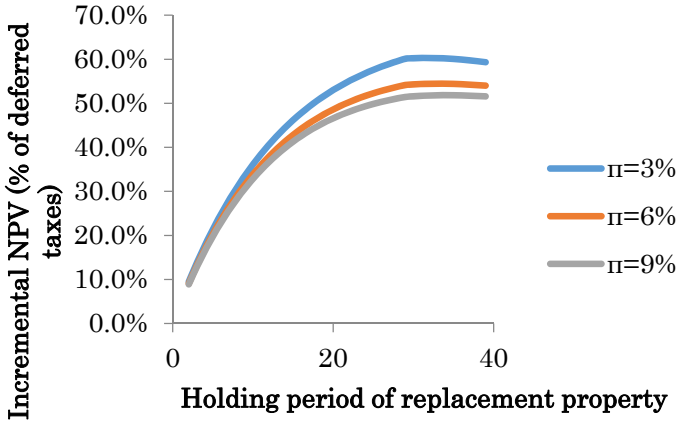

Figure 4C: 15 years since acquisition of relinquished property

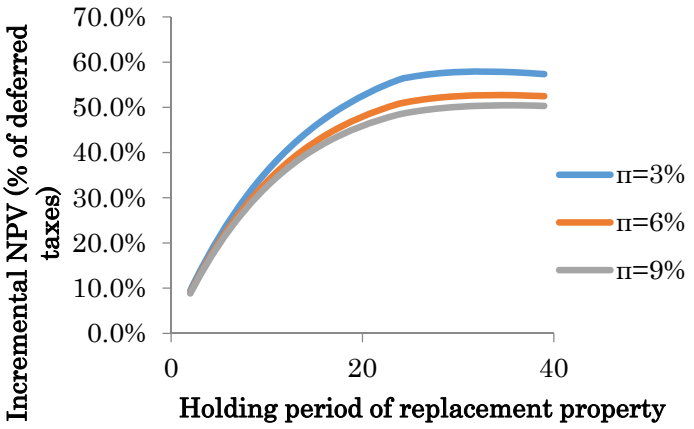

Figure 4D: 20 years since acquisition of relinquished property

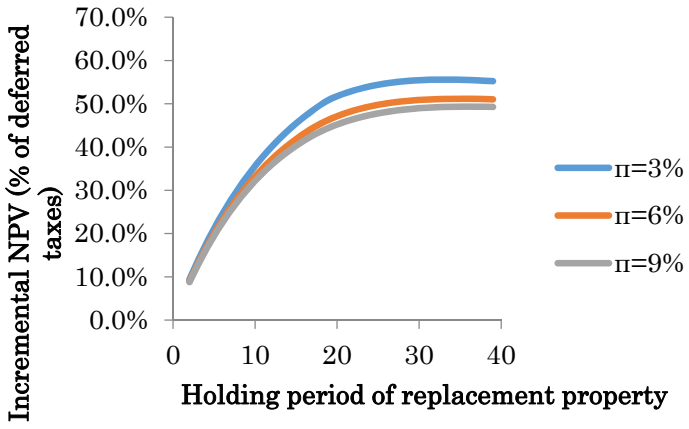

Figure 5: Difference in incremental NPV as a percentage of deferred taxes

Assumptions: price of relinquished and replacement nonresidential property are equal; selling cost of a fully taxable sale and exchange costs are three percent of the relinquished property's sale price; ordinary income tax rate: 39.6 percent; depreciation recapture tax rate: 25 percent; capital gain tax rate: 23.8 percent; non-depreciable land portion of the relinquished property's and replacement property's original tax basis: 20 percent (no personal property); The incremental NPV of the exchange, *INCNPVt*, is calculated per equation (A4) in the appendix. π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

Figure 5A: 5 years since acquisition of relinquished property

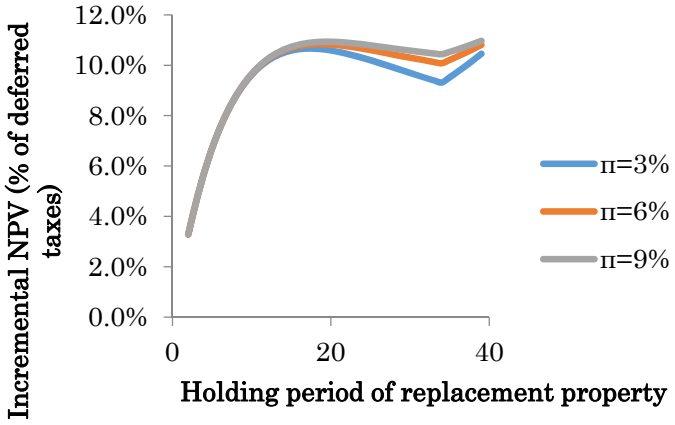

Figure 5B: 10 years since acquisition of relinquished property

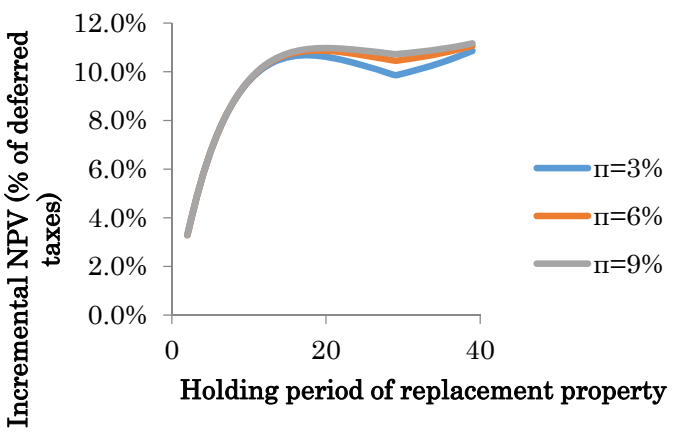

Figure 5C: 15 years since acquisition of relinquished property

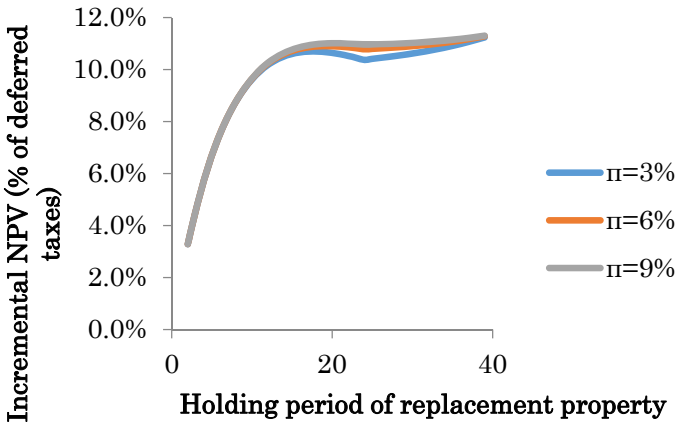

Figure 5D: 20 years since acquisition of relinquished property

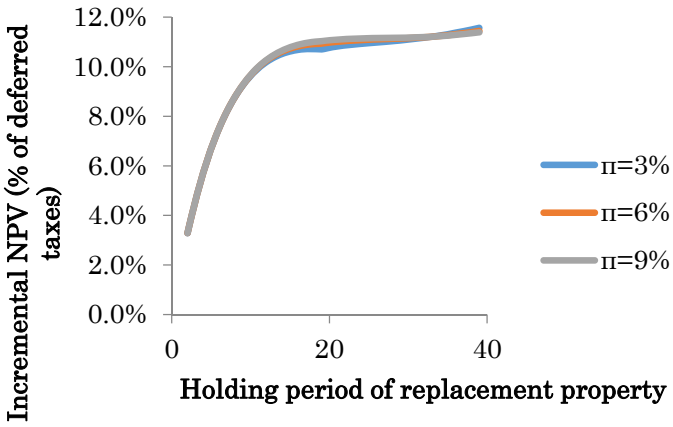

Figure 6: Incremental NPV of residential property exchange as a percentage of deferred taxes

Assumptions: price of relinquished and replacement nonresidential property are equal; selling cost of a fully taxable sale and exchange costs are three percent of the relinquished property's sale price; ordinary income tax rate: 39.6 percent; depreciation recapture tax rate: 25 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 6 percent; non-depreciable land portion of the relinquished property's and replacement property's original tax basis: 20 percent (no personal property); The incremental NPV of the exchange, *INCNPVt*, is calculated per equation (A4) in the appendix. π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

Figure 6A: 5 years since acquisition of relinquished property

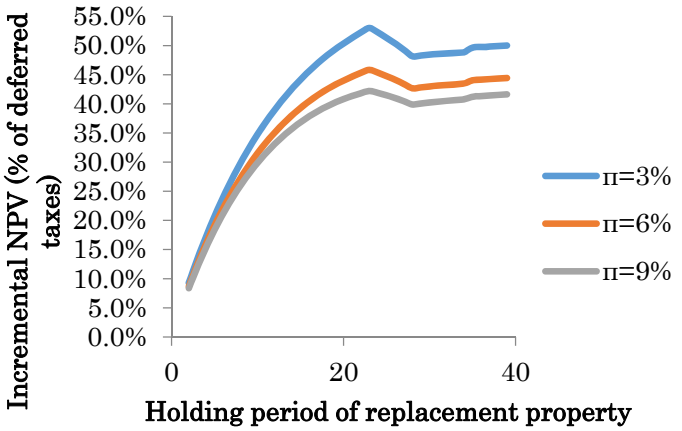

Figure 6B: 10 years since acquisition of relinquished property

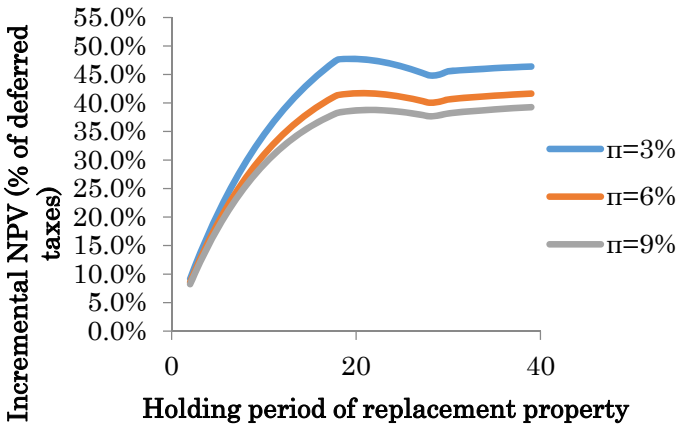

Figure 6C: 15 years since acquisition of relinquished property

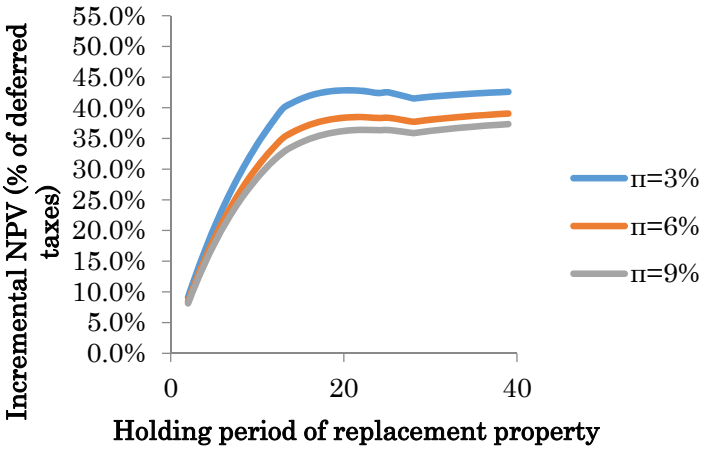

Figure 6D: 20 years since acquisition of relinquished property

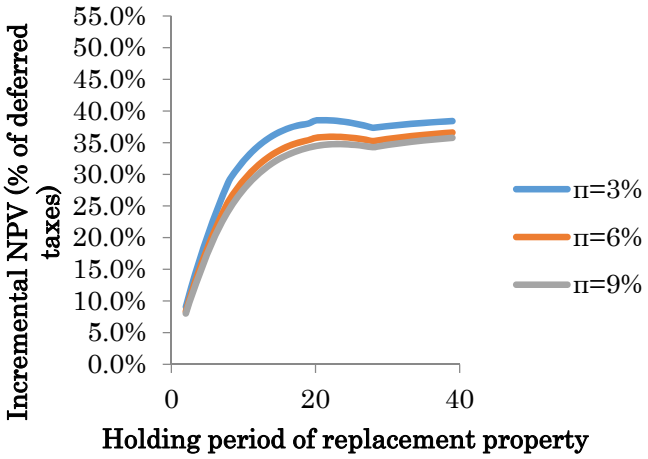

Figure 7-9: Internal rate of return and effective tax rates-nonresidential property

Figure7A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 0\%, \tau_{DR} = 0\%$

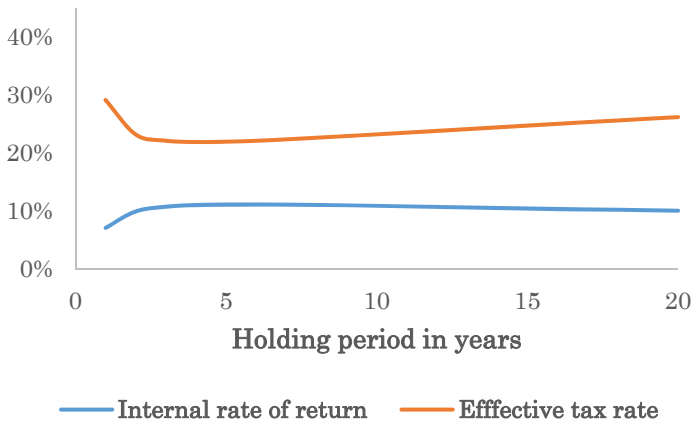

Figure7B: $\tau_{OI} = 52.9\%, \tau_{CG} = 0\%, \tau_{DR} = 0\%$

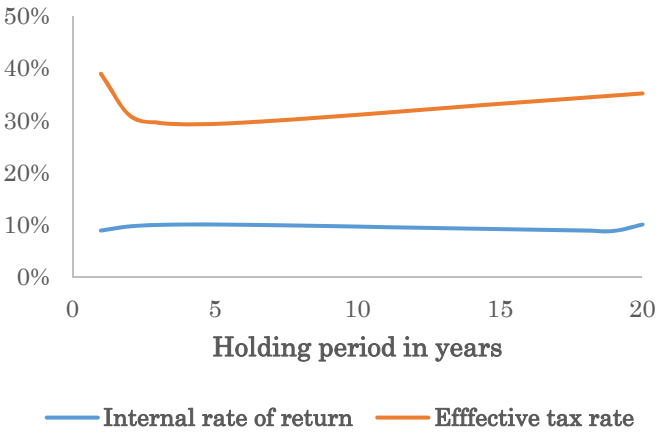

Figure 8A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 23.8\%, \tau_{DR} = 25\%$

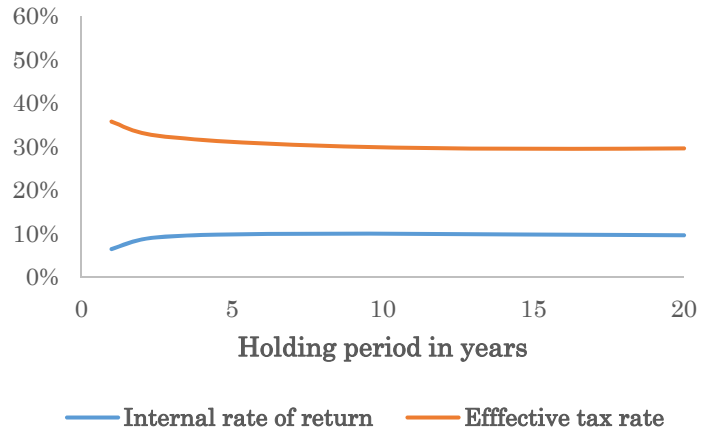

Figure 8B: $\tau_{OI} = 52.9\%, \tau_{CG} = 33\%, \tau_{DR} = 38\%$

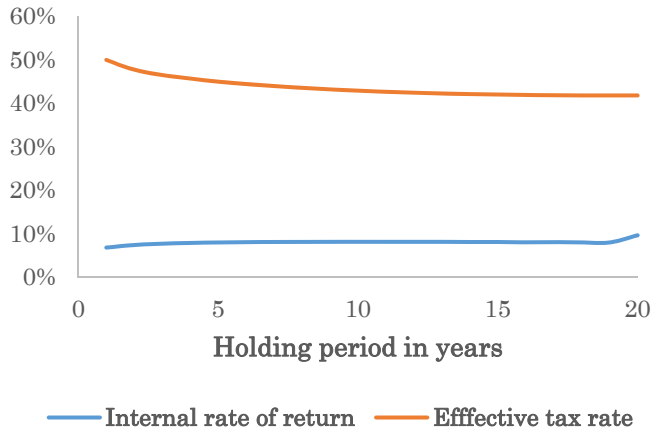

Figure9A: Changes in IRR and ETR

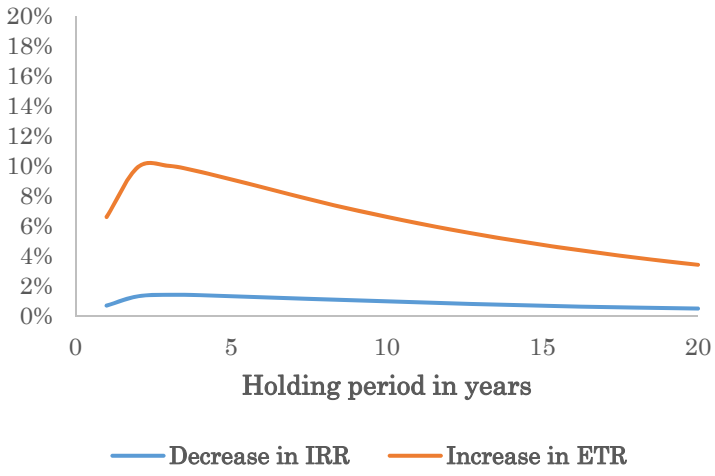

Figure9B: Changes in IRR and ETR

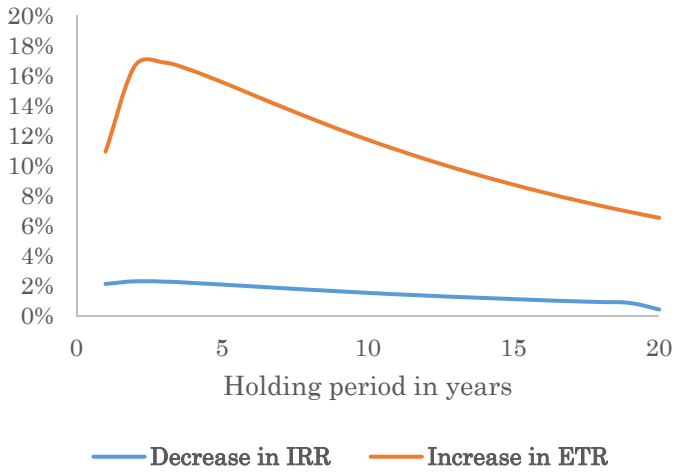

Figure 10: Required decrease in price after elimination of exchange-nonresidential property

Figure10A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 23.8\%, \tau_{DR} = 25\%$

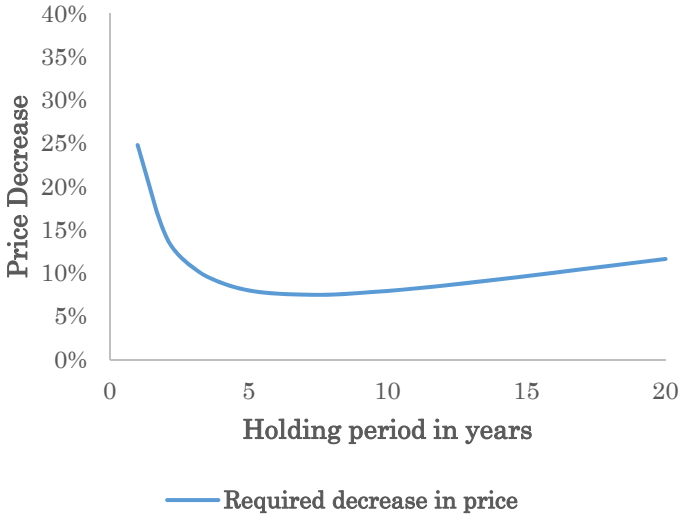

Figure10B: $\tau_{OI} = 52.9\%, \tau_{CG} = 33\%, \tau_{DR} = 38\%$

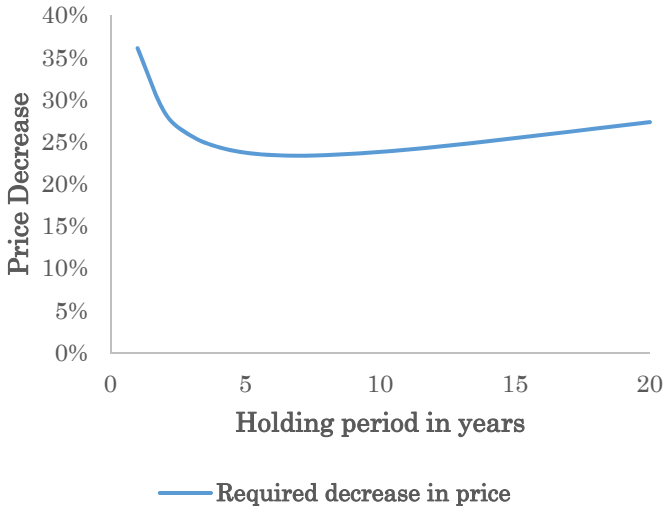

Figure 11: Required increase in rent after elimination of exchange-nonresidential property

Figure11A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 23.8\%, \tau_{DR} = 25\%$

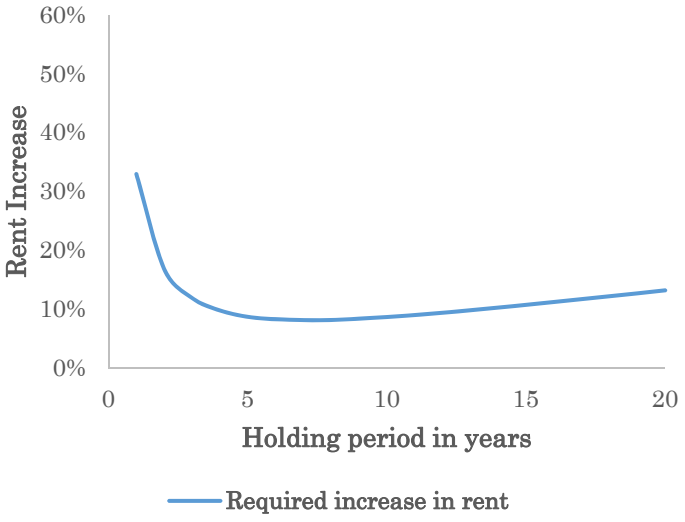

Figure11B: $\tau_{OI} = 52.9\%, \tau_{CG} = 33\%, \tau_{DR} = 38\%$

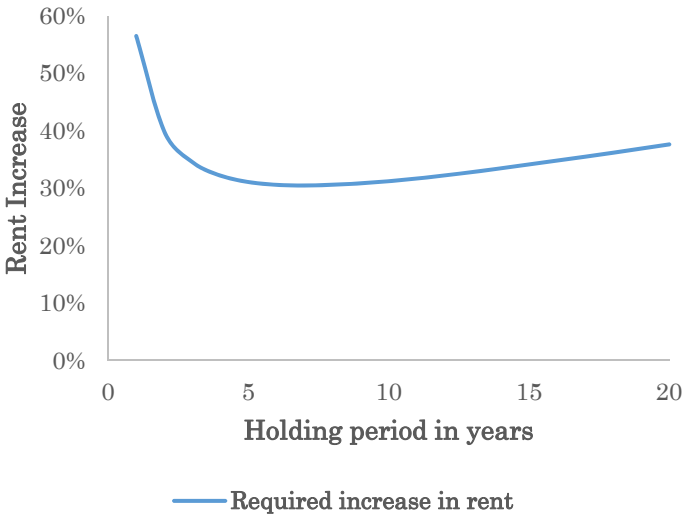

Figure 12: Required decrease in price after elimination of like-kind exchange-residential property

Figure12A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 23.8\%, \tau_{DR} = 25\%$

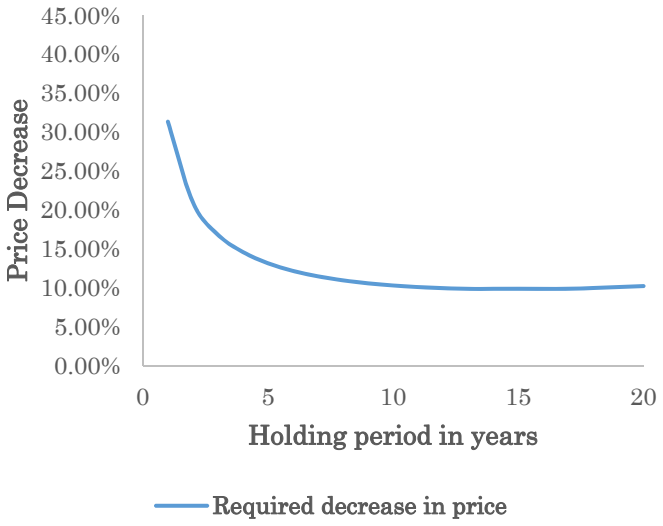

Figure12B: $\tau_{OI} = 52.9\%, \tau_{CG} = 33\%, \tau_{DR} = 38\%$

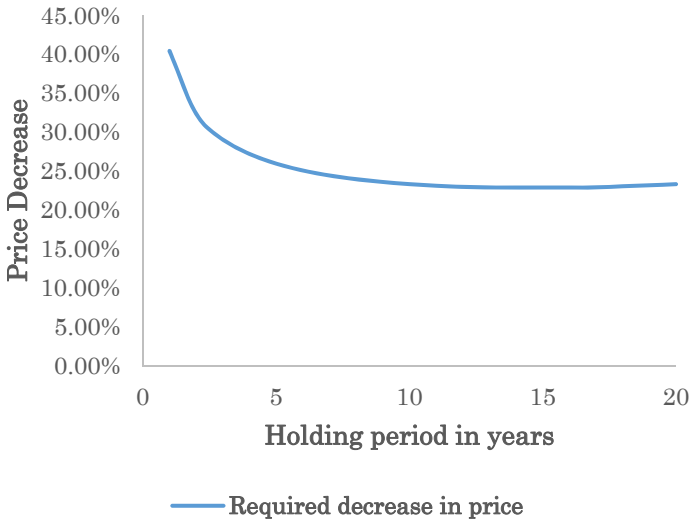

Figure 13: Required increase in rent after elimination of like-kind exchange-residential

Figure13A: $\tau_{OI} = 39.6\%,\ \tau_{CG} = 23.8\%, \tau_{DR} = 25\%$

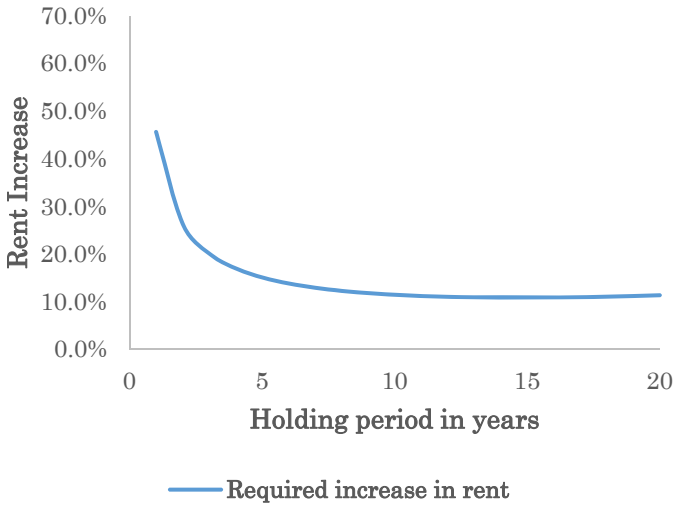

Figure13B: $\tau_{OI} = 52.9\%, \tau_{CG} = 33\%, \tau_{DR} = 38\%$

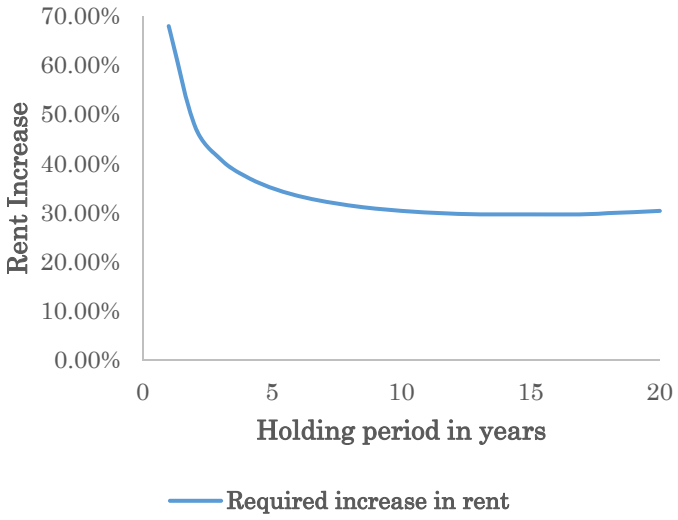

Table 1: Distribution of CoStar exchanges and non-exchanges by year.

Year of Sale	All CoStar sales		CoStar Sales involving an exchange			
	Number	$ Volume (millions)	Number	% of all sales	$ Volume (millions)	% of all sales
1997	41,697	85,550	3,210	8%	5,809	7%
1998	51,792	113,681	4,497	9%	8,356	7%
1999	66,304	124,708	6,228	9%	10,735	9%
2000	66,079	130,547	6,188	9%	12,261	9%
2001	58,539	121,976	5,424	9%	12,919	11%
2002	68,424	143,042	6,209	9%	15,260	11%
2003	73,986	179,602	6,548	9%	18,424	10%
2004	84,469	265,130	6,567	8%	20,262	8%
2005	76,561	355,060	6,045	8%	23,782	7%
2006	86,781	419,588	5,719	7%	25,081	6%
2007	111,003	575,655	5,391	5%	28,275	5%
2008	94,045	247,919	4,199	4%	17,206	7%
2009	75,987	127,821	1,778	2%	4,531	4%
2010	93,778	228,702	1,587	2%	5,456	2%
2011	117,107	328,543	1,696	1%	8,976	3%
2012	139,758	374,980	2,019	1%	10,045	3%
2013	152,932	466,157	3,298	2%	16,427	4%
2014	150,469	519,832	4,501	3%	21,265	4%
Total	**1,609,711**	**4,808,493**	**81,104**	**5%**	**265,068**	**6%**

Table 2: Distribution of CoStar exchange and non-exchange sales by property type: 1997-2014

Property type	All CoStar sales				CoStar sales involving an exchange			
	Number	% of all sales	$ Volume (millions)	% of total $ volume	Number	% of all exchanges	$ Volume (millions)	% of total $ volume of exchanges
General retail	426,222	26%	827,314	17%	18,682	23%	59,595	22%
Land	314,829	20%	570,834	12%	7,664	9%	15,915	6%
Office	249,365	15%	1,326,200	28%	11,388	14%	63,674	24%
Industrial	231,563	14%	459,524	10%	10,531	13%	24,659	9%
Multifamily (≥ 10 units)	158,277	10%	943,967	20%	18,393	23%	74,788	28%
Multifamily (< 10 units)	99,189	6%	67,009	1%	9,447	12%	7,402	3%
Flex	47,701	3%	117,584	2%	2,802	3%	7,769	3%
Speciality	41,943	3%	96,839	2%	1,047	1%	2,700	1%
Hospitality	25,964	2%	258,256	5%	892	1%	7,056	3%
Health care	11,089	1%	121,772	3%	201	0%	1,235	0%
Sports & Entertainment	3,368	0%	19,079	0.4%	54	0%	275	0%
Mixed-Use	201	0%	115	0.0%	2	0%	1	0%
Total	**1,609,711**	**100%**	**4,808,493**	**100%**	**81,104**	**68%**	**265,068**	**72%**

Table 3: Percentage of CoStar sales by property type involved in like-kind exchange

	Full sample: 1997-2014		1997-2007		2008-2014	
Property type	Based on number of sales	Based on $ transaction volume	Based on number of sales	Based on $ transaction volume	Based on number of sales	Based on $ transaction volume
General retail	12%	8%	16%	11%	5%	5%
Land	10%	11%	14%	15%	4%	7%
Office	6%	7%	9%	8%	3%	4%
Industrial	5%	6%	8%	7%	2%	4%
Multifamily (≥ 10 units)	5%	5%	8%	6%	2%	3%
Multifamily (< 10 units)	5%	5%	7%	8%	2%	3%
Flex	4%	7%	7%	10%	2%	5%
Speciality	3%	3%	5%	3%	2%	2%
Hospitality	2%	3%	4%	4%	1%	2%
Health care	2%	3%	3%	3%	1%	2%
Sports & Entertainment	2%	1%	3%	1%	1%	1%
Mixed-Use	2%	1%	3%	3%	0%	0%
Total	**1%**	**1%**	**2%**	**2%**	**1%**	**1%**

Table 4: Distribution of CoStar exchange and non-exchange transactions by CBSA: 1997-2014

	All CoStar sales				CoStar sales involving an exchange			
CBSA	Number	% of all sales	$ Volume (millions)	% of total $ volume	Number	% of all exchanges	$ Volume (millions)	% of total $ volume of exchanges
Los Angeles-Long Beach-Anaheim, CA	131,640	8%	437,244	9%	15,718	19%	43,373	16%
New York-Newark-Jersey City, NY-NJ-PA	115,860	7%	646,876	13%	1,762	2%	24,170	9%
Chicago-Naperville-Elgin, IL-IN-WI	85,811	5%	250,898	5%	2,614	3%	9,074	3%
Miami-Fort Lauderdale-West Palm Beach, FL	63,543	4%	195,446	4%	1,204	1%	5,561	2%
Atlanta-Sandy Springs-Roswell, GA	60,406	4%	178,135	4%	797	1%	2,808	1%
Phoenix-Mesa-Scottsdale, AZ	59,175	4%	179,920	4%	2,544	3%	7,873	3%
San Francisco-Oakland-Hayward, CA	46,299	3%	198,086	4%	6,033	7%	17,861	7%
Denver-Aurora-Lakewood, CO	40,750	3%	102,721	2%	3,580	4%	8,539	3%
Washington-Arlington-Alexandria, DC-VA-MD-	38,990	2%	271,508	6%	829	1%	9,286	4%
Seattle-Tacoma-Bellevue, WA	38,858	2%	140,749	3%	6,480	8%	17,102	6%
Philadelphia-Camden-Wilmington, PA-NJ-DE-	37,764	2%	89,234	2%	553	1%	2,505	1%
Riverside-San Bernardino-Ontario, CA	37,380	2%	88,102	2%	3,077	4%	8,427	3%
San Diego-Carlsbad, CA	32,289	2%	127,906	3%	5,505	7%	16,470	6%
Boston-Cambridge-Newton, MA-NH	30,017	2%	149,016	3%	511	1%	3,479	1%
Las Vegas-Henderson-Paradise, NV	29,217	2%	108,173	2%	2,621	3%	8,415	3%
Tampa-St. Petersburg-Clearwater, FL	28,204	2%	71,777	1%	412	1%	1,279	0%
Detroit-Warren-Dearborn, MI	25,536	2%	32,684	1%	358	0%	1,271	0%
Portland-Vancouver-Hillsboro, OR-WA	23,985	1%	54,815	1%	4,216	5%	9,192	3%
Dallas-Fort Worth-Arlington, TX	23,863	1%	112,375	2%	1,645	2%	7,805	3%
Orlando-Kissimmee-Sanford, FL	23,669	1%	72,741	2%	296	0%	2,151	1%
Sacramento--Roseville--Arden-Arcade, CA	18,335	1%	46,119	1%	1,927	2%	5,553	2%
Minneapolis-St. Paul-Bloomington, MN-WI	17,410	1%	42,910	1%	656	1%	1,933	1%
Houston-Sugar Land-Baytown, TX	15,450	1%	85,500	2%	783	1%	4,674	2%
San Jose-Sunnyvale-Santa Clara, CA	15,261	1%	82,707	2%	1,812	2%	5,827	2%
Tucson, AZ	15,144	1%	21,984	0%	1,249	2%	2,605	1%
Charlotte-Concord-Gastonia, NC-SC	12,174	1%	32,953	1%	296	0%	1,165	0%
Colorado Springs, CO	8,211	1%	14,297	0%	731	1%	1,556	1%
Austin-Round Rock, TX	7,680	0%	35,538	1%	315	0%	1,242	0%
Oxnard-Thousand Oaks-Ventura, CA	6,242	0%	17,903	0%	616	1%	1,710	1%
Santa Rosa, CA	5,840	0%	10,717	0%	873	1%	1,520	1%
Boulder, CO	4,850	0%	8,968	0%	540	1%	1,228	0%
Other	509,858	32%	900,493	19%	10,551	13%	29,417	11%
Total	**1,609,711**	**100%**	**4,808,493**	**100%**	**81,104**	**100%**	**265,068**	**100%**

Table 5: Percentage of all U.S. like-kind exchanges in each state-1997-2014

	Based on:			
	Number of sales		$ Transaction volume	
State	Percentage	Cumulative	Percentage	Cumulative
California	46.5%	46.5%	39.7%	39.7%
Washington	9.1%	55.6%	7.3%	46.9%
Colorado	6.4%	62.0%	4.6%	51.5%
Oregon	5.1%	67.1%	3.4%	54.9%
Arizona	4.8%	71.9%	4.0%	58.9%
Texas	3.7%	75.6%	5.5%	64.4%
Nevada	3.5%	79.0%	3.4%	67.8%
Illinois	3.3%	82.3%	3.5%	71.2%
Florida	3.0%	85.4%	4.1%	75.3%
New York	1.7%	87.1%	7.8%	83.1%
Ohio	1.2%	88.3%	0.9%	84.1%
Georgia	1.1%	89.5%	1.2%	85.3%
North Carolina	0.9%	90.4%	0.9%	86.2%
Minnesota	0.9%	91.2%	0.8%	87.0%
New Jersey	0.8%	92.0%	1.8%	88.8%
Massachusetts	0.7%	92.8%	1.4%	90.2%
Virginia	0.7%	93.5%	1.8%	92.0%
Maryland	0.7%	94.2%	1.0%	93.1%
Pennsylvania	0.6%	94.9%	0.9%	93.9%
Michigan	0.6%	95.5%	0.6%	94.5%
Wisconsin	0.5%	96.0%	0.4%	94.9%
Utah	0.5%	96.5%	0.3%	95.2%
South Carolina	0.4%	96.9%	0.3%	95.6%
Missouri	0.3%	97.3%	0.3%	95.8%
Tennessee	0.3%	97.6%	0.4%	96.2%
Hawaii	0.3%	97.8%	0.5%	96.7%
Oklahoma	0.2%	98.0%	0.2%	96.9%
District of Columbia	0.2%	98.2%	1.4%	98.3%
Indiana	0.2%	98.4%	0.2%	98.5%
Iowa	0.2%	98.6%	0.1%	98.6%
Connecticut	0.2%	98.8%	0.2%	98.8%
Remaining 20 states	1.2%	100.0%	1.2%	100.0%

Table 6: Percentage of CoStar sales by MSA involved in exchange-1997-2014

CBSA	Based on: Number of sales	Based on: $ transaction volume
Portland-Vancouver-Hillsboro, OR-WA	18%	17%
San Diego-Carlsbad, CA	17%	13%
Seattle-Tacoma-Bellevue, WA	17%	12%
Santa Rosa, CA	15%	14%
San Francisco-Oakland-Hayward, CA	13%	9%
Los Angeles-Long Beach-Anaheim, CA	12%	10%
San Jose-Sunnyvale-Santa Clara, CA	12%	7%
Boulder, CO	11%	14%
Sacramento--Roseville--Arden-Arcade, CA	11%	12%
Oxnard-Thousand Oaks-Ventura, CA	10%	10%
Las Vegas-Henderson-Paradise, NV	9%	8%
Colorado Springs, CO	9%	11%
Denver-Aurora-Lakewood, CO	9%	8%
Tucson, AZ	8%	12%
Riverside-San Bernardino-Ontario, CA	8%	10%
Dallas-Fort Worth-Arlington, TX	7%	7%
Houston-Sugar Land-Baytown, TX	5%	5%
Phoenix-Mesa-Scottsdale, AZ	4%	4%
Austin-Round Rock, TX	4%	3%
Minneapolis-St. Paul-Bloomington, MN-WI	4%	5%
Chicago-Naperville-Elgin, IL-IN-WI	3%	4%
Charlotte-Concord-Gastonia, NC-SC	2%	4%
Washington-Arlington-Alexandria, DC-VA-MD-WV	2%	3%
Miami-Fort Lauderdale-West Palm Beach, FL	2%	3%
Boston-Cambridge-Newton, MA-NH	2%	2%
New York-Newark-Jersey City, NY-NJ-PA	2%	4%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	1%	3%
Tampa-St. Petersburg-Clearwater, FL	1%	2%
Detroit-Warren-Dearborn, MI	1%	4%
Atlanta-Sandy Springs-Roswell, GA	1%	2%
Orlando-Kissimmee-Sanford, FL	1%	3%
Total US	**5%**	**6%**

Table 7: Real estate exchanges as a percentage of all CoStar sales in each state-1997-2014

State	Based on: Number of sales	Based on: $ transaction volume	State	Based on: Number of sales	Based on: $ transaction volume
Oregon	16.3%	15.9%	Maryland	1.8%	2.6%
Washington	15.0%	12.0%	Delaware	1.7%	1.8%
California	11.6%	9.9%	Ohio	1.7%	2.9%
Nevada	8.6%	7.7%	Wisconsin	1.7%	3.3%
Utah	8.5%	7.4%	Massachusetts	1.6%	2.3%
Colorado	8.4%	8.9%	New Hampshire	1.5%	3.0%
Hawaii	7.9%	6.2%	New York	1.5%	3.7%
Alaska	7.2%	5.8%	South Dakota	1.5%	2.2%
Texas	5.1%	5.5%	Florida	1.5%	2.5%
Arizona	5.0%	5.2%	Oklahoma	1.4%	2.5%
Montana	4.9%	6.5%	Alabama	1.3%	2.5%
Idaho	3.8%	7.5%	Georgia	1.3%	1.6%
Wyoming	3.5%	4.6%	Kentucky	1.3%	1.9%
Minnesota	3.5%	4.6%	Connecticut	1.2%	2.3%
Illinois	2.9%	3.6%	Indiana	1.2%	2.5%
New Mexico	2.5%	3.4%	New Jersey	1.2%	3.4%
District of Columbia	2.2%	3.9%	Michigan	1.2%	3.4%
Kansas	2.2%	3.3%	Pennsylvania	1.1%	2.2%
Missouri	2.1%	2.6%	Louisana	1.1%	3.0%
North Carolna	2.0%	2.9%	Vermont	1.0%	0.6%
South Carolina	2.0%	2.7%	Tennessee	1.0%	2.5%
Mississippi	2.0%	1.3%	West Virginia	0.8%	0.8%
North Dakota	2.0%	4.1%	Maine	0.8%	1.8%
Iowa	2.0%	2.9%	Arkansas	0.7%	1.5%
Nebraska	1.9%	5.1%	Rhode Island	0.5%	1.4%
Virginia	1.8%	3.1%			

Table 8: Estimated losses to Treasury from real estate like-kind exchanges (in $billions)

											2003-2011	
Individuals + Corporations + Partnerships	2011	2010	2009	2008	2007	2006	2005	2004	2003	2003	Sum	Mean
FMV of all like-kind property received (Form 8824, line 17)	$70.8	$78.6	$63.3	$118.4	$199.4	$219.7	$223.8	$176.4	$117.4	$97.3	$1,267.8	$140.9
Deferred gain from all industries (From 8824, line 24)	33.7	39.9	33.8	56.1	90.0	102.8	101.4	73.7	46.0	40.1	577.2	64.1
Deferred gain from RE is 66% of total (based on 2007 data):												
Deferred gain from RE industry	22.2	26.3	22.3	37.0	59.4	67.8	66.9	48.6	30.3	26.4	381.0	42.3
Estimated deferred tax liability from RE industry	4.7	5.5	4.7	7.8	12.5	14.2	14.1	10.2	6.4	5.6	80.0	8.9
Estimated economic loss to Treasury:												
Minimum-9.2% of deferred tax liability	0.4	0.5	0.4	0.7	1.1	1.3	1.3	0.9	0.6	0.5	7.4	0.8
Average-45.0% of deferred tax liability	2.1	2.5	2.1	3.5	5.6	6.4	6.3	4.6	2.9	2.5	36.0	4.0
Maximum-64.0% of deferred tax liability	3.0	3.5	3.0	5.0	8.0	9.1	9.0	6.5	4.1	3.6	51.2	5.7
Deferred gain from RE is 30% of total deferred gain:												
Deferred gain from RE industry	10.1	12.0	10.1	16.8	27.0	30.8	30.4	22.1	13.8	12.0	173.2	19.2
Estimated deferred tax liability from RE industry	2.1	2.5	2.1	3.5	5.7	6.5	6.4	4.6	2.9	2.5	36.4	4.0
Estimated economic loss to Treasury:												
Minimum-9.2% of deferred tax liability	0.2	0.2	0.2	0.3	0.5	0.6	0.6	0.4	0.3	0.2	3.3	0.4
Average-45.0% of deferred tax liability	1.0	1.1	1.0	1.6	2.6	2.9	2.9	2.1	1.3	1.1	16.4	1.8
Maximum-64.0% of deferred tax liability	$1.4	$1.6	$1.4	$2.3	$3.6	$4.1	$4.1	$3.0	$1.9	$1.6	$23.3	$2.6

Table 9: Summary statistics for differences between relinquished and replacement property prices for like-kind exchanges vs. ordinary sales

This table presents summary statistics for differences in replacement and relinquished property prices by the same investor when the replacement property acquisition is completed within 180 days of the closing on the relinquished property and there are no other sales conditions. Price differences are expressed in dollars. Panel A presents the statistics by investors in real estate like-kind exchanges and investors in non-exchange related transactions. Panel B presents the statistics when the replacement property is more expensive than the relinquished property. Panel C presents the results when the replacement property is less expensive. To eliminate the effect of large price differences we also trimmed and winsorized price differences at the 5% level in both tails of the distribution. We also report the statistics for a modified 1-step Huber estimation approach, which also removes the effect of outliers. The price difference between the replacement and relinquished property price is positive 66 percent of the time in like-kind exchanges and 51 percent of the time in ordinary sales.

Panel A: Difference in replacement and relinquished property price in all round-trip (sale followed by an acquisition) transactions

	Like-kind exchanges		Ordinary sales			
Price Difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	$305,000		$0		$305,000	
Trimmed	411,974	1,160,833	(77,641)	1,342,274	489,615	***
Winsorized	422,212	1,521,802	(125,082)	1,860,107	547,294	***
Modified 1-step	349,830	867,190	22,893	839,540	326,937	***

Panel B: Difference in replacement and relinquished property price when $P_{replacement}$-$P_{relinquished}$>0

	Like-kind exchanges		Ordinary sales			
Price Difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	$792,500		$605,000		$187,500	
Trimmed	1,110,816	1,029,177	1,070,075	1,226,849	40,741	
Winsorized	1,237,791	1,284,321	1,288,063	1,682,284	(50,273)	
Modified 1-step	790,597	652,735	617,323	577,176	173,274	***

Panel C: Difference in replacement and relinquished property price when $P_{replacement}$-$P_{relinquished}$<0

	Like-kind exchanges		Ordinary sales			
Price Difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	($722,067)		($735,000)		$12,933	
Trimmed	(1,173,417)	1,297,199	(1,388,033)	1,675,901	214,616	***
Winsorized	(1,349,894)	1,627,167	(1,693,225)	2,303,570	343,331	***
Modified1-step	(725,172)	678,380	(728,399)	686,980	3,227	

Table 10: Summary statistics for differences between relinquished and replacement property prices for like-kind exchanges vs. ordinary sales expressed as percentage of value of the relinquished property

This table presents summary statistics for differences in replacement and relinquished property prices for the same investor when the replacement property acquisition is completed within 180 days of the closing on the relinquished property. The difference in price is expressed as a percentage of the value of the relinquished property. Panel A presents the statistics for all matched transactions. Panel B presents the statistics when the replacement property is more expensive than the relinquished property. Panel C presents the results when the replacement property is less expensive than the relinquished property. To eliminate the effect of very large price differences we trimmed and winsorized price differences at the 5% level in both tails of the distribution. We also report the statistics for a modified 1-step Huber estimation approach, which also removes the effect of outliers. The price difference between replacement and relinquished property price is positive in 66 percent of the matched like-kind exchanges and 51 percent of the time in ordinary sales.

Panel A: Difference in replacement and relinquished property price in all round-trip (sale followed by an acquisition) transactions

	Like-kind exchanges		Ordinary transactions			
Price difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	0.3333		0.0000		0.33	
Trimmed	0.4668	0.8148	0.2998	1.0344	0.17	***
Winsorized	0.5411	1.0027	0.4584	1.3918	0.08	**
Modified 1-step	0.3020	0.7082	0.0013	0.6744	0.30	***

Panel B: Difference in replacement and relinquished property price when $P_{replacement}$-$P_{relinquished}$>0

	Like-kind exchanges		Ordinary transactions			
Price difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	0.7024		0.78		(0.08)	
Trimmed	0.9609	0.8224	1.324	1.5342	(0.36)	***
Winsorized	1.0555	1.0215	1.6285	2.2018	(0.57)	***
Modified 1-step	0.7122	0.5461	0.7865	0.7096	(0.07)	***

Panel C: Difference in replacement and relinquished property price when $P_{replacement}$-$P_{relinquished}$<0

	Like-kind exchanges		Ordinary transactions			
Price difference	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Median	-0.3917		-0.4946		0.10	
Trimmed	-0.3914	0.2209	-0.4822	0.2441	0.09	***
Winsorized	-0.3948	0.2430	-0.4819	0.2686	0.09	***
Modified1-step	-0.3977	0.2508	-0.4827	0.2737	0.09	***

Table 11: Summary statistics for percentage differences between replacement and relinquished property prices for like-kind exchanges vs. ordinary sales by year

This table presents summary statistics by year for differences in replacement and relinquished property prices for the same investor when the replacement property acquisition is completed within 180 days of closing on the sale of the relinquished property. We report median price differences to eliminate the effect of outliers. For the full sample, the price difference is positive 66 percent of the time in like-kind exchanges and 51 percent of the time in non-tax motivated transactions.

	Like-kind exchanges	Ordinary sales	
Year	Median difference	Median difference	Difference in difference
1997	$174,500	$35,680	$138,820
1998	510,000	-	510,000
1999	146,000	26,125	119,875
2000	240,500	13,000	227,500
2001	210,000	35,000	175,000
2002	445,000	42,611	402,389
2003	377,797	13,150	364,647
2004	430,000	100,000	330,000
2005	435,000	37,000	398,000
2006	455,000	(75,000)	530,000
2007	(117,500)	-	(117,500)
2008	100,000	(17,500)	117,500
2009	172,682	17,107	155,575
2010	330,000	-	330,000
2011	1,091,000	10,000	1,081,000
2012	78,500	-	78,500
2013	(40,000)	(56,106)	16,106
2014	977,500	(88,750)	1,066,250
Full sample	$305,000	-	$305,000

Table 12: Summary statistics for differences between replacement and relinquished property prices for like-kind exchanges vs. ordinary sales, expressed as a percentage of the relinquished property price, by year

This table presents summary statistics by year for differences in replacement and relinquished property prices for the same investor when the replacement property acquisition is completed within 180 days of the sale of the relinquished property. We report median price differences to eliminate any effect of outliers. The price difference between replacement and relinquished property price is positive 66 percent of the time in like-kind exchanges and 51 percent of the time in non-tax motivated transactions.

	Like-kind exchanges	Ordinary sales	
Year	% median price difference	% median price difference	Difference in difference
1997	20%	8%	12%
1998	63%	0%	63%
1999	27%	3%	24%
2000	44%	2%	41%
2001	26%	7%	19%
2002	43%	6%	37%
2003	39%	1%	38%
2004	38%	11%	27%
2005	40%	3%	37%
2006	24%	-5%	28%
2007	-4%	0%	-4%
2008	2%	-2%	4%
2009	10%	3%	8%
2010	15%	0%	15%
2011	76%	1%	75%
2012	-4%	0%	-4%
2013	-3%	-11%	8%
2014	60%	-12%	72%
Full sample	33%	0%	33%

Table 13: Summary statistics for differences between replacement and relinquished property prices for like-kind exchanges vs. ordinary sales by state

This table presents summary statistics by state for differences in replacement and relinquished property prices for the same investor when the replacement property acquisition is completed within 180 days of the sale of the relinquished property. We report median price differences to eliminate any effect of outliers. Panels A and B present the price differences expressed in dollars and percentage of relinquished property value, respectively. We only report data for states in which there is a sufficient number of like-kind exchanges.

	Panel A: Difference in prices expressed in dollars			Panel B: Difference in prices expressed in percentage of relinquished property value		
	Like-kind exchanges	Ordinary sales		Like-kind exchanges	Ordinary sales	
Year	Median difference	Median difference	Difference in difference	Median difference	Median difference	Difference in difference
Arizona	($146,500)	$56,874	($181,500)	-15%	5%	-20%
California	350,000	75,500	267,298	34%	8%	27%
Colorado	142,500	0	215,000	8%	0%	8%
Florida	315,500	-26,700	294,900	27%	-4%	30%
Illinois	310,000	-27,500	322,300	38%	-5%	43%
Maryland	100,000	-22,330	117,892	35%	-3%	38%
Minnesota	396,000	90,000	650,110	23%	23%	0%
Nevada	131,240	-150,000	277,032	21%	-12%	33%
New York	280,000	-50,000	340,000	22%	-4%	27%
Ohio	345,000	-17,700	384,350	29%	-4%	34%
Oregon	385,625	37,829	393,125	47%	4%	43%
Texas	510,000	20,500	320,000	43%	4%	39%
Washington	349,400	11,948	334,999	44%	1%	43%
Full sample	**305,000**	**0**	**305,000**	**33%**	**0%**	**33%**

Table 14: Summary statistics for initial leverage used by investors in like-kind exchanges vs. ordinary sales

This table presents summary statistics for initial leverage used by investors to acquire a property within 180 days of the sale of another property. Leverage is defined as the initial amount of mortgage debt divided by the property's acquisition price. Statistics are presented for leverage used to acquire replacement properties in like-kind exchanges and ordinary acquisitions when there are no additional sale conditions, associated with the transaction. Panel A presents the statistics for an unbalanced panel of all transactions in the sample period; Panel B presents the statistics for a balanced panel based on one-on-one match of like-kind exchange properties with ordinary acquisitions. The matching is conducted using a propensity score approach, described in Appendix 2. We drop observations where leverage is negative or larger than one to eliminate the effect of data errors and outliers.

	Like-kind exchanges acquisitions		Ordinary acquisitions			
Leverage	Estimate	Std. dev.	Estimate	Std. dev.	Difference	Significance
Panel A: Unbalanced sample						
Mean (all)	49%	31%	48%	37%	0.9%	***
Median (all)	61%		64%		-3.0%	
Mean (all; no conditions)	50%	30%	50%	37%	-0.3%	
Median (all; no conditions)	62%		66%		-3.7%	
Panel B: One-on-one (like-kind exchange – sale) matched sample using propensity-score matching						
Mean (matched sales)	52%	29%	57%	31%	-5.7%	***
Median (matched sales)	63%		70%		-6.8%	***
Mean (matched sales; no conditions)	53%	29%	58%	30%	-5.6%	***
Median (matched sales; no conditions)	64%		70%		-5.8%	***

Table 15: Summary statistics by year for initial leverage used by investors to acquire replacement properties for exchanges and ordinary acquisitions

This table presents the mean leverage used by investors each year to acquire a property within 180 days of a sale of another property. We use a one-on-one match of like-kind exchange properties with ordinary acquisitions. The matching is conducted with a propensity-score approach, described in Appendix 2. We drop observations where leverage is negative or larger than one to eliminate the effect of data errors and outliers. Leverage is defined as total initial mortgage debt divided by the property's acquisition price.

	Like-kind exchanges	Ordinary acquisitions	
Year	Mean leverage	Mean leverage	Difference
1997	54%	56%	-2.6%
1998	54%	58%	-4.1%
1999	55%	61%	-6.0%
2000	50%	57%	-6.3%
2001	53%	58%	-5.9%
2002	55%	59%	-3.2%
2003	55%	59%	-3.9%
2004	56%	60%	-4.1%
2005	53%	59%	-6.0%
2006	51%	59%	-7.6%
2007	49%	56%	-6.9%
2008	44%	56%	-12.3%
2009	40%	48%	-8.4%
2010	34%	42%	-8.7%
2011	37%	44%	-6.7%
2012	35%	44%	-9.3%
2013	38%	46%	-7.7%
2014	38%	46%	-8.0%
Full sample	53%	58%	-5.8%

Table 16: Summary statistics by state for initial leverage used by investors in like-kind exchanges vs. ordinary acquisitions

This table presents mean initial leverage used by investors to acquire a replacement (new) property within 180 days of closing on the relinquished (sold) property. We use a one-on-one match of like-kind exchange acquisitions with ordinary acquisitions conducted with a propensity-score approach, described in Appendix 2. We drop observations where leverage is negative or larger than one to eliminate the effect of data errors and outliers. Leverage is defined as initial mortgage debt divided by the property's acquisition price. We only report data for states in which there is sufficient number of like-kind exchanges.

	Like-kind exchanges	Ordinary acquisitions	
Year	Mean leverage	Mean leverage	Difference
Arizona	57%	57%	0.0%
California	52%	58%	-6.1%
Colorado	53%	59%	-5.9%
Florida	51%	58%	-7.0%
Georgia	42%	54%	-12.0%
Illinois	54%	57%	-3.3%
Massachusetts	51%	56%	-4.9%
Maryland	50%	42%	8.2%
Michigan	48%	51%	-2.9%
Minnesota	51%	64%	-13.7%
Missouri	58%	72%	-13.8%
North Carolina	46%	40%	5.9%
New Jersey	51%	55%	-4.0%
Nevada	38%	45%	-7.7%
New York	27%	40%	-13.4%
Ohio	51%	58%	-6.8%
Oregon	54%	54%	-0.5%
Pennsylvania	56%	56%	-0.1%
Texas	52%	52%	-0.9%
Virginia	50%	53%	-3.0%
Washington	54%	58%	-3.9%
Wisconsin	57%	65%	-7.7%
Full sample	53%	58%	-5.8%

Table 17: Summary statistics for capital expenditures for replacement properties in exchanges and ordinary acquisitions

This table presents average capital expenditures for exchange replacement properties (during the like-king exchange post-acquisition period) and ordinary acquisitions. In Panel A, we report annualized total capital expenditures, tenant improvements, building improvements, building expansion expenses, and other capital expenditures (including intangible improvements to the property, such as free rent and buy-outs) for the entire sample. Panel B reports the corresponding statistics for a one-on-one matched sample, where the matching is based on a propensity score model, which controls for age, age squared, square footage, number of parking spaces, number of floors, vacancy, location, time and property type. All expenditures expenses are scaled by the square footage of the property.

	Replacement exchange acquisitions		Ordinary acquisitions			
Panel A: Annualized capital expenditures per square foot (all properties)						
	Mean	Std. dev.	Mean	Std. dev.	Dif.	Significance
Capex/sf (excl. LC)	1.53	1.97	1.26	2.18	0.27	P(T>t)=0.22
Tenant improvement/sf	0.55	0.89	0.64	1.03	-0.09	
Building improvements/sf	0.57	0.80	0.39	0.78	0.18	P(T>t)=0.07
Building expansion/sf	0.002	0.016	0.004	0.046	-0.002	
Other capex/sf	0.15	0.49	0.13	0.61	0.02	
Panel B: Annualized capital expenditures per square foot (similar properties)						
Capex/sf (excl. LC)	1.78	2.15	1.38	1.34	0.40	P(T>t)=0.20
Tenant improvement/sf	0.65	0.96	0.77	0.98	-0.13	
Building improvements/sf	0.64	0.87	0.41	0.60	0.24	
Building expansion/sf	0.003	0.018	0.008	0.041	-0.004	
Other capex/sf	0.18	0.56	0.13	0.19	0.05	P(T>t)=0.11

Table 18: Summary statistics for holding periods of investors in like-kind exchanges vs. ordinary sales

This table presents summary statistics for holding periods by exchange vs. non-exchange investments. Panel A provides the statistics for all sales in the sample, eliminating all repeating observations (1,579,547). If a property is acquired during the sample period but not sold, we calculate its holding period as the difference in years between Dec. 31, 2014 and the property's acquisition date. We are not able to break down the sample of holding periods for all sales by exchanges and non-exchanges, since we don't know for the properties that remain in the sample in 2014, which ones will sell in a disposition exchange. Panel B presents the statistics only for properties that transacted at least twice during our sample period (336,572). Exchange disposition sales represent 2.4 percent of the sample of repeat sales. Note that properties sold in exchange disposition sales may have been purchased in an ordinary acquisition or as a part of a replacement exchange. Panel C presents the summary statistics for holding periods of investors in a one-on-one matched sample of exchange and non-exchange dispositions, based on the repeat sales sample. The propensity-score model utilized for the matching is as described in Appendix 2, although the coefficient estimates vary with the different samples used.

Panel A: All properties				
Holding period	Mean	Std. dev.	Min	Max
All sales	6.63	5.09	0.00	17.94
Panel B: Repeat sales				
Holding period	Mean	Std. dev.	Min	Max
All sales	3.97	3.57	0.00	17.94
Exchanges (1)	3.49	2.83	0.00	17.75
Non exchanges (2)	3.98	3.59	0.00	17.94
Difference (1)- (2)	-0.49***			
T-stat	-12.21			
Panel C: Matched sample of repeat sales				
Holding period	Mean	Std. dev.	Min	Max
All sales	3.60	2.85	0.00	17.54
Exchanges (1)	3.38	2.60	0.00	17.30
Non exchanges (2)	3.66	2.92	0.00	17.35
Difference (1)- (2)	-0.28***			
T-stat	-4.26			

Table 19: Summary statistics for holding periods in like-kind exchanges vs. ordinary sales by state

This table presents summary statistics by states for holding periods of exchange related and non-exchange related investments for our sample of matched exchange and non-exchange properties that sold twice. In exchange investments the investor disposes of a previously acquired property through a 1031 like-kind exchange. Exchange sales represent four percent of the sample of properties that sold. We only report data for states in which there is sufficient number of like-kind exchanges. The propensity-score model utilized for the matching is described in Appendix 2, although the coefficient estimates vary with the different samples used.

	Relinquished through a like-kind exchange (1)	Non-exchange motivated relinquished (2)	(1)–- (2)
State	Holding period	Holding period	Difference
Arizona	3.81	3.60	0.21
California	3.25	3.64	-0.39
Colorado	3.66	3.58	0.09
Florida	4.27	3.19	1.08
Illinois	2.68	3.49	-0.81
Nevada	3.44	3.98	-0.53
Oregon	4.23	4.48	-0.25
Pennsylvania	3.45	3.90	-0.46
Texas	3.45	3.81	-0.36
Washington	4.22	4.35	-0.13
Full sample	**3.38**	**3.66**	**-0.28**

Table 20: Summary statistics for frequency of sale of 1031 exchange replacement properties by year

This table presents summary statistics for the frequency of sale of replacement properties, acquired through a 1031 exchange. In column (1) we report the percentage of properties sold in a repeat sales sample, which were originally acquired through a 1031 exchange. Our sample of repeat sales contains 336,572 properties during 1997-2014. In Column (2) the frequency of relinquished properties, acquired through a like-kind exchange, using a roll-over into a new exchange is reported.

	Relinquished 1031 exchange property (1)	Relinquished 1031 exchange property sold through another exchange (2)
Year	Mean	Mean
1997	2.2%	0.4%
1998	4.2%	0.5%
1999	4.5%	1.0%
2000	5.6%	1.5%
2001	6.1%	1.4%
2002	6.8%	1.6%
2003	7.2%	1.8%
2004	7.6%	1.4%
2005	7.8%	1.4%
2006	6.0%	0.9%
2007	4.8%	0.4%
2008	4.1%	0.4%
2009	3.1%	0.1%
2010	2.9%	0.0%
2011	2.9%	0.1%
2012	2.7%	0.0%
2013	2.5%	0.0%
2014	2.4%	0.1%

Table 21: Summary statistics for capital and depreciation recapture tax liability over the holding period by sale strategy

This table presents summary statistics capital gain and depreciation taxes paid and deferred based on sale strategy. Panel A reports the statistics over the holding period. Panel B reports annualized tax liabilities by strategy.

	Exchange rolled into an exchange	Exchange followed by an ordinary sale	Ordinary sale followed by an ordinary sale (CG taxes liability >0)
Panel A: Capital gain and depreciation recapture tax liability over the holding period			
Capital gain tax paid	0.0%	19.3%	16.5%
Capital gain tax deferred	24.9%	0.0%	0.0%
Depreciation recapture tax paid	0.0%	3.2%	2.4%
Depreciation recapture tax deferred	8.2%	0.0%	0.0%
Total taxes deferred	33.1%	0.0%	0.0%
Total taxes paid	0.0%	22.5%	18.9%
Panel B: Annualized capital gain and depreciation recapture tax liability over the holding period			
Annualized capital gain tax paid	0.0%	7.9%	5.5%
Annualized capital gain tax deferred	6.8%	0.0%	0.0%
Annualized depreciation recapture tax paid	0.0%	1.1%	0.5%
Annualized depreciation recapture tax deferred	2.2%	0.0%	0.0%
Total taxes deferred	9.0%	0.0%	0.0%
Total taxes paid	0.0%	9.0%	6.0%