

*The Tax and Economic Impacts of Section 1031
Like-Kind Exchanges in Real Estate*

submitted to the

The Real Estate Research Consortium

by

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Executive Summary

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. Although the legislation commonly known as the Tax Cuts and Jobs Act (TCJA) of 2017¹ repealed deferred exchanges for personal property, TCJA maintained their use for real property. The ongoing need for revenue to fund government expenses and new legislative initiatives has once again generated increased discussion of the benefits and costs of like-kind exchanges of real estate.

We contribute to this discussion by first documenting the widespread use of real estate like-kind exchanges and the extent to which their use varies across states and metropolitan areas. Using a large sample of commercial property transactions (including multifamily exchanges) over the 2010 to 2020 period from CoStar, we find that seven percent of the dollar value of these transactions involved the use of an exchange by the buyer or seller. However, this percentage understates the share of commercial real estate (CRE) transactions that involve an exchange-motivated investor because of the nature of CoStar's data. According to Marcus & Millichap Research Services, 23 percent of transactions they brokered in 2017 through 2019 involved a buyer completing a like-kind exchange. In response to a recent survey by the National Association of REALTORS® (NAR), its commercial members involved in the brokerage of CRE reported that 12 percent of the transactions in which they were involved in the past four years were part of a like-kind exchange. Based on these various sources we conclude the share of exchanges likely ranges from 10 to 20 percent of all CRE transactions over our sample period.

California dominates other states in the use of exchanges. CRE transactions in New York, Florida, Washington, Texas, Arizona and Colorado also involve a high percentage of exchanges. In addition, data obtained from a prominent facilitator of exchanges reveals that the median sale price of a property involved in an exchange in 2018 and 2019 is approximately \$500,000. This demonstrates that 1031 exchanges are not primarily used by large institutional investors but enjoy broad use across a range of taxpayer types and income levels and property values.

To quantify the effects of real estate link-kind exchanges on taxpayers and Treasury revenue, we next develop an analytical model to quantify the incremental present value of an exchange to the owner, relative to a fully taxable sale. In addition to capturing the benefit of

¹ Public L. No. 115-97, <https://www.congress.gov/115/plaws/publ97/PLAW-115publ97.pdf> .

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 when the replacement property is disposed of in a fully taxable sale.

We estimate that the incremental present value of a like-kind exchange on typical office, industrial, retail and other commercial properties ranges from 0.5 to 12 percent of the price of the relinquished property, with a mean of 5 percent, depending on state income taxes, 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. These incremental tax benefits also capture the extent to which the market value of replacement properties would have to decline, or the value of future after-tax rental income would have to increase, to fully offset the loss in tax benefits that would be associated with the elimination of exchanges, all else equal. The incremental value of an exchange strategy as a percent of the deferred tax liability ranges from a low of 8 percent to a high of 58 percent with a mean of 37 percent. Said differently, 63 percent of the value of immediate tax deferral is eliminated by reduced depreciation deductions in the replacement property and increased capital gain and depreciation recapture taxes.

We also conduct an empirical analysis of exchanges that reveals real property like-kind exchanges are associated with increased capital investment in the replacement property, reduced loan-to-value ratios (that reduces system-wide risk), and shorter holding periods. We additionally provide evidence that capital expenditures on replacement properties in an exchange tend to be higher than expenditures on otherwise similar properties, not associated with an exchange.

The Joint Committee on Taxation estimates that because of real estate like-kind exchanges \$9.9 billion in tax revenue was lost in 2019. This loss is forecasted to accumulate to \$51.0 billion over the period 2019 to 2023. We argue that the present value of the loss in Treasury revenues if like-kind exchanges were eliminated would have been well below \$4 billion in 2019 and below \$20 billion during 2019-2023, even if taxpayers do not alter their behavior or seek other tax-deferral strategies. In addition, our study concludes that in the absence of exchanges, investors would delay disposing of their properties or engage in alternative tax-deferred disposition strategies. These behavioral responses by taxpayers to elimination would reduce the tax revenues collected by the Treasury. Furthermore, we argue that because of

Treasury's low cost of capital (discount rate), the present value of lost Treasury revenue is substantially less than the present value of exchange tax benefits to taxpayers.

We conclude that elimination of real estate exchanges would likely lead to a decrease in transaction activity in most CRE markets as well as price declines in some markets, at least in the short run. These price declines would be more pronounced in states with high income tax rates. Elimination would also likely produce a decrease in capital investment on acquired properties, an increase in investment holding periods, and an increase in the use of leverage to finance acquisitions. Overall, our analysis suggests the cost of like-kind exchanges to the U.S. Treasury is likely overestimated, while their benefits to small investors and to local CRE markets are often overlooked.

Introduction and Summary of Results

Although Congress has frequently altered the taxation of accrued capital gains, Section 1031 of the Internal Revenue Code, and its antecedents, have permitted taxpayers to defer the recognition of taxable gains on the disposition of business-use or investment assets since 1921. The legislation commonly known as the Tax Cuts and Jobs Act (TCJA) of 2017 repealed exchanges for non-real properties, decreased the maximum corporate income tax rate from 35 to 21 percent and increased the amount of bonus depreciation for qualified property. The decrease of the corporate tax rate and ability to use bonus depreciation may reduce the attractiveness on 1031 exchanges, especially for corporations. The ongoing need for revenue to fund government expenses and new legislative initiatives has once again generated increased discussion of the benefits and costs of like-kind exchanges in real estate.

The benefits that like-kind exchanges provide owner/operators in local commercial real estate (CRE) markets and the economy in general are numerous and significant, although they come with a cost. 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, all of which create jobs and add to state and local governments tax bases. Higher tax bases imply high property taxes, which represent a major source of revenue for states and are the largest source of tax revenue for localities.²

Section 1031 like-kind exchanges can also be used to diversify properties or to substitute depreciable real property for non-depreciable real property. The equity preserved by an exchange may also lead to increased capital investment in the replacement property and to lower leverage, thereby reducing investor (and system-wide) risk. Tax-deferred exchanges also improve the marketability of highly illiquid CRE. This increased liquidity is especially important to the many non-institutional investors in relatively inexpensive properties that comprise the majority of the market for real estate like-kind exchanges.

Despite the potential advantages of tax-deferral, Section 1031 exchanges have several drawbacks that limit their attractiveness. First, the larger the amount of tax-

² <https://taxfoundation.org/state-property-tax-reliance-2020/> .

deferral, the smaller is the taxpayer's depreciable basis in the replacement property and, therefore, the smaller is the allowable annual tax 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.³

Another disadvantage is that the transaction costs (both monetary and non-monetary) associated with initiating and completing an exchange likely exceed the transaction costs of a fully taxable sale. The additional costs may include intermediary fees, accounting and attorney fees, or paying a higher price for replacement properties in order to close on an exchange within the time-limit mandated by the IRC. 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" mortgage 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 in the year of the exchange.

From the perspective of the overall economy, there are allocative and macroeconomic effects that 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.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 tax-induced 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

³ Even though in theory like-kind exchanges can be repeated, research has shown over 80% are final events (Ling and Petrova, 2020).

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).

income and job creating spending. This has positive spillover effects in directly related industries such as construction, title insurance, and mortgage lending.

In our first comprehensive study based on exchanges during the period 1997-2014 (Ling and Petrova, 2015), we documented the widespread use of real estate like-kind exchanges based on a data sample of over 1.6 million property transactions reported by Co-Star. In this study we focus on the period from 2010 to June 2020 during which CoStar's coverage included over 800 Core Based Statistical Areas (CBSAs).⁵ The updated study provides a more comprehensive picture of the use and geographic distribution of 1031 exchanges, due to the significantly expanded CRE market coverage by CoStar since 2010. Furthermore, we employ data from alternative sources to examine the role of exchanges in the CRE market.

Using data from CoStar and two additional sources, we conclude that the share of exchanges likely ranges from 10 to 20 percent of all CRE transactions over our sample period. California dominates other states in the use of exchanges with a 35 percent share of all transactions based on dollar volume. In addition, data obtained from a prominent facilitator of exchanges reveals that the median sale price of a property involved in an exchange in 2018 and 2019 is approximately \$500,000. This demonstrates that 1031 exchanges are not primarily or exclusively used by large or institutional investors.

We next employ 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, our 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 in a fully taxable sale of the replacement property. Ignoring state income taxes, we estimate that the incremental present value of a like-kind exchange on typical multifamily, office, industrial, retail and other commercial properties, relative to a fully taxable sale, ranges from 0.5 to 9 percent of the value of the disposed property with a mean of 4 percent depending on the holding period of the relinquished property, the amount of price

⁵ 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 includes adjacent areas that are socioeconomically tied to the urban center by commuting. Areas defined by 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. Prior to the early 2000s, CoStar's coverage included less than 100 CBSAs; between 2006 and 2008 the coverage grew to over 500 CBSAs and reached over 800 CBSAs by 2014.

appreciation experienced by the relinquished property, and the amount of time the investor expects to hold the replacement property before its disposition in a fully taxable sale. In states with average income tax rates, the incremental value of an exchange ranges from 0.5 to 12 percent of the value of the relinquished property with a mean of 6 percent. These incremental tax benefits also capture the extent to which the market value of replacement properties would have to decline, or the value of future after-tax rental income would have to increase, to fully offset the loss in tax benefits that would be associated with the elimination of exchanges, all else equal.

The incremental value of a CRE exchange as a percentage of the investor's deferred tax liability ranges from eight percent to 58 percent with a mean of 37 percent. Said differently, 63 percent of the value of immediate tax deferral is eliminated by reduced depreciation deductions in the replacement property and increased capital gain and depreciation recapture taxes. The value of an exchange as a percentage of the price of the relinquished property and as a percentage of deferred taxes for residential income producing property is similar.

Using a "static" model, the Joint Committee on Taxation (JCT) estimates that \$9.9 billion in tax revenue was lost in 2019 because of CRE like-kind exchanges.⁶ The JCT estimates this loss will accumulate to \$51.0 billion during 2019 to 2023.⁷ We argue that the static (holding everything else constant) present value of the loss in Treasury revenues was well below \$4 billion in 2019 and below \$20 billion in 2019 to 2023. This static estimate assumes elimination would not negatively affect CRE transaction activity and prices, economic activity, or wages earned by market participants involved with exchanges. However, in the absence of exchanges, many investors would delay disposing of their properties and others would engage in other tax-deferral strategies (e.g. investments in Opportunity Funds, UPREIT transactions, and installment sales).⁸ These

⁶ Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2019-2023, Table 1, Dec. 18, 2019 (JCX-55-19) <https://www.jct.gov/publications.html?func=startdown&id=5238>.

⁷ The JCT provides estimates of "tax expenditures," which are defined under the Congressional Budget and Impoundment Control Act of 1974 (the "Budget Act") as "revenue losses attributable to provisions of the Federal tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability." Thus, tax expenditures include any reductions in income tax liabilities that result from special tax provisions or regulations that provide tax benefits to taxpayers.

⁸ IRC Section 453 allows a taxpayer who sells a property on an installment basis to defer paying capital gain taxes to future tax years when the installment payments are received from the buyer. Opportunity Zone (OZ)

behavioral responses by taxpayers would further reduce the tax revenue collected by the Treasury. Furthermore, we argue that because of Treasury's low cost of capital (discount rate), the present value of lost Treasury revenue is substantially less than the present value of exchange tax benefits to taxpayers. This cost of capital "wedge" should be considered in tax policy discussions.

Although the present value of Treasury 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 investors. The price 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 also employ data from Costar and NCREIF (National Council of Real Estate Investment Fiduciaries) to examine the economic benefits of CRE 1031 exchanges. Our empirical analyses demonstrate that like-kind exchanges are associated with higher capital investment in replacement properties, shorter holding periods and less leverage. More specifically, replacement like-kind exchanges are associated with an investment in subsequent properties that is on average \$127,500 (15.4 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 income tax rates. Capital expenditures, specifically building improvements, for replacement exchange properties tend to be higher by about \$0.5/sf. The average holding periods for exchanges vs. non exchanges are 10.5 and 11.4 years, respectively. Replacement properties involved in an exchange have mean loan-to-value ratios of 30 percent, while the mean loan-to-value ratio for properties acquired in non-exchange transactions is 43 percent. Using a matched sample of exchange and non-exchange properties to account for selection bias, we obtain similar results. We also find

investments (IRC Section 1400Z-1) allow investors to defer capital gains taxes when rolling proceeds from the sale of real estate, stocks or a business into a qualifying OZ investment. In addition, investors avoid capital gain taxes on the acquired asset if it is held for 10 years. IRC Section 721 allows investors who contribute property to an umbrella partnership real estate investment trust (UPREIT) to defer, with restrictions, the recognition of capital gains and depreciation recapture income.

that in 38 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.

The Mechanics of Tax-Deferred Exchanges

When considering the disposition of a property, investors need to account for any potential tax liabilities associated with accrued capital appreciation and depreciation recapture income. Like-kind exchanges allow deferral of income taxes on the disposition of a CRE asset to the extent the investor uses the proceeds to acquire another similar-use asset and complies with the regulatory requirements and time limits set by the IRS. Both the relinquished real property and the replacement property must be held for productive use in a trade or business or held as a “long-term investment.” Thus, personal residences and real property held for sale to consumers (i.e., “dealer” property/inventory) cannot be part of a Section 1031 exchange. CRE ownership interests in a limited partnership or multi-member limited liability company, which are widely used vehicles for purchasing ownership interests in CRE, are not considered real property.⁹ A holding period greater than one year is assumed to qualify the relinquished property as a long-term investment for the purposes of implementing a tax-deferred exchange. Section 1031 requires investors to redeploy the capital from relinquished U.S. property within the U.S. or its territories.

Although Section 1031 of the Internal Revenue Code (IRC) dates 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 because of the difficulty of synchronizing the closings of two or more complex transactions. In response to a court decision related to the “Starker” case (Starker vs. United States, 602 F. 2d 1341 (9th Cir., 1979)), in 1984 the Congress amended its original regulations 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, much the way that corporations and their shareholders defer the realized but not recognized gains upon

⁹ Tenant in Common (TIC) interests in real property and ownership interests in Delaware Statutory Trust (DSTs) are considered real property and are therefore eligible for like-kind exchanges.

a merger of two corporations. 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 (if) 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.¹⁰ 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.

To completely avoid the immediate recognition of the accrued taxable gain, the exchanging taxpayer must typically acquire a property (or properties) of equal or greater value than the relinquished property and use all 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 unreplaced debt or cash left over after the purchase of the replacement property.

The calculation of a taxpayer's deferred gain on the sale of a relinquished property associated with an exchange strategy begins with the calculation of the realized gain. In general, the realized gain is equal to the net selling price of the property minus the adjusted tax basis. The adjusted basis of the property in the year of disposition 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 (on both real and personal property) taken since the asset was placed in service by the taxpayer 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). The calculation of the adjusted basis, which is sometimes referred to as the “book value” or the “depreciated value” of the property, is summarized below:

¹⁰ In 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 (IRC Section 121). For married couples, filing jointly, the exclusion is \$500,000. This tax exclusion is potentially far more valuable to a homeowner than the potential tax deferral available to owners of income-producing property under Section 1031.

	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 the real property since its purchase.¹¹ Assuming the property has been held for at least 12 months, the remainder of the taxable gain is the capital gain component.¹² 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 liability plus the recapture tax on accumulated depreciation. The calculation of total taxes due on a fully taxable sale of a CRE property is summarized as follows:

¹¹ 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 rate), the excess of total depreciation minus allowable straight-line depreciation is taxed (recaptured) at ordinary tax rates.

¹² If the net sale proceeds are less than the undepreciated cost basis but greater than the adjusted tax basis, the difference between the net sale proceeds and the adjusted basis is taxed at the applicable depreciation recapture rate. If the net sale proceeds are less than the adjusted tax basis, a taxable loss is incurred.

$$\begin{aligned}
& \text{Net sale proceeds} \\
& - \text{ Adjusted tax basis} \\
& = \text{ Total realized gain} \\
& - \text{ Depreciation recapture income} \\
& = \text{ Capital gain} \\
& \text{Capital gain} * \text{ capital gain tax rate (max. 23.8\% federal rate)} \\
& + \text{ Depreciation recapture income} * \text{ depreciation recapture income tax rate} \\
& \quad \text{(max. 28.8\% federal rate}^{13}\text{)} \\
& = \text{ Total taxes due on sale}
\end{aligned}$$

As discussed in detail in Barker, Ling and Petrova (2020), 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.¹⁴ Moreover, her annual depreciation deduction in the replacement property is equal to the deduction she would be allowed had she maintained ownership of the relinquished property. This “carry-forward” of basis and depreciation deductions can be a significant disadvantage of a like-kind exchange because (1) depreciation deductions after the exchange are lower than if the relinquished property had been disposed in a fully taxable sale and (2) realized gains on the disposition of the replacement property will be larger to the extent of any deferred gain on the relinquished property. However, if the subsequent disposition of the replacement property is also structured in the form of a Section 1031 exchange, the realized gain can again be deferred.

Most Section 1031 CRE 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 selling taxpayer does not receive directly proceeds from their disposition. Instead, cash paid by the buyer of the relinquished property is “parked” with the QI until the taxpayer identifies and acquires a replacement property (or properties).

¹³ The maximum capital gain and depreciation recapture tax rates include the 3.8% Net Investment Income Tax (NIIT).

¹⁴ 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.

Like-kind exchanges are subject to time limits regarding (1) identification of replacement property and (2) completion of the replacement property acquisition. The taxpayer must identify in writing the replacement property or properties 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 a potential replacement property, the taxpayer may designate more than one replacement property.¹⁵ In addition, 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 converts the transaction to a fully taxable sale.¹⁶ At the closing of the replacement property, the QI transfers cash to the seller of the replacement property and the title is transferred to the taxpayer completing the replacement exchange.

Evidence on the Use of Real Estate Like-Kind Exchanges

Evidence from Transaction Databases

Ideally, we would like to have historical information on every CRE real estate transaction that has taken place in the U.S., 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. We employ several data sources to examine the use of exchanges in CRE: transaction property data from Costar and Marcus & Millichap Research Services, exchanges data from IPX1031 and survey data from the National Association of REALTORS® (NAR). 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 800

¹⁵ 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.

¹⁶ 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.

core based statistical areas (CBSAs).¹⁷ To assure reliability of the data, transactional details are verified with at least one of the following parties: buyer, seller, buyer's broker, seller's broker.

We analyze transaction data from January 1, 2010 until June 30, 2020. The original data contains 1,143,621 million transactions. However, for many observations in the database, the selling price is not available. We exclude observations with missing price or a price less than \$10,000. We further exclude transactions with detrimental conditions (e.g. bankruptcy sales) and eliminate duplicate property sales. The final sample contains 816,002 property transactions with a median price of \$1.1 million and a total transaction volume of \$3.4 trillion, unadjusted for inflation. Sales in which one or more of the parties were engaged in a like-kind exchange total 45,214, or approximately six percent of total transactions with a median price of \$2.1 million and a total transaction volume of \$241 billion. If weighted by sales volume, exchange-related sales represent seven percent of transactions.

We note that these percentages understate the share of CRE transactions that involved an exchange-motivated investor because CoStar flags a transaction as including a "1031 exchange sale condition" only if this information has been disclosed by one of the parties involved (buyer, seller, or a broker). Therefore, the evidence on the use of exchanges based on Costar's data provides a lower bound on the estimate of the share of exchanges. However, the data is still useful to uncover trends over time. We present the distribution of exchanges based on Costar's data during 2010- June 2020 in Table 1. Table 1 reveals a significant increase in the number and volume of exchanges over time. Post-2015, the share of exchanges each year (between 7-10 percent) is comparable to the percentage share observed prior to 2007 and documented in our earlier study (Ling and Petrova, 2015). In addition, although the volume of all sales increased by 389% between 2010 and 2019, the dollar value of exchanges grew by 827%. Clearly the increases in nominal prices that occurred in most markets during the last decade, and the corresponding increase in unrealized capital gain tax liabilities, have increased the

¹⁷ 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 includes adjacent areas that are socioeconomically tied to the urban center by commuting. Areas defined by 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. Prior to the early 2000s, CoStar's coverage included less than 100 CBSAs; between 2006 and 2008 the coverage grew to over 500 CBSAs and reached over 800 CBSAs by 2014.

attractiveness of deferring capital gains through an exchange. We also note that the share of exchanges falls slightly after 2017 from approximately 9 percent (based on volume) to approximately 8 percent. This could be a result of the new tax environment for corporations.

The distribution of the 816,002 CoStar sale transactions by property type is displayed in Table 2. Sales of retail properties account for 28 percent of total transactions, but just 14 percent of total dollar volume. In contrast, sales of multifamily properties represent 16 percent of all CoStar transactions but 31 percent of total dollar volume. Office sales account for 16 percent of transactions, and 23 percent of dollar volume. Land and industrial sales each account for 15 percent of all transactions. Turning to the distribution of exchanges by property type displayed in Table 2, we observe that exchanges are more common among retail and multifamily properties. Approximately one third of the exchange sample is composed of apartment exchanges. Retail exchanges represent 21 percent of all exchanges based on volume; the corresponding percentage for office properties is 18 percent.

To further explore the use of like-kind exchanges in CRE markets, we obtain data from Marcus & Millichap Research Services. These data include the total number of transactions the firm brokered during 2017 through 2019, as well as the number of transactions that involved a buyer completing a like-kind exchange. Table 3 summarizes the distribution of exchanges by property type and over time during 2017-2019 based on the data provided by Marcus & Millichap Research Services. On average, 23 percent of their apartment, shopping center, office, and industrial property transactions during these three years involved a 1031 buyer, a much higher percentage than we were able to uncover from CoStar data. Exchanges are relatively equally distributed among the four major property types: apartment (22 percent), office (20 percent), industrial (21 percent) and retail (27 percent). In addition, 39 percent of net leased properties involved an exchange.

In July of 2020, the National Association of REALTORS® (NAR) surveyed their members involved in the brokerage of commercial real estate and received 2,416 responses. One survey question asked: “About what percent of your transactions over the past four years (2016-2019) were part of a 1031 like-kind exchange”? The mean response to this question was 12 percent. The data from Marcus & Millichap and NAR suggest that the share of exchanges is closer to 12-20 percent nationwide.

We also examine data on exchanges facilitated during 2010-June 2020 by Investment Property Exchange Services, Inc. (IPX1031®), a Fidelity National Financial, Inc. company and a national leader in 1031 exchange services. During this period, IPX1031® served as a qualified intermediary in 123,359 (131,748) relinquished (replacement) property exchanges, involving a variety of property types.¹⁸ Excluding transactions with a price less than \$10,000 and multiple observations related to the same property (e.g. when there are several partners involved) yields a sample of 107,357 properties that were disposed through 1031 exchanges over the period examined. These numbers provide strong evidence that the number of exchanges reported by Costar is underestimated.

We also note that relinquished properties were sold at a median price of \$575,000, with 75 percent of properties involved in a 1031 exchange sale having a price of less than \$1.5 million. These statistics suggest that like-kind exchanges include a significant number of small transactions, including single family and modest multifamily residential rental properties and other property types in areas across the country in which property values are relatively low. In comparison, the median price of relinquished properties in our Costar sample is over \$2 million. Thus, it appears our CoStar sample does not include a large number of smaller properties in tertiary markets, which provides an explanation for the significantly lower number of exchanges reported by Costar. Therefore, rather than focusing on the percentage share, we use exchange data from CoStar to identify trends – over time, by market and property type. Finally, using Costar data we conduct further empirical analysis on the impact of exchanges on investment, leverage, and liquidity.

While the motivation for engaging in a like-kind exchange is highly correlated with recent property price appreciation, 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 816,002 CoStar transactions by CBSA. The remaining four columns contain the corresponding CBSA distribution of our 45,214 exchange-related transactions. The Los Angeles CBSA accounts for approximately six percent of all sales based on both the number transactions and dollar volume. However, 13 percent of all exchanges in the CoStar database occurred in the Los Angeles CBSA (15 percent based on dollar volume).

¹⁸ We exclude transactions with a price of zero and count multiple observations related to the same property (e.g. when there are several partners involved) as one exchange.

Thus, the Los Angeles CBSA is disproportionately represented in our exchange sample. Other CBSA with disproportionately high shares of sales involving an exchange include Phoenix, Denver, Seattle/Puget Sound, San Diego, Orange County (CA) and San Francisco.

The percentage of all CoStar exchanges that occurred in each state is displayed in Table 5. California clearly dominates our sample of exchange transactions--approximately 40 percent of all CoStar-verified exchanges occurred there. Based on transaction volume, California accounts for 35 percent of all exchange transactions. Certainly, high marginal state income tax rates in California contribute to the widespread use of exchanges. The state of Washington accounts for approximately 5 percent of all exchanges based on number of transactions and their volume. Other states with a high share of exchanges include Arizona, Florida, Oregon, Colorado, New York and Texas. New York ranks second among all states based on exchange transactions volume with a share of exchanges of approximately 8 percent. Overall, the use of exchanges is more predominant in Western states or states with higher recent price appreciation. However, 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.

Seventeen percent of all Costar transactions recorded in the Santa Cruz/Watsonville CBSA involved an exchange-motivated investor. The corresponding percentages for the San Diego, Orange County (CA), Los Angeles, Hawaii, Portland, Salinas, North Bay/Santa Rosa, and San Francisco CBSAs range from 13 percent to 15 percent. Although not separately tabulated, these percentages are significantly higher in the 2016-2020 period. When examining CBSA exchange percentages based on sales volumes we note that the median share of exchanges is approximately 11 percent. Table 7 reports the percentage of CoStar sales in each state that involved an exchange. Based on both the number of sales and dollar transaction volumes, Oregon and California taxpayers make the most frequent use of like-kind real estate exchanges. In both states, exchanges account for

approximately 13 percent of transactions and dollar volume. Hawaii (Minnesota) is the state with largest share of exchanges based on number (volume) with exchanges representing 13.9 (13.4) percent. Once again, we conclude based on Tables 6 and 7 that the use of exchanges in Western cities and states is more widespread than in other parts of the country.

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”). If the replacement property is acquired without boot, the taxpayer’s annual depreciation deductions as owner of the replacement property will be the same as if the taxpayer still owned the relinquished property; that is, depreciation deductions in the replacement property will not be based on the market value of the replacement property. This is because the taxpayer’s depreciable basis and allowable deductions on the relinquished property are carried forward into the replacement property. However, to the extent the property owner pays cash or other boot to complete the exchange, the boot is added to the depreciable basis of the replacement property and subsequently depreciated. In addition, when the replacement property is sold, capital gains taxes paid will be higher than if a taxable sale of the relinquished property and purchase of replacement property had been the chosen strategy.

The present value of income tax deferral associated with the exchange is a function of the magnitude of the deferred capital gain and depreciation recapture taxes, the expected length of time before the replacement property is disposed of in a fully taxable sale, and the discount rate applied to the incrementally higher taxes paid in the years after the exchange. 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 Barker, Ling and Petrova (2020). However, the incremental NPV of an exchange, $INCNPV_t$, can be summarized as follows:

$$INCNPV_t = \text{Deferred tax liability in year } t$$

- *PV of reduced benefits of annual depreciation deductions after the exchange*
- *PV of increased cost of depreciation recapture tax on sale of the replacement property*

- *PV of increased cost of capital gain taxes on a taxable sale of the 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 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 the net boot paid.¹⁹ Second, 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. Third, 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 if a sale-purchase strategy were used to acquire the replacement property, all else equal. The second term in equation (1) captures the cumulative present value of the foregone depreciation deductions under an exchange strategy 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 depreciation recapture income originally deferred by the exchange, plus the tax depreciation deducted since the exchange.²⁰ 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

¹⁹ Equivalently, the tax basis in 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.

²⁰ This ignores potential complications that arise if some of the depreciable basis consists of personal property.

be larger than with a sale-purchase strategy due to the deferred recapture income.²¹ 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 (3) in Barker, Ling, and Petrova (2020), summarized by equation (1) above, is used to estimate $INCNPV_t$ under several plausible assumptions. Simulated values of $INCNPV_t$ are then divided by (1) the price of the relinquished property and (2) the deferred taxable gain in the year of the exchange to quantify the economic magnitude of exchange tax benefits. These simulations are intended to quantify the net benefits taxpayers can obtain from a real estate like-kind exchange.

Model Assumptions

Before estimating the magnitude of exchange tax benefits, we first calculate the deferred gain, which is equal to the realized gain minus any gain recognized at the time of the exchange. The realized gain or loss on the sale or exchange of the relinquished property is equal to the net sale proceeds minus the adjusted tax basis at sale. To numerically solve for the realized gain, taxes due on a fully taxable sale, the deferred gain, and the incremental NPV of an exchange, the following base-case assumptions are employed:

- The prices of the relinquished and replacement properties are equal.
- The amount of mortgage debt on the replacement property and its terms do not vary with the disposition/acquisition strategy.²²

²¹ 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.

²² The amount of mortgage debt on the replacement property and its terms (interest rate, maturity, etc.) may, in practice, vary with the chosen disposition/acquisition strategy. This situation can be handled by our simulation model but has little effect on the magnitude of the incremental value of an exchange.

- Exchange costs and the selling costs of a fully taxable sale are equal to 3 percent of the relinquished property's sale price.²³
- Relinquished and replacement properties are both non-residential real properties.
- Non-depreciable land portion of the relinquished and replacement property's original tax basis: 20 percent (there is no personal property).²⁴
- Trade or business income marginal tax rate: 40.8 percent.
- Capital gain marginal tax rate: 23.8 percent.
- Depreciation recapture marginal tax rate: 28.8 percent.
- The replacement property's nominal value increases by 2.5 percent annually.

To ensure complete deferral of realized gains in the year of the exchange, taxpayers may choose to obtain a replacement property that is more valuable than the relinquished property. The lack of sensitivity of our results to higher replacement property prices is discussed below.

Although many non-real estate C corporations use CRE as a factor of production, the potential double taxation of income renders C corporations a less desirable ownership form for entities created to invest in CRE than alternative ownership forms, such as limited partnerships and limited liability companies. With these alternative ownership forms, the income tax liabilities associated with the underlying properties flow through directly to investors/taxpayers. Thus, it is personal tax rates, not corporate rates that are most relevant for the valuation of CRE investments and associated tax benefits.²⁵

Although the Tax Cut and Jobs Act of 2017 lowered the maximum statutory tax rate on corporate income from 35 percent to 21 percent, we have observed no evidence that CRE investors are turning to the corporate form of ownership to acquire properties. Our base-case simulations therefore assume the marginal investor in CRE is an individual who faces the maximum federal tax rates on trade or business, capital gain, and depreciation recapture income, although we also model the value of exchanges to

²³ The required use of qualified intermediaries and the time and expense required to satisfy all the rules required to qualify for Section 1031 tax treatment may cause the cost of an exchange to exceed the cost of a fully taxable sale. Thus, the simplifying assumption that they are equal may bias slightly upwards the calculated incremental benefit of an exchange.

²⁴ Land value as a share of total property value ("land share") varies over time, markets, and property types. Bokhari and Geltner (2016) find that land shares for newer residential income-producing property averaged about 20 percent from 2005 to 2015. We assume this share in our base-case calculations for both residential and nonresidential property.

²⁵ Using data from the IRS Statistics of Income (SOI), Duca, Hendershott, and Ling (2017) provide empirical support for the widely held assumption that CRE investments are held primarily by high-bracket taxpayers.

corporate owners of CRE.²⁶ In addition to being outbid by higher-bracket taxpayers for the tax shelter advantages of CRE assets, low-bracket taxpayers are unlikely to have enough wealth to invest in CRE investment vehicles.

Under the tax code in place in 2020, capital gains are subject to a maximum statutory tax rate of 20 percent. In contrast, the maximum statutory federal rate on depreciation recapture income and ordinary (wage and salary) income are 25 percent and 37 percent, respectively. The Net Investment Income Tax (NIIT) adds 3.8 percentage points to each of these maximum statutory tax rates for most higher income investors.^{27,28} We also consider the effects of state income taxes on the incremental value of an exchange. The tax 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.²⁹

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 (r^1), and (4) the expected holding period of the replacement property ($HOLD^2$). A discount rate of five percent is 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 CRE, including uncertainty about future rents, operating expenses, and

²⁶ In a seminal article on investment returns and U.S. income taxation, Bailey (1974) states: “Because tax deductions and tax credits associated with particular investments are worth more in equivalent pretax income to a high-bracket taxpayer than to a low-bracket one, tax privileged investments find their way into the hands of high-bracket taxpayers. Their competition with each other and with the next lower brackets drive down pretax rates of return on such investments” (p. 1157).

²⁷ The Net Investment Income Tax (NIIT) surcharge under I.R.C. §1411, in effect since January 1, 2013, applies to households with AGI in excess of \$250,000. For most taxpayers who own interests in real property, the rental income and income generated by a sale is “passive” income, which is subject to the 3.8 percent tax. However, “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.

²⁸ The Tax Cuts and Jobs Act of 2017 included a new Qualified Business Income Deduction (QBID), called the Section 199A 20 percent deduction, for pass-through entities, such as partnerships, limited liability companies, and S-corporations. This 20 percent deduction may reduce the effective maximum statutory rate from 37 percent to 29.6 percent for some commercial real estate investors.

²⁹ 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 non-transient 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/acquisition strategy because under both strategies the taxpayer is assumed to acquire the same (replacement) property. Therefore, the assumed discount rate needs only to capture uncertainty about the future tax savings or costs of an exchange, relative to a fully taxable sale, which are arguably more certain than the changes in future 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 $INCNPV_t$ by the dollar value of the relinquished property. Figure 1 presents our base-case results for nonresidential real property. Figure 1A displays the tax savings assuming the relinquished property was acquired five years ago. The three curves in Figure 1A capture the incremental NPV of the tax savings at the time of the exchange assuming the price of the relinquished property has increased by two, four, and six percent, respectively, since its acquisition five years ago. Figures 1B-1D present the corresponding results for relinquished property holding periods of 10, 15, and 20 years.

One pattern is especially noteworthy: the incremental value of an exchange is positively related to the holding period of the relinquished property. For example, assuming $HOLD^1 = 5$ (Figure 1A), $HOLD^2 = 5$, and $\pi^1 = 4$ percent, $INCNPV_t$ is equal to 1.06 percent of the value of the relinquished property. As $HOLD^1$ increases to 10 years (Figure 1B), the value of tax deferral assuming $HOLD^2 = 5$, rises from 1.06 percent to 1.96 percent. Assuming $HOLD^1 = 20$ (Figure 1D), the value of tax deferral increases further to 3.10 percent. Thus, the relative attractiveness of the exchange strategy is positively related to the magnitude of the accumulated gain on the relinquished property, all else equal. Increased nominal price appreciation on the relinquished property prior to the exchange also produces increases in $INCNPV_t$. Figures 1A-1D also reveal that the present value of tax deferral also increases with the expected holding period of the replacement property, but at a decreasing rate. Overall, the incremental benefit of tax deferral ranges from 0.35 percent to 8.45 percent of relinquished property value, with a mean value of 4.38 percent, across the results presented in Figure 1.

In the tax and economics scenarios presented in Figure 1, the use of an exchange strategy defers capital gain and depreciation recapture income that would otherwise be taxed at 23.8 percent and 28.8 percent, respectively. However, $INCNPV_t$ never exceeds

nine percent of the value of the relinquished property--even if the replacement property is assumed to be held for over 30 years before being disposed in a fully taxable sale. This cap on the maximum value of tax deferral 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, larger deferred gains also reduce the tax basis carried into the replacement property, relative to what the basis would be with a sale-purchase strategy. This, in turn, reduces allowable depreciation deductions after the exchange. This loss in the present value of future depreciation substantially offsets the value of immediate tax deferral. Larger deferred gains also increase the capital gain and depreciation recapture taxes that will be recognized when the replacement property is sold in a fully taxable sale. This increase in expected future tax liabilities also offsets the present value of immediate tax deferral.³⁰

It is not uncommon for taxpayers executing a deferred exchange to “trade up”; that is, acquire a replacement property that is more valuable than the relinquished property. For example, round-trip (relinquished exchange followed by a replacement exchange) exchange transaction data from IPX1031 suggests that in over 63 percent of exchanges the replacement property is more expensive than the relinquished property. In such a case, cash or other non-like kind property (boot) is paid by the taxpayer to the seller of the replacement property--in addition to the cash that was generated by the sale of the relinquished property.³¹ Payment of cash or boot increases the taxpayer’s basis in the replacement property, thereby increasing future depreciation deductions and future depreciation recapture taxes. These increased future depreciation recapture taxes reduce the net cash flow from the disposition of the replacement property in a subsequent fully taxable sale. The effect of trading up on $INCNPV_t$ will therefore depend on the extent to which the present value of the increased depreciation deductions and the net cash flow from a potential fully taxable sale of the replacement property is greater (less) than the

³⁰ 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 decreases. 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 non-residential property in the year of the exchange (39-5), minus the 34 years of depreciation subsequent to the exchange.

³¹ Cash may also be required if the mortgage debt on the replacement property is less than the mortgage debt on the relinquished property.

opportunity cost of investing additional equity capital, as well as the increased depreciation recapture taxes that would result from a future taxable sale of the replacement property. The assumed rate at which future tax savings (costs) are discounted will also affect the net present value of trading up.

To examine the impact of a trading up strategy on the incremental net present value of an exchange, we assume the replacement property is 10 percent more valuable than the relinquished; our other base-case assumptions are maintained. Over our 360 scenarios (12 combinations of $HOLD^1$ and r^1 times 30 holding periods for the replacement property, $HOLD^2$), the average decrease in $INCNPV_t$ as a percentage of price associated with a 10 percent increase in the value of the replacement property is just -0.28 percentage points. In short, because of the offsetting effects, relaxing the assumption that the values of the relinquished and replacement property are equal has no material effect on our results.

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 relative to the magnitude of the deferred gain reported by the taxpayer on line 24 of Form 8824. It also provides a starting point to an analysis of the cost of an exchange in lost tax revenue to the U.S. Treasury. Figure 2 presents our base-case results for nonresidential real property. Figure 2A displays the tax savings under the assumption that the relinquished property was purchased five years ago. The three curves in Figure 2A capture $INCNPV_t$ assuming the price of the relinquished property has increased by two percent, four percent, and six percent, respectively, since its acquisition.

Assuming $HOLD^1 = 5$ (Figure 2A), $HOLD^2 = 5$, and $r^1 = 4$ percent, $INCNPV_t$ is equal to 4.54 percent of the deferred gain. As $HOLD^1$ increases to 10 years (Figure 2B), the value of tax deferral assuming $HOLD^2 = 5$, declines slightly to 4.52 percent. Assuming $HOLD^1 = 20$ (Figure 2D), the value of tax deferral again slightly decreases to 4.43 percent. In short, the relative attractiveness of an exchange strategy, as a percentage of the deferred gain, is little affected by the holding period of relinquished property. $INCNPV_t$ as a percentage of the deferred gain does increase at a decreasing rate as the holding period of the replacement property ($HOLD^2$) increases from 2 to 30 years.

As the assumed rate of price appreciation since the acquisition of the relinquished property increases from two percent, to four percent, to six percent, the (raw) 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 r^t ; in fact, the ratio of $INCNPV_t$ to the deferred gain declines slightly as the rate of price appreciation realized on the relinquished property increases.

Overall, the results displayed in Figures 2A-2D allow us to put into context the magnitude of the deferred taxable gains associated with CRE 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. In addition, $INCNPV_t$ scaled by the deferred gain 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 two percent to 15 percent with a mean of nine percent. Clearly, the simple application of an assumed tax rate to the total amount of deferred gains reported on line 24 of Form 8824 dramatically overstates the present value of the benefits of exchanges to taxpayers and the present value of the cost to the U.S. Treasury.

Incremental Internal Rate of Return on an Exchange

Our base-case assumptions can also be used to calculate the incremental internal rate of return (IRR) of the exchange strategy. The net cash flows used to calculate the incremental IRR are the initial savings of capital gain and depreciation recapture taxes that result from a tax deferred exchange (minus any additional transaction costs or invested equity capital), the additional annual tax payments that result from having a lower depreciable basis, and therefore lower depreciation deductions, in the years following the exchange, and the additional capital gain and depreciation recapture taxes that will be paid on the taxable sale of the replacement property that also results from the taxpayer's lower basis in the replacement property. Using a discount rate equal to the incremental IRR, the NPV of the initial tax savings is equal in absolute value to the present value of the additional taxes paid subsequent to the exchange using the same discount rate.

Because the initial incremental tax savings from the exchange, relative to a fully-taxable sale, is positive but the subsequent tax savings from the exchange are negative, the exchange strategy is preferred to a taxable sale if the investor's discount rate is higher

than the incremental IRR.³² Over the same simulation scenarios used in our nonresidential base-case analysis (and presented in Figure 1), these incremental IRRs range from 0.56 percent to 1.53 percent, with a mean of 0.86 percent. Abstracting from potential non-tax advantages and disadvantages of an exchange, this implies that an exchange is always the preferred disposition strategy for investor's discount rates on tax savings and expenditures higher than 1.53 percent. The implication of this result is that, from strictly a tax perspective, a tax-deferred exchange will be generally preferred to a fully taxable sale.

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 offset, at least in part, by the decreased tax depreciation associated with the carry-forward of basis and depreciation deductions from the relinquished property into the replacement property.

We conduct an analysis for residential real property with the same set of tax rate and other assumptions used for nonresidential property. Although not separately displayed, the incremental benefit of tax deferral for residential real estate ranges from 0.44 percent to 9.29 percent of the value of the relinquished property, with a mean value of 4.66 percent. For comparison, the incremental benefit of tax deferral for nonresidential property ranges from 0.35 percent to 8.45 percent of the value of the relinquished property, with a mean value of 4.38 percent across our reported scenarios (see Figure 1). These relatively small differences suggest the increased deferral benefit associated with larger accumulated depreciation deductions on residential properties is largely offset by the negative effects of a lower basis carry forward and lower depreciation deductions in the replacement property. As a result, our nonresidential results are reasonable proxies for residential properties.

³² In the usual case of an initial negative cash flow followed by positive cash flows, investors choose to undertake projects if their risk-adjusted discount rate is lower than the IRR. If positive initial cash flow is followed by negative cash flows, projects are chosen if investors' discount rates are higher than the IRR.

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 recapture tax liabilities occur in subsequent years. Thus, the present value of these future exchange *disadvantages* is reduced by a higher discount rate. As a result, the incremental NPV of an exchange to the taxpayer is *increasing* in the discount rate.

As previously noted, the discount rate of five percent we initially assume is not intended to reflect the riskiness of a levered equity investment in CRE, but rather the uncertainty associated with the tax savings of an exchange. Under the current historically low interest rate environment, the appropriate discount rate for tax-related cash flows may be lower than five percent, although still greater than the risk-free rate. To examine the sensitivity of our results to lower discount rates on future tax deductions and liabilities, we repeat our base case analysis using a three percent discount rate to calculate *INCNPV* in place of the five percent rate. For each set of assumptions, we then take the incremental NPV using a three percent discount rate and subtract it from the corresponding five percent *INCNPV*, holding constant the rest of our non-residential base-case assumptions.

Although not separately displayed, the reductions in incremental NPV as a percentage of the price of the relinquished property range from 0.79 percentage points to 3.88 percentage points, with a mean of 1.78. The decrease in deferral tax savings as a percentage of price associated with the use of a three percent discount rate increases at an increasing rate with the holding period and price appreciation of the relinquished property. That is, the larger the magnitude of tax deferral the more sensitive is the incremental NPV to the assumed after-tax discount rate.

Estimates for States with an Income Tax

California dominates other states in the use of exchanges. Colorado, Oregon, and Arizona, all states with relatively high-income tax rates, also account for a disproportionately large share of the real estate like-kind exchanges identified by the authors.³³ It is in these high-tax states that the marginal, price determining, CRE

³³ Seven states levy no individual income tax: Alaska Florida, Nevada, South Dakota, Texas, Washington, and Wyoming. Two states—New Hampshire and Tennessee—exclusively tax dividend and interest income.

investor is more likely to be contemplating the use of an exchange to dispose/acquire property.

To examine the differential magnitude of exchange tax benefits for investors with a state income tax, we calculated a weighted average of the maximum statutory tax rate on wage and salary income in each state, including those states with no income tax. The weights are the percentage of all U.S. tax-deferred exchanges that, according to our CoStar data, occurred in each state from 2010 to 2020. This weighted average maximum state tax rate is 8.2 percent. We therefore add eight percent to the tax rates assumed in our base case, no state income tax, analysis. This raises the assumed tax rates on wage and salary income, capital gain income, and depreciation recapture income to 48.8 percent, 31.8 percent, and 36.8 percent, respectively.³⁴

Figure 3 presents our nonresidential simulations for investors filing income tax returns in states with an eight percent income tax. Figure 3A displays the tax savings for a relinquished property acquired five years prior to the exchange assuming annual price appreciation over that five years of two, four, and six percent, respectively. As in our base-case, the incremental value of an exchange is positively related to nominal price appreciation prior to the exchange. $INCNPV_t$ as a percentage of price also increases with the expected holding period of the replacement property prior to a fully taxable sale, although at a decreasing rate. Similar patterns are visible when the holding period of the relinquished property ($HOLD^i$) increases to 10, 15, and 20 years (Figures 3B-3D). Overall, the incremental present value of tax deferral ranges from 0.46 percent to 12.29 percent of relinquished property value with a mean of 6.09 percent across the parameter assumptions. This mean value is 170 basis points greater than the corresponding mean calculated with our base-case (no state income tax) assumptions. Clearly, the option to exchange into a replacement property, and avoid a fully-taxable sale, is more valuable to more highly-taxed investors, all else equal.

Estimates for Corporate Owned Property

According to the U.S. Treasury, 35 percent of the estimated tax revenue losses in 2020 associated with real property like-kind exchanges will be generated by corporations. To examine the incremental value of an exchange to a corporate taxpayer, we rerun our

³⁴ To the extent state income taxes are deductible at the federal level, the effective marginal state tax rate is reduced from the applicable statutory rate.

base case, nonresidential property, simulations assuming ordinary income, capital gain income, and depreciation recapture income are taxed at the maximum statutory corporate tax rate of 21 percent. Figure 4 presents our nonresidential simulations for corporate owners. Figure 4A displays the tax savings for a relinquished property acquired five years prior to the exchange assuming annual price appreciation over that five years of two, four, and six percent, respectively. As in our base-case, the incremental value of an exchange is positively related to nominal price appreciation prior to the exchange. $INCNPV_t$ as a percentage of price also increases with the expected holding period of the replacement property prior to a fully taxable sale, although at a decreasing rate. Similar patterns are visible when the holding period of the relinquished property ($HOLD^t$) increases to 10, 15, and 20 years (Figures 4B-4D).

Overall, the incremental present value of tax deferral ranges from 0.31 percent to 10.09 percent of relinquished property value with a mean of 4.47 percent across the parameter assumptions. This mean value is 0.09 basis points less than the corresponding mean calculated with our base-case nonresidential assumptions for individual taxpayers. Thus, overall, the option to exchange into a replacement property, and avoid a fully taxable sale, is roughly as valuable to many corporate taxpayers as individual taxpayers.

Implications of Elimination for Market Values

Prior to the passage of the TCJA of 2017, the CRE industry predicted that elimination of real estate like-kind exchanges would put downward pressure on CRE prices in the short run, reduce liquidity and transaction activity, and put upward pressure on market rents in the longer run. These concerns reflect the operations of competitive CRE markets: a change in tax law that increases the taxes paid by the marginal CRE investor in a local market will, in the short-run, reduce the price the marginal investor is willing to pay per dollar of current net operating income, all else equal.

Our analytical model produces estimates of the tax savings associated with the use of a tax-deferred exchange, relative to a fully-taxable sale, holding constant all other assumptions about the expected cash flow generating ability of the replacement property (e.g., future rents, operating expenses, capital expenditures, mortgage payments, net sale price at reversion). Under certain assumptions, these calculated tax savings can be used as estimates of the maximum short-run price declines or long-run rent increases that would be required in local CRE markets if exchanges were eliminated.

The first assumption is that the marginal investor in the local market in question is assumed to be a taxable, profit maximizing, noncorporate investor contemplating the disposition of one property to acquire a replacement property. Second, this investor estimates the incremental NPV of exchanging into the replacement property versus a fully taxable sale of the relinquished property and purchase of the replacement property. Moreover, this marginal (price determining) investor fully incorporates the potential tax savings from an exchange into his bid (reservation) prices for potential acquisitions. Third, the investor is subject to the ordinary, capital gain, and depreciation recapture tax rates assumed in our base case analysis of nonresidential property. Finally, no offsetting market responses or general equilibrium effects on CRE prices, either positive or negative, will be associated with elimination of exchanges.

Under these “static” assumptions, the mean market price decline under our base case (no state income tax) assumptions across our price appreciation and holding period assumptions is 4.38 percent. The maximum static price decline across our base case scenarios is 8.45 percent (see Figure 1). When an eight percent state income tax rate is included, the mean and maximum static price declines are 6.09 percent and 12.29 percent, respectively (see Figure 3). These static results bracket the high end of price declines that could occur in the short run in local markets because of the elimination of 1031 exchanges. These percentage price declines can also be interpreted as the percentage increase in the value of after-tax rental income that would be required in the longer run to offset the elimination of like-kind exchanges.

General equilibrium considerations, the demand and supply of properties for sale in a local market and expected long-run rent adjustments in local markets all complicate a comprehensive analysis of the effects of CRE tax law changes. General equilibrium effects associated with a change in tax law generally perceived to be unfavorable to capital formation could include, for example, a reduction in the level of economy-wide interest rates. Such a reduction could moderate the price declines associated with a negative change in tax law.

In addition, if property values in a local market are expected to fall below the cost to replace the property as a result of a 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 would be required to push market rental rates up to their new (higher) 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, current market values will decline less than the amount needed to fully offset the negative tax changes.³⁵ Finally, if the marginal (typical) investor in a local market does not incorporate potential tax savings from an exchange into her bid (reservation) prices for potential acquisitions, local market values would not be directly affected by the elimination of exchanges, although negative general equilibrium effects could depress prices.³⁶

The Effects of Exchanges on Treasury Revenues³⁷

The deferred gains reported on IRS Form 8824 are only the starting point for approximating the economic benefit of CRE exchanges to investors and their cost to the U.S. Treasury. The next step is to estimate the deferred tax liabilities associated with CRE exchanges. Using our base case model assumptions and our twelve combinations of holding period length for the relinquished property and nominal price appreciation on the relinquished property over that holding period, we calculate that taxable gains on a fully taxable sale in 2020 would be taxed at an average rate of 26 percent. This average effective tax rate is a weighted average of the assumed 23.8 percent capital gain tax rate and the 28.8 percent depreciation recapture income tax rate across our 12 holding period/price appreciation scenarios for the relinquished property.

Exchange Benefits as a Percentage of Deferred Tax Liabilities

The initial benefit to the taxpayer and the initial cost to the Treasury of an exchange, relative to a fully taxable sale, is the dollar amount of the deferred tax liability. However, as discussed above, the true economic benefit to the exchanger is equal to the deferred tax

³⁵ Note that if the supply of rental space in a market 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.

³⁶ On the other hand, the deferred tax from an exchange is a potential source of capital for investors buying property. If investors are capital-constrained, and some investors are unable to acquire what would be profitable properties because of the elimination of exchanges, the effect on market prices could be greater than our model suggests.

³⁷ This section draws on Ling and Petrova (2015) and Barker, Ling, and Petrova (2020).

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 5 presents our base-case results for nonresidential real property and individual taxpayers. Figure 5A displays $INCNPV_t$ as a percentage of the deferred tax liability assuming the relinquished property was acquired five years ago. If the relinquished property appreciated two percent annually over those five years and if the replacement property is sold in a fully taxable sale two years after being acquired in an exchange, the NPV of tax savings is just 8.21 percent of the deferred tax. Said differently, the present value of increased taxes after the exchange is equal to 91.8 percent (100% - 8.2%) of the deferred tax liability. The incremental NPV as a percentage of the deferred tax liability increases (although at a decreasing rate) as the holding period of the replacement property ($HOLD^2$) increases. For replacement property holding periods between 21 and 30 years, $INCNPV_t$ ranges from 43 percent to 57 percent of the deferred tax liability. Clearly the benefit of an exchange is positively related to the length of time the relinquished property is held before it is disposed in a fully taxable sale. The three curves in Figure 5A capture the NPV of the tax savings assuming the price of the relinquished property has increased by two, four, and six percent, respectively, since its acquisition five years ago. Figures 5B-5D present the corresponding results for relinquished property holding periods of 10, 15, and 20 years.

Overall, the results displayed in Figures 5A-5D allow us to put into context the magnitude of deferred taxes associated with real estate like-kind exchanges. First, the incremental benefit of an exchange to taxpayers, as a percentage of the investor's deferred tax liability, is largely insensitive to the length of time the relinquished property has been held by the taxpayer. $INCNPV_t$ scaled by the deferred tax liability decreases slightly as the amount of price appreciation realized by the relinquished property increases. However, $INCNPV_t$ as a percentage of the deferred tax liability increases (at a decreasing rate) as the length of time the replacement property is held before a fully taxable sale. Clearly, the simple application of an assumed 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 their cost to the Treasury.

As displayed in Figure 5, given the range of assumptions for $HOLD^1$; π^1 ; and $HOLD^2$, the incremental value of an exchange disposition strategy as a percent of the deferred tax

liability using our base-case assumptions ranges from a low of 8.2 percent to a high of 57.6 percent with a mean of 36.6 percent, assuming both the relinquished and replacement property are nonresidential. A similar analysis was conducted for corporate taxpayers. Although not separately displayed, using the range of assumptions for *HOLD*¹; *II*¹; and *HOLD*² used for individual taxpayers, the incremental value of an exchange disposition strategy as a percent of the deferred corporate tax liability ranges from a low of 9.22 percent to a high of 67.07 percent with a mean of 44.62 percent, assuming both the relinquished and replacement property are nonresidential

Estimated Cost to the Treasury

Individuals, corporations, and partnerships making use of a real estate like-kind exchange in a given tax year must include a completed Form 8824 with their federal tax return. This information is compiled and distributed by the U.S. Treasury. Unfortunately, the latest publicly available data from the Treasury on Form 8824 is 2013, prior to the elimination of like-kind exchanges for all assets except real property. To examine the magnitude of lost Treasury revenues from real property like-kind exchanges, we start with estimates of the tax expenditure associated with real estate like-kind exchanges produced by the Joint Committee on Taxation.³⁸

The JCT estimates that \$9.9 billion in tax revenue was lost in 2019 as a result of like-kind exchanges. Of this, \$7.2 billion was lost from individual taxpayers; \$2.7 billion from corporate taxpayers. Although significantly less than the Form 8824 deferred gains reported by the Treasury, these deferred tax liabilities (expenditures) 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 5, given the range of assumptions for *HOLD*¹; *II*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 eight percent to a high of 58 percent, with a mean of 37 percent, assuming both the relinquished and replacement property are nonresidential.

If the incremental present value of an exchange to a typical taxpayer is 37 percent of the deferred tax liability, this suggests that the benefit to individual taxpayers was \$2.7

³⁸ Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2019-2023, Table 1, December 18, 2019 (JCX-55-19), <https://www.jct.gov/publications.html?func=startdown&id=5238>..

billion in 2019 (0.37 x \$7.2 billion); the corresponding benefit to corporate taxpayers was \$1.2 billion (0.45 x \$2.7 billion). With these assumptions, the total economic cost (present value) of like-kind exchanges to all taxpayers was \$3.9 billion in 2019 based on the JCT's estimate of \$9.9 billion in deferred tax revenues. The corresponding estimate for 2019-2023 is \$20.1 billion based on JCT's estimated tax expenditures of \$51 billion.

The present value of taxpayer benefits we calculate in our base case assumes a discount rate of 5 percent. To the extent the Treasury's opportunity cost is lower than CRE owners, the true cost of an exchange to the Treasury is lower than the corresponding benefit to the taxpayer. Taxpayer discount rates are higher than Treasury discount rates not only because the cost of capital is higher for taxpayers than for the Treasury, but also because the risks involved in choosing an exchange transaction is influenced by a taxpayer's idiosyncratic tax situation. For the Treasury, this risk is diversified over millions of taxpayers.

The benefit of immediate tax deferral to the taxpayer is equal to the tax revenue foregone by the Treasury. However, as discussed above, the immediate value of deferral to the taxpayer is partially offset by the present value of foregone depreciation deductions and the present value of larger capital gains and depreciation recapture taxes if the property is disposed in a fully taxable sale. These disadvantages to taxpayers in the years after the exchange help to offset the true cost of exchanges to the Treasury. However, to the extent taxpayer discount rates exceed the Treasury's, the cost of these increased future tax liabilities to taxpayers is less than their benefit to the Treasury. This wedge between the net benefit of exchanges to taxpayers and the cost to the Treasury is large and potentially important to consider when formulating tax policy.

It is also important to emphasize that the use of our estimates of taxpayer benefits to approximate the cost of real estate exchanges to the Treasury assumes taxpayers would have disposed of their properties in fully-taxable sales even in the absence of the option to exchange. As estimates of foregone Treasury revenue these estimates are therefore inflated as many investors would delay disposing of their properties if a tax-deferred exchange were not available. Others might engage in opportunity zone investments, UPREIT transactions or installment sales. Ownership of real estate might also shift toward tax-exempt investors. In short, behavioral responses by taxpayers would reduce the increase in Treasury revenues implied by a static analysis.

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 for real property in terms of forgone tax revenue is relatively small. In this section, we turn to empirical evidence to further quantify 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 cash 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. We use data from IPX1031, which enables us to match the replacement exchange transactions to the original relinquished property using a unique exchange identification number. We provide statistics on the differences in prices between investors' relinquished and replacement properties, as well as document the frequency of cases in which an exchange is associated with immediate tax liability because the replacement property(s) is less expensive than the relinquished property. We conduct a similar matching procedure based on Costar data using the (true) investor's identity and a search within 180 days from the sale date of the relinquished property. The results using Costar's data are similar to those using IPX1031. However, due to the matching procedure we are able to identify a much larger number of roundtrip exchange transactions (75,681) using data from IPX1031.³⁹ Therefore, we report the results for exchanges based on IPX1031 exchange data, while for non-tax-motivated transactions we use Costar's data.

We analyze differences in relinquished and replacement property prices for like-kind exchanges versus taxable sales when a replacement property acquisition by the same investor is completed within 180 days of the closing of the sale 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

³⁹ For comparison purposes, we exclude exchanges with prices of less than \$10,000. Our results are qualitatively the same if this filter is not applied. We also exclude exchanges where partnership interests are involved as the recorded price of the relinquished property does not reflect the proceeds received by the investor. When a relinquished property is replaced with more than one exchange property, we sum the prices of the replacement properties for that exchange.

by an acquisition) transaction. To eliminate the effect of very large price differences, we trim price differences at the 5% level in both tails of the distribution.⁴⁰ Furthermore, we use a modified 1-step Huber estimation approach to remove the effect of outliers.

We observe that, based on median values, exchange investors acquire a replacement property that is \$40,500 more expensive than their relinquished property. In contrast, when an ordinary sale is followed by a purchase of a replacement property, the price of the replacement property is \$87,000 less than the price of the relinquished property. Thus, the replacement properties in like-kind exchanges are associated with an increased investment by \$127,500 compared to non-exchange acquisitions. This increased investment is statistically significant at the 1 percent level based on our trimmed and modified 1-step mean estimate statistics. In addition, the statistics in Panel A reveal that replacement properties, on average, are associated with higher prices in like-kind exchanges, but lower prices in the non-tax motivated investment strategies. This demonstrates that investors can afford to acquire higher-priced replacement properties on average through like-kind exchanges.

Next, we examine how frequently the price difference between the replacement property and relinquished property is positive ($P_{\text{replacement}} - P_{\text{relinquished}} > 0$). This difference is positive in 62 percent of the like-kind exchanges and only 45 percent of the non-tax motivated transactions. This indicates that taxes may not be fully deferred in 38 percent of the like-kind exchanges, depending on differences in the amount of debt financing used on the relinquished and replacement property.

Panel B presents the corresponding statistics for only those cases where the replacement property is more expensive than the relinquished property. The differences are large and positive for both types of strategies, but they are larger for non-tax motivated transactions. Since Costar's transactions are larger on average (with a median price of \$1.1 million) these larger dollar differences may result from differences in scale. In any case, it is important to note that price differences are positive in non-tax motivated replacement acquisitions in minority of the cases. Finally, Panel C presents the results when the replacement property is less expensive than the relinquished property. We

⁴⁰ 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.

observe that like-kind exchanges are associated with a smaller reduction in investment when $P_{\text{replacement}} - P_{\text{relinquished}}$ is negative.

Table 9 presents strong evidence that like-kind exchanges are associated with larger investments in subsequent real estate 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. These 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 when investors are completing a like-kind exchange. This difference ranges from fourteen to seventeen percent of the relinquished property's sale price 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. Nevertheless, price differences are positive for non-exchange properties only 45 percent of the time compared to 62 percent for like-kind exchange properties. Finally, the statistics reported in Panel C show that the price difference ($P_{\text{replacement}} - P_{\text{property}}$) is a significantly smaller negative percentage for exchanges when $P_{\text{replacement}} - P_{\text{property}}$ is negative. Overall, the results in Table 10 provide evidence that the increased investment we observe in exchanges for the entire sample is not driven by higher prices in our sample of exchange properties.

In untabulated results we further examine if price differences differ for smaller 1-4-unit residential properties. Such properties have a median price of only \$263,500. Overall, small residential exchange relinquished properties are associated with an approximately 12 percent increase in investment. The increase in investment is approximately 8 percent when the relinquished property is replaced with another small residential property (60 percent of the time) and 20 percent when the relinquished property is replaced with another property type.

Table 11 examines median price differences, $P_{\text{replacement}} - P_{\text{relinquished}}$, by year. We note that the median price difference is positive in all years. Generally, the difference is positively correlated with years of higher CRE price increases. In addition, while the median price difference for like-kind exchanges is positive in all years, the price differences for non-tax motivated investments is zero or negative in all years during the

period examined. 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 statistics on price difference by state. Panel A reports the results in dollars, while panel B presents the results as a percentage of the relinquished property value. We report statistics for the top 20 states by number of exchanges. The number of round-trip exchange transactions (relinquished followed by a replacement exchange) varies from 22,650 exchange pairs in California to 728 such transactions in Oklahoma. The results are consistent with our previous findings. Price differences for like-kind exchanges are positive for all states; however, this median difference is negative in all states but Massachusetts for non-tax motivated sales.

In summary, the results reported in Tables 9 through 13 support the notion that the value of replacement properties in exchange transactions exceed the value of relinquished properties. However, given that in 38 percent of the cases the replacement property in an exchange has a lower value than the investor's relinquished property, we conclude that in a large number of like-kind exchanges 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 314,465 acquisitions, of which 14,490 are replacement exchanges. 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.⁴¹ The predictive model used for matching

⁴¹ 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 like-kind exchanges with acquisitions following taxable sale controls for the square footage of improvements and land (using natural logs), age, age squared, property quality rating assigned by Costar, holding period of the relinquished property, number of floors, location (longitude and latitude coordinates of the property) and property type fixed effects. Most of these variables used in our propensity score model significantly predict whether the acquisition was tax motivated or not. Therefore, it is important to conduct the leverage analysis on a matched basis; otherwise the 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 samples of replacement exchange acquisition 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 the matched sample.

We observe that like-kind exchanges in the unbalanced sample (Panel A) are associated with a mean leverage ratio of 30 percent and a median ratio of 15 percent. The corresponding mean and median leverage ratios for ordinary acquisitions are 43 percent and 55 percent, respectively. We also observe lower financial leverage for replacement properties in exchanges in the matched sample (Panel B). The mean difference in initial leverage between replacement exchanges and ordinary acquisitions in the matched sample is approximately 13 percent; the corresponding median difference is 34 percent. These differences are statistically significant and economically large.

Table 15 displays yearly mean difference in initial leverage for replacement exchanges and non-exchange related acquisitions for the matched sample that excludes transactions with sale conditions. The differences are negative in all sample years and vary between -16.5 and -9.1 percent. Similarly, the state-level results for the matched sample reported in Table 16 show negative differences in all states. Overall, the results presented in Tables 9-16 provide strong evidence that 1031-exchange tax-driven investment strategies are associated with larger capital investments but lower leverage.

replacement properties are also larger. To account for this potential selection bias, we employ a propensity score matching approach.

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 NCREIF capital expenditure data at the property level. NCREIF produces several quarterly indexes that track real estate return performance based on data provided by NCREIF's contributing members. The data NCREIF collects includes property level operating income and expenses as well as data on capital expenditures. 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 for a property is available for analysis.⁴² We conduct statistical analysis to determine whether, all else equal, properties that have been 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 exchange replacement properties 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 reported in Panel A suggest that, overall, like-kind exchanges are associated with higher capital expenditures, with the effect being driven by increased investment in building improvements. The differences in capital expenditures, however, are not statistically significant.⁴³ Turning to Panel B, we note that capital expenditures

⁴² Note that since most NCREIF data providing members are non-taxable entities, we are able to obtain capital expenditure data for a small subsample of transactions that appear in the Costar database. Our capital expenditure analysis is based on 7,911 observations, of which 90 are replacement exchanges.

⁴³ This is could be due to the small sample size. In addition, since exchange properties in Costar are significantly larger than non-exchange properties, controlling for property size is important.

associated with 1031 replacement properties are, on average, higher by \$0.66/sf. This increased capital investment is driven by significantly higher building improvements. Overall, our analysis of capital expenditure lends some support to the argument that acquisitions of replacement properties to complete a like-kind exchange are associated with higher capital expenditures. This is consistent with Ling and Petrova (2008) who find that sale prices of properties acquired to complete an exchange are higher, even after controlling for the physical and locational characteristics of the exchange and non-exchange related properties. If capital expenditures produce higher investment returns through increases in rents and prices (Ghosh and Petrova, 2017), then we can expect that like-kind exchange properties will have higher prices at disposition, all else equal. Our results are also supported by the 2020 NAR survey, in which commercial survey respondents reported that, after acquiring property with a like-kind exchange, 89 percent of their clients invested additional equity capital to improve the property; furthermore, on average, this additional capital was equal to 18 percent of the market value of the acquired property. Commercial members also responded that, in addition to pursuing a deferral of capital gain taxes, 39 percent of their clients used like-kind exchanges to conserve equity for the acquisition of another property or properties.

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.⁴⁴ 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). It is generally accepted that eliminating tax-deferred exchanges will lead to longer investment holding periods and decreased liquidity for investors. Thus, property prices could be negatively impacted by reduced tax benefits and by reduced liquidity. We turn to CoStar data to examine differences in holding periods between

⁴⁴ Properties disposed in like-kind exchanges may have been acquired either in an ordinary acquisition or as part of an exchange.

exchange-motivated transactions and non-exchanges. Our results are presented in Table 18.

To compare investment holding periods for exchange related acquisitions and non-exchanges, we use information provided by Costar. This data is available for 659,802 of the 816,002 observations in our CoStar sample, of which 13,154 represent relinquished property exchanges. However, for holding periods that exceed 20 years, Costar reports a holding period of “240+ months.” Therefore, the holding period data may be right censored, which implies our holding period statistics may be biased downward, although holding periods of 20+ years are rare.

We present summary statistics for differences in holding periods by disposition strategies in Table 18. Panel A displays the results for the full sample. Panel B provides the statistics for a matched sample of relinquished properties with ordinary sales, using a propensity score model that controls for the square footage of improvements and land, property age, number of floors, the quality rating of the property, location, time of sale, and property type. Most of the control variables in the propensity score matching model are significant revealing a selection bias, should these characteristics be ignored. The average holding periods reported in Panel A (for the full sample) and Panel B (for the matched sample) vary between 10.5 and 10.6 years for exchanges and 10.9 and 11.4 years for non-exchanges. Although not large in magnitude, these differences are statistically significant at 1 percent level. Overall, the results in Table 18 show that exchanges are associated with holding periods that are about a year (Panel A) to a third of a year (Panel B) shorter.

Table 19 presents holding period summary statistics for each state with 30 or more relinquished property exchanges. 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. 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 can defer taxes indefinitely with 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. Four percent of the properties in the Costar sample were originally acquired through a like-kind exchange. Out of these, only 12 percent 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 results suggest 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. These results should be used with caution, due to the possibility of under-identification of exchanges, which was previously discussed.

Conclusions

We examine the economic and tax effects of Section 1031 commercial real estate (CRE) exchanges. Based on several sources, we document the widespread use of like-kind exchanges and conclude that the share of exchanges likely ranges from 10 to 20 percent of all CRE transactions over our 2010 to 2020 sample period. Using data from Costar we examine the extent to which the number and volume of like-kind exchanges varies over time, by property type, across states and CBSAs. While tax-deferred exchanges tend to be more common in states with higher taxes or price appreciation, we show that the number and volume in exchanges has significantly increased across all states since 2010. In addition, based on data from IPX1031® (a major facilitator of exchanges), we observe that the median price of properties involved in an exchange is approximately \$500,000. This suggests that 1031 exchanges are an important tax strategy that enables smaller, non-institutional investors to dispose of properties on a tax-deferred basis. Therefore, the removal of such a tool will primarily hurt small investors and the local markets in which they are active.

We further develop a “micro” model that quantifies the present value of an exchange to the owner. We find that the incremental value of an exchange, relative to a fully taxable sale, as a percentage of the value of the relinquished property ranges from 0.50 percent to 12 percent, depending on the tax rates faced by the investor, the length of time since the acquisition of the relinquished property, the amount of nominal price appreciation the investor has experienced on the relinquished property, and the length of time the investors expects to hold the replacement property before disposing of it in a fully taxable sale. These incremental tax benefits also capture the extent to which the market value of properties would have to decline, or rental income would have to increase, to fully offset the loss in tax benefits that would be associated with the elimination of exchanges, holding constant other model assumptions.

In addition to capturing the benefit of immediate tax deferral, our analytical model incorporates the corresponding tax disadvantages of an exchange from the investor’s perspective; in particular, the reduced depreciation deductions in the replacement property and increased capital gain and depreciation recapture taxes at sale. We estimate that the incremental value of an exchange disposition strategy as a percent of the deferred tax liability ranges from a low of eight percent to a high of 58 percent with a mean of 37 percent, depending again on assumed tax rates, the length of time since the acquisition of the relinquished property, the amount of price appreciation on the relinquished property, and the length of time the investor expects to hold the replacement property before disposing of it in a fully taxable sale. Thus, a strict focus on the dollar value of immediate tax deferral dramatically overstates the “net” value of an exchange strategy to taxpayers.

The Joint Committee on Taxation (JCT) estimates that real estate like-kind exchanges produced a “static” (holding everything else constant) loss in tax revenues of \$9.9 billion in 2019 and estimate that lost Treasury revenue will accumulate to \$51 billion over the period 2019 to 2023. Our analytical model suggests that the total cost of like-kind exchanges to the Treasury will be less than \$20 billion over the five-year period of 2019 to 2023. But even this calculation, which is based on the JCT’s static analysis of revenue losses, assumes elimination would not negatively affect CRE prices, transaction activity, economic activity, or wages earned by affected market participants (real estate lawyers, brokers, exchange facilitators, etc.). In addition, this estimate assumes taxpayers would not alter their behavior, if like-kind exchanges were eliminated. However, absent exchanges, many investors would simply delay disposing of their properties, while others would use alternative tax deferral strategies such as opportunity zone investments,

(UPREIT) transactions with REITs, or installment sales. These behavioral responses by taxpayers would further reduce the amount of tax revenue collected if like-kind exchanges were eliminated. Furthermore, we argue that because of Treasury's low (near zero?) cost of capital (discount rate), the present value of lost Treasury revenue is substantially less than the present value of exchange tax benefits to taxpayers.

Finally, our empirical analyses demonstrate that like-kind exchanges are associated with increased investment, shorter holding periods, and lower leverage. Therefore, the removal of exchanges will likely 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.

Therefore, 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 nevertheless disrupt many local property markets and harm both tenants and owners. Overall, our analyses suggest that the cost of Section 1031 like-kind exchanges to the U.S. Treasury is overstated, while benefits to investors, local real estate markets, and economic activity are often overlooked.

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Figure 1: Incremental NPV of exchange as a percentage of property value-no state income tax

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: 40.8 percent; depreciation recapture tax rate: 28.8 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 5 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, $INCNPV_t$, is calculated per equation (3) in Barker, Ling and Petrova (2020). π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

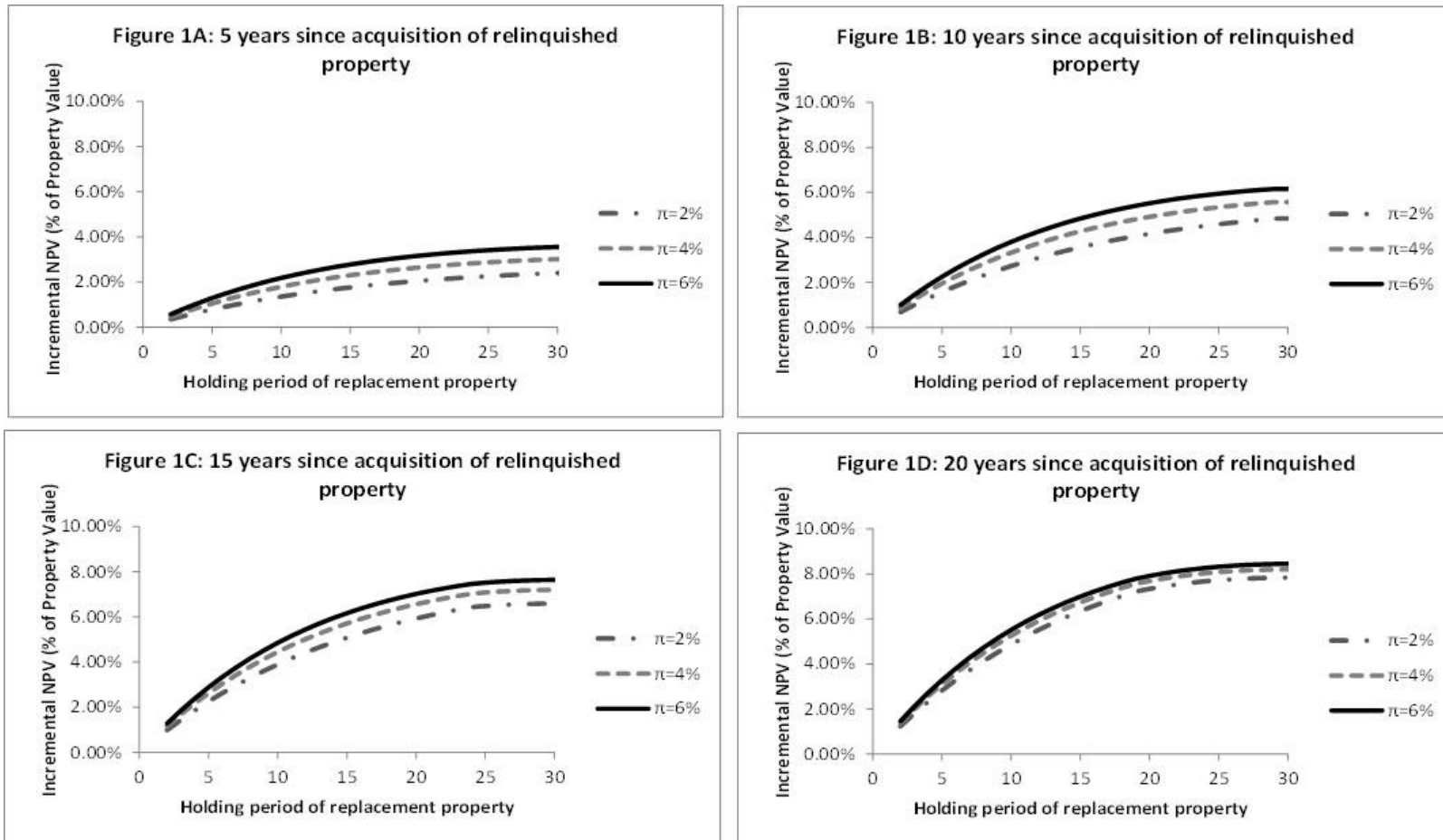


Figure 2: Incremental NPV of nonresidential exchange as a percentage of deferred gain

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: 40.8 percent; depreciation recapture tax rate: 28.8 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 5 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, $INCNPV_t$, is calculated per equation (3) in Barker, Ling and Petrova (2020). π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

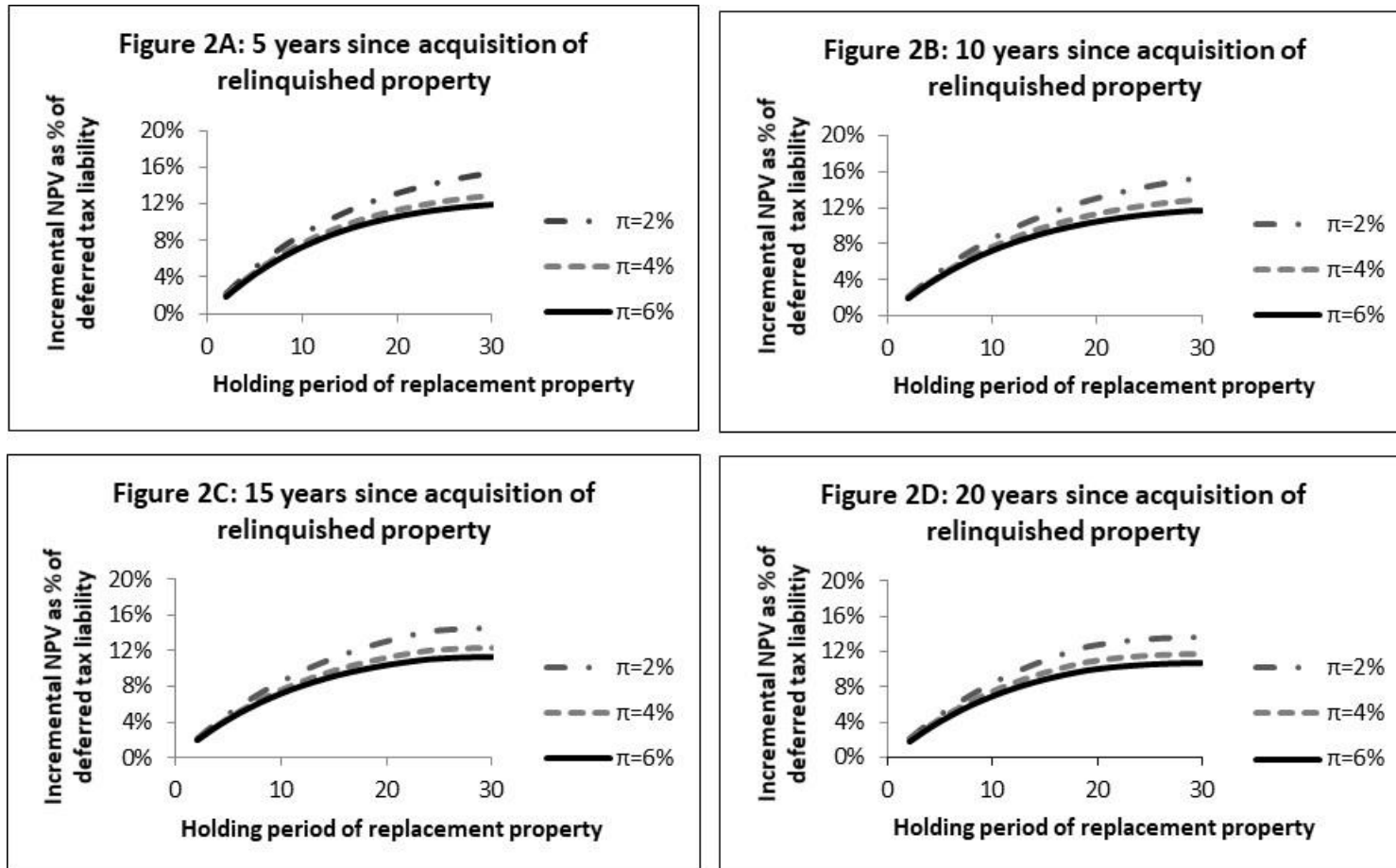


Figure 3: Incremental NPV of exchange as a percentage of property value-with state income tax

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: 40.8 percent; depreciation recapture tax rate: 28.8 percent; capital gain tax rate: 23.8 percent; after-tax discount rate: 5 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, $INCNPV_t$, is calculated per equation (3) in Barker, Ling and Petrova (2020). π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

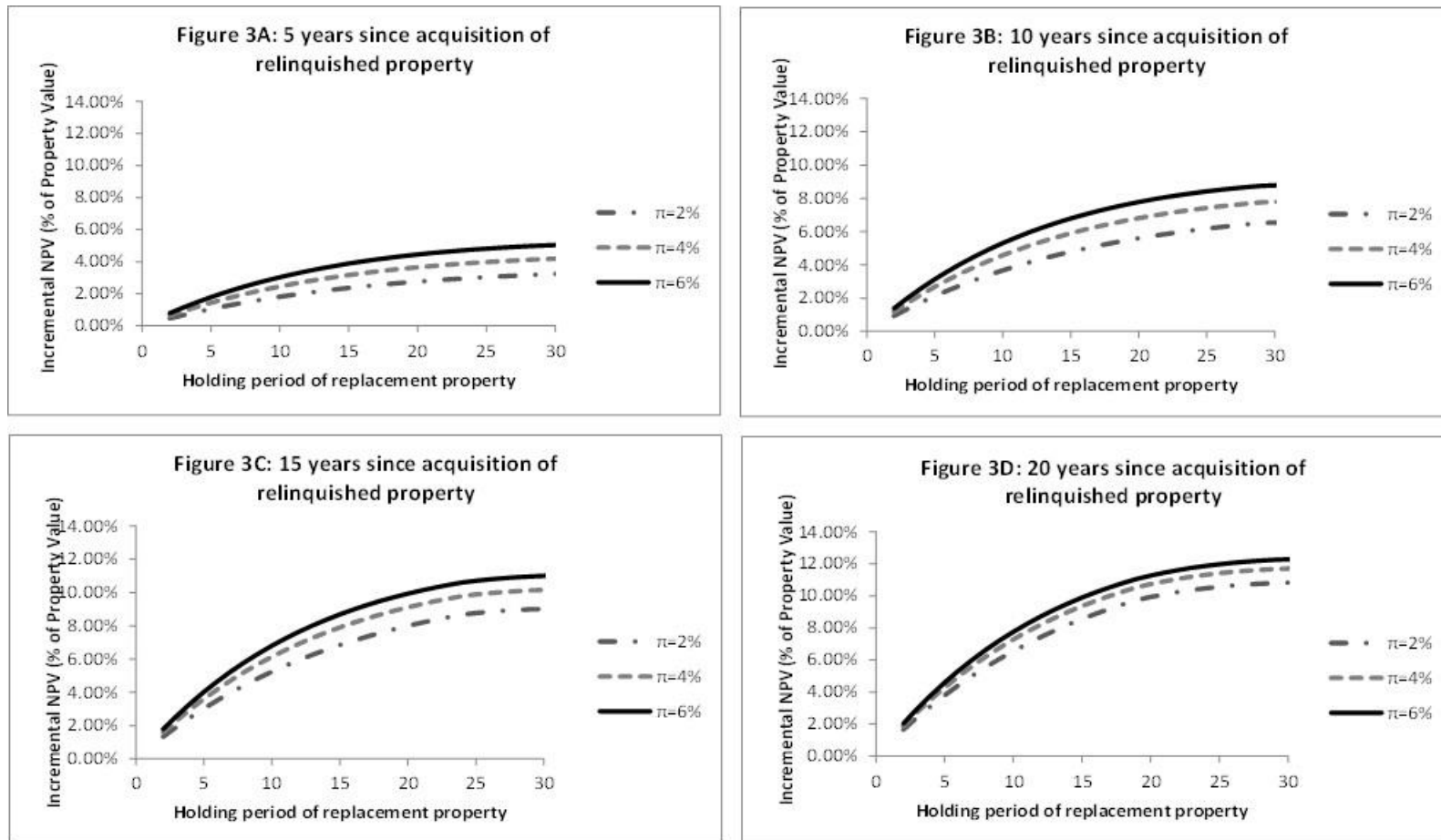


Figure 4: Incremental NPV of exchange as a percentage of property value-corporate taxpayer

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: 21 percent; depreciation recapture tax rate: 21 percent; capital gain tax rate: 21 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, $INCNPV_t$, is calculated per equation (3) in Barker, Ling and Petrova(2020). π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

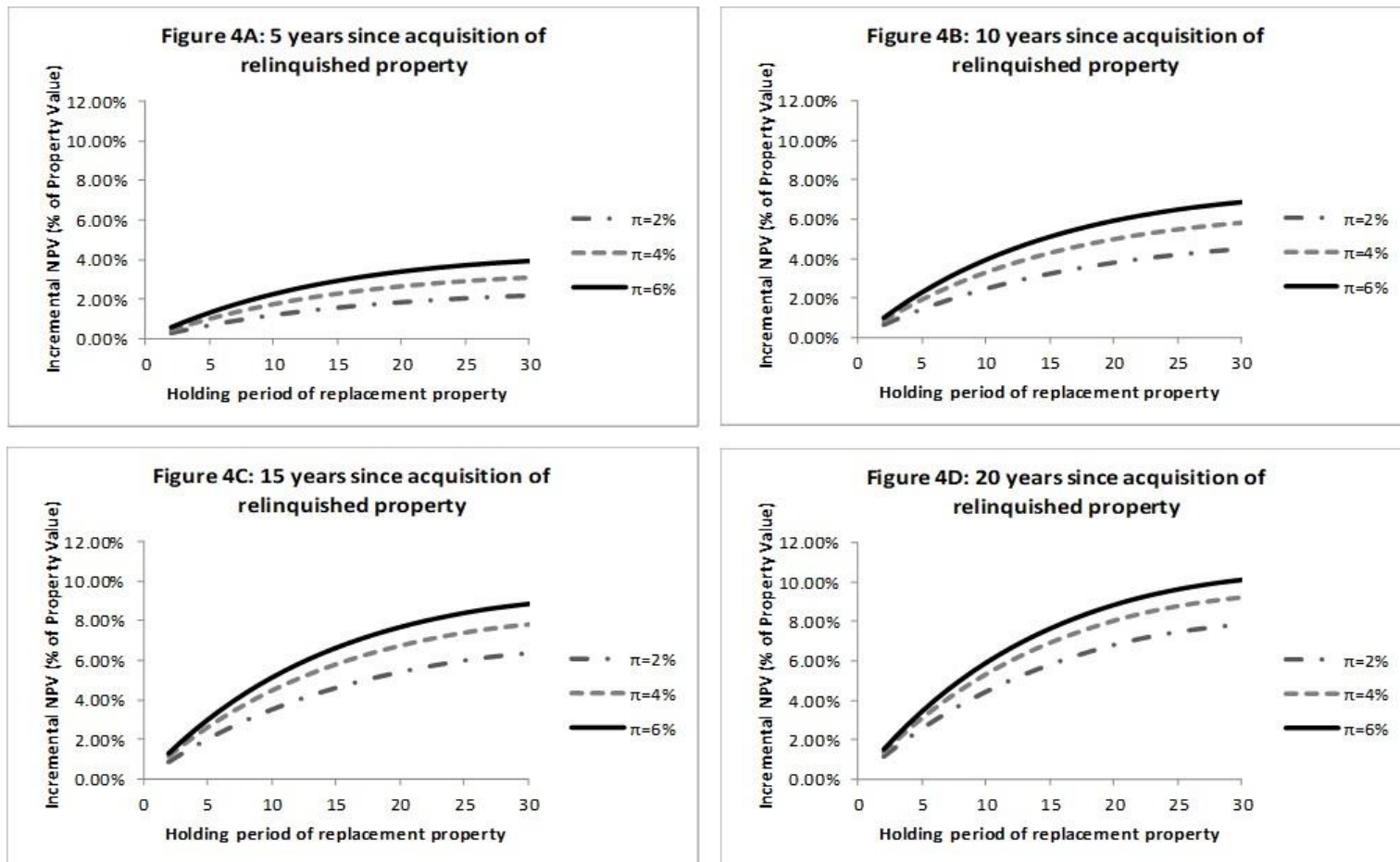


Figure 5: Incremental NPV of exchange as a percentage of deferred taxes-individual taxpayer

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, $INCNPV_t$, is calculated per equation (3) in Barker, Ling, and Petrova (2020). π is the amount of annual price appreciation experienced by the relinquished property since its acquisition.

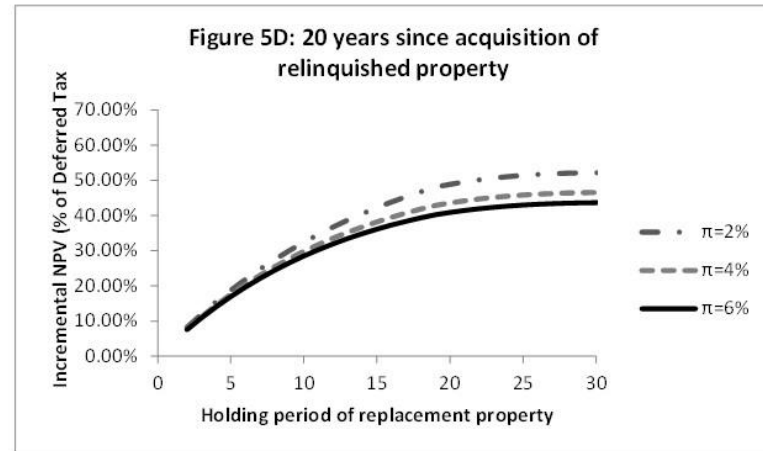
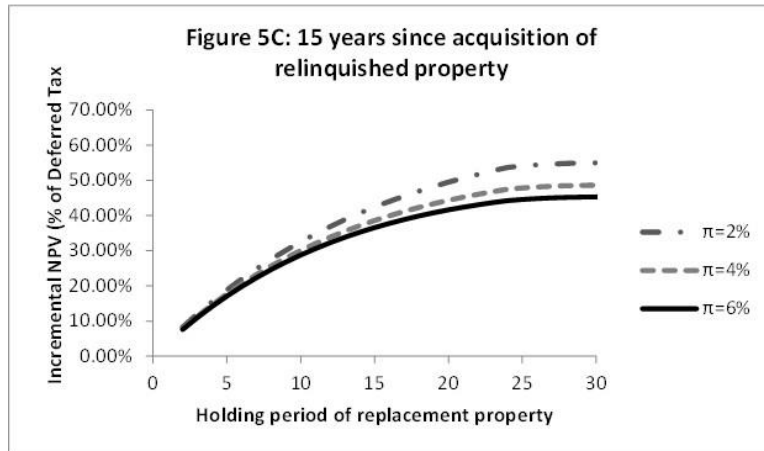
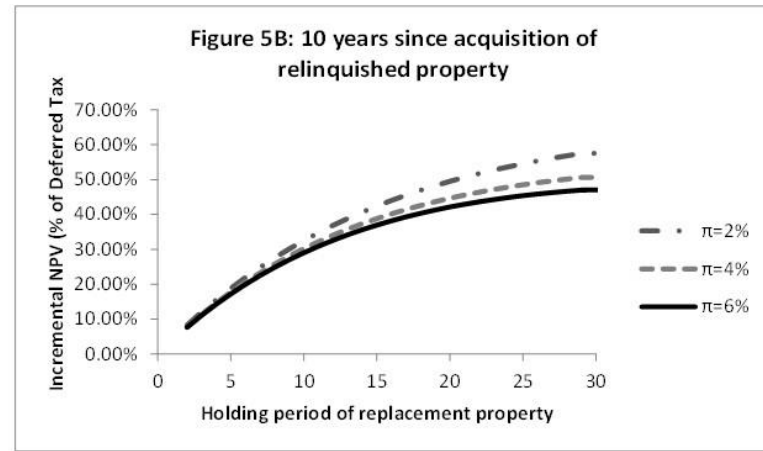


Table 1: Distribution of 1031 exchanges versus all sales by year based on Costar data

In this table we report the frequency of exchanges over time as reported by Costar based on 816,002 transactions with confirmed sales price in 2010 to June 2020.

Year of Sale	All CoStar sales		CoStar Sales involving an exchange			
	Number	\$ Volume (billion)	Number	% of all sales	\$ Volume (billion)	% of all sales
2010	51,482	126.2	1,288	2.5%	4.5	3.6%
2011	58,572	177.3	1,345	2.3%	6.6	3.7%
2012	76,197	217.8	1,616	2.1%	7.8	3.6%
2013	88,015	287.7	2,711	3.1%	14.2	4.9%
2014	95,294	352.8	4,267	4.5%	20.9	5.9%
2015	101,666	430.6	5,004	4.9%	34.6	8.0%
2016	99,971	406.2	6,646	6.6%	33.7	8.3%
2017	63,837	390.2	6,751	10.6%	35.9	9.2%
2018	77,497	440.7	6,778	8.7%	34.5	7.8%
2019	79,604	490.9	6,544	8.2%	37.2	7.6%
2020	23,867	127.5	2,264	9.5%	11.1	8.7%
Total	816,002	3,448	45,214	5.5%	241	7.0%

Table 2: Distribution of 1031 exchanges based on CoStar data by property type

Property type	All CoStar sales				CoStar sales involving an exchange			
	Number	% of all sales	\$ Volume (billion)	% of total \$ volume	Number	% of all exchanges	\$ Volume (billion)	% of total \$ volume of exchanges
Retail	229,668	28.1%	486.6	14.1%	14,176	31.4%	51.6	21.4%
Multifamily	132,991	16.3%	1,058.0	30.7%	14,161	31.3%	91.4	37.9%
Office	128,556	15.8%	786.8	22.8%	5,502	12.2%	44.2	18.3%
Land	123,763	15.2%	245.2	7.1%	1,841	4.1%	4.5	1.9%
Industrial	122,323	15.0%	377.6	11.0%	4,955	11.0%	18.9	7.8%
Specialty	27,165	3.3%	75.1	2.2%	632	1.4%	2.6	1.1%
Flex	22,853	2.8%	70.9	2.1%	1,404	3.1%	5.6	2.3%
Hospitality	16,061	2.0%	201.2	5.8%	619	1.4%	10.9	4.5%
Health care	7,666	0.9%	93.2	2.7%	167	0.4%	1.4	0.6%
Other	4,956	0.6%	53.3	1.5%	1,757	3.9%	9.9	4.1%
Total	816,002	100.0%	3,448	100%	45,214	100%	241	100%

Table 3: Share of exchanges over time and distribution by property type during 2017-2019

In this table we report the frequency of exchanges over time and by property type during 2017-2019 as reported by Marcus and Millichap Research Services.

Period	Apartment	Office	Industrial	Retail	Total	Net Leased
2017Q1	22.8%	25.0%	25.0%	27.6%	24.2%	38.4%
2017Q2	24.3%	25.3%	15.8%	21.6%	23.4%	39.7%
2017Q3	21.8%	20.6%	30.4%	26.7%	23.2%	35.6%
2017Q4	23.0%	11.0%	24.0%	28.1%	22.8%	40.5%
2018Q1	28.4%	20.3%	12.8%	26.1%	26.4%	38.8%
2018Q2	20.9%	14.5%	20.9%	27.9%	21.4%	36.0%
2018Q3	25.7%	20.3%	25.0%	26.3%	25.4%	42.8%
2018Q4	20.3%	17.2%	23.9%	31.1%	22.3%	40.7%
2019Q1	25.9%	19.4%	26.1%	34.4%	26.8%	44.9%
2019Q2	22.6%	24.1%	25.0%	28.6%	24.0%	41.5%
2019Q3	19.2%	20.3%	15.3%	20.6%	19.3%	41.7%
2019Q4	16.5%	20.7%	9.1%	22.4%	17.7%	33.0%
All years	22.4%	19.8%	20.8%	26.5%	22.9%	39.3%

Table 4: Distribution of CoStar exchange and non-exchange transactions by CBSA: 2010-06/2020

CBSA	All CoStar sales				CoStar sales involving an exchange			
	Number	% of all sales	\$ Volume (billion)	% of total \$ volume	Number	% of all exchanges	\$ Volume (billion)	% of total \$ volume of exchanges
Los Angeles	46,214	5.7%	214	6.2%	6,950	12.8%	31	15.4%
Chicago	28,724	3.5%	138	4.0%	720	1.8%	4	1.6%
Long Island (NY)	25,683	3.1%	90	2.6%	629	2.0%	5	1.4%
Atlanta	24,738	3.0%	122	3.5%	594	1.3%	3	1.3%
South Florida	24,306	3.0%	111	3.2%	661	1.8%	4	1.5%
Philadelphia	23,999	2.9%	81	2.3%	398	0.9%	2	0.9%
Phoenix	21,617	2.6%	101	2.9%	1,713	3.4%	8	3.8%
Northern New Jersey	20,730	2.5%	82	2.4%	552	2.1%	5	1.2%
Denver	19,451	2.4%	97	2.8%	1,520	3.7%	9	3.4%
Tampa/St Petersburg	17,544	2.1%	64	1.9%	470	1.2%	3	1.0%
Boston	16,661	2.0%	117	3.4%	413	1.1%	3	0.9%
Inland Empire (CA)	15,317	1.9%	61	1.8%	1,641	2.6%	6	3.6%
Washington, DC	14,977	1.8%	161	4.7%	469	3.3%	8	1.0%
Detroit	13,960	1.7%	22	0.6%	133	0.3%	1	0.3%
Portland	13,247	1.6%	49	1.4%	1,803	2.6%	6	4.0%
Seattle/Puget Sound	13,211	1.6%	101	2.9%	1,557	3.5%	8	3.4%
San Diego	11,941	1.5%	60	1.7%	1,818	3.5%	8	4.0%
Orlando	11,812	1.4%	52	1.5%	283	1.4%	3	0.6%
Charlotte	10,977	1.3%	45	1.3%	342	0.9%	2	0.8%
Minneapolis/St Paul	10,387	1.3%	39	1.1%	1,050	2.1%	5	2.3%
Orange County (CA)	10,302	1.3%	59	1.7%	1,559	3.2%	8	3.4%
Westchester/So CT	10,118	1.2%	40	1.2%	263	0.9%	2	0.6%
Milwaukee/Madison	9,725	1.2%	19	0.5%	254	0.3%	1	0.6%
Dallas/Ft Worth	9,661	1.2%	86	2.5%	449	1.7%	4	1.0%
East Bay/Oakland	9,169	1.1%	49	1.4%	968	2.2%	5	2.1%
Cincinnati/Dayton	9,053	1.1%	20	0.6%	133	0.2%	1	0.3%
Sacramento	8,702	1.1%	29	0.9%	912	1.7%	4	2.0%
Cleveland	8,556	1.0%	14	0.4%	156	0.2%	1	0.3%
Las Vegas	8,474	1.0%	51	1.5%	644	1.7%	4	1.4%
Houston	8,256	1.0%	66	1.9%	311	1.4%	3	0.7%
Nashville	7,971	1.0%	34	1.0%	199	0.4%	1	0.4%
San Francisco	7,267	0.9%	88	2.5%	942	3.5%	8	2.1%
Raleigh/Durham	6,919	0.8%	36	1.0%	278	0.8%	2	0.6%
New York City	6,622	0.8%	215	6.2%	368	5.5%	13	0.8%
Baltimore	6,614	0.8%	36	1.0%	137	0.6%	1	0.3%
Southwest Florida	6,434	0.8%	17	0.5%	163	0.2%	1	0.4%
South Bay/San Jose	6,341	0.8%	55	1.6%	742	2.2%	5	1.6%
Columbus	5,890	0.7%	18	0.5%	116	0.2%	0	0.3%

Table 4: Continued

Oklahoma City	5,798	0.7%	12	0.3%	180	0.3%	1	0.4%
St. Louis	5,783	0.7%	16	0.4%	162	0.2%	1	0.4%
Indianapolis	5,769	0.7%	19	0.6%	139	0.3%	1	0.3%
Kansas City	5,682	0.7%	18	0.5%	160	0.3%	1	0.4%
Jacksonville (FL)	5,632	0.7%	20	0.6%	108	0.2%	1	0.2%
Pittsburgh	5,602	0.7%	11	0.3%	64	0.1%	0	0.1%
Other Market Areas	5,573	0.7%	14	0.4%	221	0.3%	1	0.5%
Hartford	5,329	0.7%	11	0.3%	80	0.1%	0	0.2%
Greenville/ Spartanburg	5,154	0.6%	11	0.3%	171	0.2%	1	0.4%
Greensboro/ Winston-Salem	4,954	0.6%	12	0.3%	167	0.3%	1	0.4%
West Michigan	4,948	0.6%	8	0.2%	59	0.1%	0	0.1%
North Bay/Santa Rosa	4,657	0.6%	19	0.6%	606	1.1%	3	1.3%
Fresno	4,206	0.5%	8	0.2%	442	0.5%	1	1.0%
Hampton Roads	4,139	0.5%	13	0.4%	95	0.3%	1	0.2%
Memphis	4,124	0.5%	12	0.4%	103	0.1%	0	0.2%
Tucson	3,851	0.5%	10	0.3%	300	0.4%	1	0.7%
Salt Lake City	3,789	0.5%	14	0.4%	331	0.6%	1	0.7%
All other markets	199,442	24.4%	482	14.0%	9,516	15.4%	37	21.0%
Total US	816,002	100%	3,448	100%	45,214	100%	241	100%

Table 5: Percentage of all U.S. like-kind exchanges in each state-2010-06/2020

State	Based on:			
	Number of sales		\$ Transaction volume	
	Percentage	Cumulative	Percentage	Cumulative
California	39.6%	39.6%	35.0%	35.0%
Washington	5.1%	44.7%	4.6%	39.7%
Arizona	4.8%	49.6%	4.1%	43.8%
Florida	4.4%	54.0%	5.4%	49.2%
Oregon	4.0%	58.0%	2.5%	51.7%
Colorado	4.0%	62.0%	4.1%	55.9%
New York	3.1%	65.1%	8.4%	64.2%
Texas	3.0%	68.1%	4.5%	68.7%
Minnesota	2.7%	70.8%	2.4%	71.1%
North Carolina	2.2%	73.0%	2.1%	73.2%
Nevada	2.1%	75.1%	2.2%	75.3%
Georgia	1.8%	76.9%	1.6%	76.9%
Illinois	1.8%	78.7%	1.9%	78.8%
South Carolina	1.4%	80.1%	0.9%	79.8%
New Jersey	1.3%	81.4%	2.1%	81.8%
Virginia	1.1%	82.5%	2.4%	84.3%
Ohio	1.0%	83.6%	0.7%	84.9%
Tennessee	1.0%	84.5%	0.7%	85.6%
Massachusetts	0.9%	85.4%	1.1%	86.7%
Pennsylvania	0.9%	86.3%	0.9%	87.7%
Wisconsin	0.9%	87.1%	0.4%	88.1%
Utah	0.8%	87.9%	0.6%	88.7%
Maryland	0.7%	88.6%	1.2%	89.9%
Indiana	0.6%	89.2%	0.5%	90.4%
Hawaii	0.6%	89.9%	0.5%	91.0%
Oklahoma	0.6%	90.5%	0.4%	91.4%
Missouri	0.6%	91.1%	0.4%	91.7%
Alabama	0.5%	91.6%	0.5%	92.2%
Michigan	0.5%	92.1%	0.4%	92.7%
Nebraska	0.5%	92.5%	0.3%	92.9%
Arizona	0.4%	92.9%	0.2%	93.1%
Remaining states	7.1%	100.0%	6.9%	100.0%

Table 6: Percentage of CoStar sales by MSA involved in exchange-2010-06/2020

CBSA	Based on:	
	Number of sales	\$ transaction volume
Santa Cruz/Watsonville	16.7%	17.4%
San Diego	15.2%	14.1%
Orange County (California)	15.1%	13.4%
Los Angeles	15.0%	14.3%
Hawaii	13.9%	7.5%
Portland	13.6%	13.0%
Salinas	13.5%	13.9%
North Bay/Santa Rosa	13.0%	14.1%
San Francisco	13.0%	9.6%
San Luis Obispo/Paso Robles	12.6%	14.8%
Bremerton/Silverdale	12.3%	17.9%
Santa Barbara/Sta Maria/Goleta	12.2%	13.2%
Seattle/Puget Sound	11.8%	8.4%
South Bay/San Jose	11.7%	9.7%
Inland Empire (California)	10.7%	10.2%
East Bay/Oakland	10.6%	11.0%
Fresno	10.5%	14.2%
Sacramento	10.5%	13.7%
Spokane	10.4%	11.9%
Minneapolis/St Paul	10.1%	13.1%
Visalia/Porterville	10.0%	10.8%
Reno/Sparks	9.7%	11.5%
Boise City/Nampa	9.5%	11.7%
Bakersfield	9.3%	12.6%
Olympia	9.2%	7.9%
Anchorage	8.9%	10.1%
Yakima	8.8%	16.8%
Salt Lake City	8.7%	10.0%
Stockton/Modesto	8.4%	10.6%
Phoenix	7.9%	8.2%
Denver	7.8%	9.1%
Tucson	7.8%	10.6%
Myrtle Beach/Conway	7.7%	7.9%
Las Vegas	7.6%	8.0%
Killeen/Temple/Fort Hood	7.0%	20.4%
Albuquerque	6.9%	7.3%
Colorado Springs	6.1%	8.3%
Omaha/Council Bluffs	5.8%	8.0%

Table 6: Continued

Beaumont/Port Arthur	5.8%	4.7%
Duluth	5.6%	10.8%
New York City	5.6%	6.1%
Corpus Christi	5.5%	2.9%
Other Market Areas	5.3%	12.1%
Charleston/N Charleston	5.3%	5.7%
San Antonio	5.0%	4.8%
McAllen/Edinburg/Pharr	4.8%	9.5%
Dallas/Ft Worth	4.6%	4.9%
Austin	4.5%	3.7%
Average US	5.5%	7.0%

Table 7: Real estate exchanges as a percentage of all CoStar sales in each state-2010-06/2020

State	Based on:		State	Based on:	
	Number of sales	\$ transaction volume		Number of sales	\$ transaction volume
Hawaii	13.9%	7.5%	Missouri	2.7%	3.7%
Oregon	13.6%	12.9%	Oklahoma	2.6%	4.3%
California	13.1%	12.5%	Florida	2.6%	4.4%
Washington	11.2%	9.3%	Maryland	2.6%	4.0%
Minnesota	9.4%	13.4%	New Jersey	2.5%	5.6%
Utah	8.5%	10.0%	Illinois	2.5%	3.2%
Nevada	8.1%	8.6%	North Dakota	2.5%	2.8%
Idaho	7.9%	11.0%	Georgia	2.5%	2.7%
Arizona	7.8%	8.6%	Kentucky	2.4%	2.5%
Alaska	7.8%	9.6%	Massachusetts	2.4%	2.3%
Colorado	7.2%	9.0%	Tennessee	2.3%	3.0%
New Mexico	5.7%	7.6%	Wisconsin	2.3%	3.6%
Montana	5.1%	11.5%	New Hampshire	2.2%	3.7%
Nebraska	4.9%	7.1%	Indiana	2.2%	3.7%
Wyoming	4.5%	5.3%	Louisiana	2.1%	4.4%
Texas	4.2%	4.8%	South Dakota	2.0%	5.4%
South Carolina	4.1%	5.5%	Maine	1.9%	5.0%
District of Columbia	3.5%	4.1%	Connecticut	1.8%	3.8%
North Carolina	3.3%	4.8%	Delaware	1.8%	2.2%
Kansas	3.1%	4.8%	Ohio	1.7%	2.9%
Arkansas	3.0%	4.0%	West Virginia	1.5%	3.3%
Iowa	3.0%	4.9%	Pennsylvania	1.5%	2.7%
Mississippi	3.0%	2.9%	Rhode Island	1.3%	1.8%
Alabama	2.9%	5.2%	Vermont	1.1%	1.1%
Virginia	2.8%	5.8%	Michigan	1.0%	3.1%
New York	2.8%	5.8%			

Table 8: Estimated present value to taxpayers from real estate like-kind exchanges (in \$billions)

	2019	2019-2023
JCT's estimated tax expenditures (deferred tax liabilities) ⁴⁵		
Individuals	\$7.2	\$35.9
Corporations	\$2.7	\$15.1
Total deferred tax liabilities	\$9.9	\$51.0
Present value to individual taxpayers of deferred tax liabilities		
Minimum-8.0% of deferred tax liability	\$0.6	\$2.9
Average-37% of deferred tax liability	\$2.7	\$13.3
Maximum-58% of deferred tax liability	\$4.2	\$20.8
Present value to corporate taxpayers of deferred tax liabilities		
Minimum-9.0% of deferred tax liability	\$0.2	\$1.4
Average-45% of deferred tax liability	\$1.2	\$6.8
Maximum-67% of deferred tax liability	\$1.8	\$10.1
Total present value to all taxpayers of deferred tax liabilities		
Minimum	\$0.8	\$4.2
Average	\$3.9	\$20.1
Maximum	\$6.0	\$30.9

⁴⁵ Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2019-2023, Table 1, December 18, 2019 (JCX-55-19), <https://www.jct.gov/publications.html?func=startdown&id=5238>.

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 report median statistics, trimmed price differences at the 5% level in both tails of the distribution and statistics using 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 62 percent of the time in like-kind exchanges and 45 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) transaction

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	40,500		(87,000)		127,500	
Trimmed	78,528	127,555	(263,440)	1,148,604	341,968	***
Modified 1-step	46,785	195,929	(115,972)	1,146,579	162,758	***

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

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	197,000		750,000		(553,000)	
Trimmed	276,341	224,916	1,104,559	1,004,415	(828,218)	***
Modified 1-step	184,528	185,334	759,796	695,400	(575,268)	***

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

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	(133,112)		(1,050,000)		916,888	
Trimmed	(189,797)	157,737	(1,508,239)	1,347,064	1,318,442	***
Modified 1-step	(125,613)	127,705	(1,075,497)	983,423	949,885	***

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 large price differences, we report median statistics, trimmed price differences at the 5% level in both tails of the distribution and statistics using 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 62 percent of the time in like-kind exchanges and 45 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) transaction

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	9.55%		-5.84%		15.39%	
Trimmed	16.78%	0.25	2.99%	0.57	13.79%	***
Modified 1-step	7.18%	0.41	-9.52%	0.57	16.70%	***

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

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	41.96%		58.61%		-16.65%	
Trimmed	50.83%	0.34	89.18%	0.84	-38.35%	***
Modified 1-step	43.20%	0.41	59.07%	0.54	-15.87%	***

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

	Like-kind Exchanges		Non-tax Motivated Investments			
<i>Price Difference</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Estimate</i>	<i>Std. Dev.</i>	<i>Difference</i>	<i>Significance</i>
Median	-19.80%		-46.97%		27.17%	
Trimmed	-22.93%	0.13	-45.96%	0.22	23.03%	***
Modified 1-step	-22.93%	0.19	-46.17%	0.27	23.24%	***

Table 11: Summary statistics for differences in 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 exchanges based on data from IPX1031 and non-exchange transactions based on data from Costar by 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 62 percent of the time in like-kind exchanges and 45 percent of the time in non-tax motivated transactions.

Year	Like-kind Exchanges	Non-tax Motivated Investments	Difference
	Median Difference	Median Difference	
2010	\$2,375	\$-	\$2,375
2011	7,500	-	7,500
2012	15,600	(53,795.0)	69,395
2013	30,000	(125,500)	155,500
2014	42,500	(95,000)	137,500
2015	45,000	(191,500)	236,500
2016	40,000	(43,300)	83,300
2017	48,000	(108,000)	156,000
2018	47,500	(94,550)	142,050
2019	50,939	(76,100)	127,039
2020	26,550	(126,375)	152,925
Full sample	40,500	(87,000)	127,500

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 as a percentage of the relinquished property price for exchanges based on data from IPX1031 and non-exchange transactions based on data from Costar by 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 percentage differences to eliminate any effect of outliers. The price difference between replacement and relinquished property price is positive 62 percent of the time in like-kind exchanges and 45 percent of the time in non-tax motivated transactions.

Year	Like-kind Exchanges	Non-tax Motivated Investments	Difference
	Median Difference	Median Difference	
2010	1%	0%	1%
2011	2%	0%	2%
2012	3%	-7%	10%
2013	7%	-12%	19%
2014	9%	-6%	15%
2015	10%	-14%	24%
2016	10%	-3%	13%
2017	11%	-4%	15%
2018	11%	-5%	16%
2019	12%	-5%	17%
2020	7%	-6%	13%
Full sample	10.00%	-6.00%	16%

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 exchanges based on data from IPX1031 and non-exchange transactions based on data from Costar by 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 the top 20 states based on number of exchanges reported by IPX1031.

<i>Year</i>	Panel A: Difference in prices expressed in dollars			Panel B: Difference in prices (% of relinquished property value)		
	Like-kind exchanges	Ordinary sales		Like-kind exchanges	Ordinary sales	
	<i>Median difference</i>	<i>Median difference</i>	<i>Dif. of differences</i>	<i>Median difference</i>	<i>Median difference</i>	<i>Dif. of differences</i>
Arizona	\$ 21,785	\$ (59,367)	\$ 81,152	7%	-4%	11%
California	\$ 86,750	\$ (48,500)	\$ 135,250	15%	-3%	18%
Colorado	\$ 64,478	\$ (100,000)	\$ 164,478	17%	-6%	23%
Florida	\$ 16,000	\$ (117,000)	\$ 133,000	4%	-10%	14%
Georgia	\$ 32,600	\$ (70,000)	\$ 102,600	9%	-7%	16%
Hawaii	\$ 55,000	\$ (150,170)	\$ 205,170	12%	-5%	17%
Illinois	\$ 45,769	\$ (93,500)	\$ 139,269	11%	-4%	15%
Indiana	\$ 16,000	\$ (135,000)	\$ 151,000	5%	-11%	16%
Massachusetts	\$ 80,000	\$ 20,000	\$ 60,000	16%	1%	17%
Michigan	\$ 5,000	\$ (50,000)	\$ 55,000	1%	-6%	7%
North Carolina	\$ 21,550	\$ (161,750)	\$ 183,300	7%	-11%	18%
Nevada	\$ 24,000	\$ (250,000)	\$ 274,000	7%	-14%	21%
New York	\$ 17,250	\$ (212,948)	\$ 230,198	2%	-14%	16%
Ohio	\$ 24,750	\$ (36,467)	\$ 61,217	8%	-6%	14%
Oklahoma	\$ 29,070	\$ (154,739)	\$ 183,809	8%	-16%	24%
Oregon	\$ 29,000	\$ (50,000)	\$ 79,000	8%	-3%	11%
South Carolina	\$ 10,000	\$ (190,000)	\$ 200,000	2%	-16%	18%
Tennessee	\$ 23,000	\$ (200,000)	\$ 223,000	7%	-14%	21%
Texas	\$ 25,000	\$ (83,500)	\$ 108,500	7%	-5%	12%
Virginia	\$ 29,000	\$ (135,470)	\$ 164,470	8%	-9%	17%
Washington	\$ 44,550	\$ (60,000)	\$ 104,550	10%	-4%	14%
Wisconsin	\$ 43,067	\$ (100)	\$ 43,167	12%	0%	12%

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. We drop observations where leverage is negative or larger than one to eliminate the effect of data errors and outliers.

Leverage	Like-kind exchanges acquisitions		Ordinary acquisitions		Difference	Significance
	Estimate	Std. dev.	Estimate	Std. dev.		
Panel A: Unbalanced sample						
Mean (all)	30%	33%	43%	38%	-12.9%	***
Median (all)	15%		55%		-40.1%	
Panel B: One-on-one (like-kind exchange – sale) matched sample using propensity-score matching						
Mean (matched sales)	31%	33%	45%	36%	-13.3%	***
Median (matched sales)	24%		57%		-33.5%	***

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. 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.

Year	Like-kind exchanges Mean leverage	Ordinary acquisitions Mean leverage	Difference
2010	28%	42%	-13.13%
2011	32%	41%	-9.10%
2012	30%	44%	-13.63%
2013	33%	45%	-11.52%
2014	31%	45%	-14.46%
2015	31%	42%	-11.17%
2016	30%	44%	-13.97%
2017	33%	44%	-11.02%
2018	30%	44%	-13.79%
2019	32%	48%	-16.53%
2020	32%	47%	-15.32%
Full sample	31%	45%	-14.00%

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. 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.

<i>Year</i>	Like-kind exchanges	Ordinary acquisitions	Difference
	Mean leverage	Mean leverage	
AZ	32%	43%	-11.3%
CA	31%	43%	-11.5%
CO	36%	57%	-20.7%
FL	25%	46%	-21.2%
GA	28%	58%	-29.4%
HI	23%	40%	-16.9%
ID	30%	48%	-17.9%
IL	28%	51%	-22.0%
MA	39%	44%	-5.0%
MD	31%	48%	-16.3%
MI	19%	37%	-18.6%
MN	45%	62%	-17.6%
MO	44%	52%	-7.6%
NC	34%	64%	-29.5%
NJ	36%	47%	-10.5%
NM	7%	48%	-40.4%
NV	24%	38%	-13.5%
NY	26%	42%	-16.0%
OH	28%	48%	-19.5%
OK	40%	49%	-9.0%
OR	34%	47%	-13.1%
PA	39%	45%	-5.7%
SC	30%	57%	-26.2%
TN	32%	42%	-10.2%
TX	35%	48%	-12.7%
UT	40%	53%	-12.9%
VA	42%	51%	-9.5%
WA	31%	47%	-15.9%
WI	65%	67%	-2.6%
Full sample	31%	45%	-14.00%

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-kind 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 matched sample, where the matching is based on a propensity score model, which controls for age, square footage, number of floors, location, and building rating. All expenditure expenses are scaled by the square footage of the property and expressed in present value terms where the base year is 2009 and the discount rate used is the five-year US Treasury constant maturity rate.

	Like-kind Exchanges		Non-tax Motivated Investments		
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Dif.
Panel A: Annualized Capital Expenditures (all properties)					
CapEx/SF (excl. LC)	1.83	2.49	1.70	4.82	0.12
TI/SF	0.52	1.61	0.48	1.60	0.05
Building Improvements/SF	1.22	2.12	0.77	2.75	0.45
Building Expansion/SF	0.000	0.000	0.013	0.110	-0.013
Other CapEx/SF	0.08	0.13	0.25	1.10	-0.17
Panel B: Annualized Capital Expenditures (matched sample; similar properties)					
CapEx/SF (excl. LC)	1.83	2.49	1.17	2.53	0.66
TI/SF	0.52	1.61	0.34	0.87	0.18
Building Improvements/SF	1.22	2.12	0.47	1.61	0.74 *
Building Expansion/SF	0.000	0.000	0.067	0.262	-0.067
Other CapEx/SF	0.08	0.13	0.24	0.83	-0.16

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. Panel B presents the summary statistics for holding periods of investors in a one-on-one matched sample of exchange and non-exchange dispositions. The propensity-score model utilized for the matching controls for the natural logs of the square footage of improvements and land, property age and age squared, number of floors, property rating, location, time of sale and type.

Holding period	Panel A: All properties				Panel B: Matched sample of all properties			
	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Seller exchanges (1)	10.47	7.72	0.08	20.00	10.57	7.70	0.08	20.00
Non exchanges (2)	11.38	7.94	0.08	20.00	10.85	7.84	0.08	20.00
Difference (1)- (2)	-0.91***				-0.28***			
T-stat	-13.08				-2.81			

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

This table presents summary statistics by states for holding periods of exchange and non-exchange dispositions for our sample of matched exchange and non-exchange properties. We only report data for states in which there is sufficient number of like-kind exchange dispositions.

	Disposition through A Like-kind Exchange (1)	Non-tax Motivated Disposition (2)	(1) - (2)
<i>State</i>	<i>Holding Period</i>	<i>Holding Period</i>	<i>Difference</i>
AL	9.51	12.83	-3.32
AR	9.90	12.51	-2.61
AZ	7.98	8.99	-1.01
CA	10.29	9.99	0.30
CO	9.60	10.12	-0.51
CT	13.55	14.60	-1.05
FL	10.82	11.23	-0.41
GA	9.48	10.02	-0.54
HI	11.77	11.86	-0.09
IA	10.58	14.00	-3.43
ID	10.26	12.14	-1.88
IL	9.70	12.01	-2.30
IN	10.28	12.72	-2.44
KS	11.16	12.27	-1.11
KY	12.33	12.34	0.00
LA	9.34	11.91	-2.56
MA	13.96	13.43	0.53
MD	12.55	11.73	0.81
MI	10.79	11.03	-0.24
MN	12.23	12.86	-0.63
MO	9.72	12.22	-2.50
NC	10.59	10.57	0.01
NE	14.02	13.21	0.82
NJ	13.05	11.72	1.33
NV	8.96	10.42	-1.46
NY	13.03	13.76	-0.73
OH	9.23	13.34	-4.11
OK	11.61	11.79	-0.18
OR	12.15	12.11	0.04
PA	11.48	13.54	-2.06
SC	9.16	10.75	-1.59
TN	10.46	11.77	-1.30
TX	8.65	9.04	-0.39
UT	12.24	12.27	-0.03
VA	11.32	10.18	1.14
WA	11.20	11.83	-0.63
WI	12.60	13.91	-1.31

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. In Column (2) the frequency of relinquished properties, acquired through a like-kind exchange, using a roll-over into a new exchange is reported.

	Disposition of a 1031 exchange property (1)	Disposition of a 1031 exchange property through another exchange (2)	(1)/(2)
<i>Year</i>	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
2010	1.1%	0.0%	0.0%
2011	0.7%	0.1%	16.7%
2012	1.2%	0.1%	5.1%
2013	1.1%	0.1%	10.6%
2014	1.3%	0.1%	9.7%
2015	1.7%	0.2%	12.0%
2016	1.6%	0.2%	13.1%
2017	2.9%	0.6%	19.0%
2018	3.0%	0.5%	16.1%
2019	2.9%	0.2%	8.6%
2020	3.8%	0.4%	11.7%