Spring 4-11-2016

Two Essays on Investor Differentiation in Industrial Real Estate Markets

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Recommended Citation
Liu, Yu, "Two Essays on Investor Differentiation in Industrial Real Estate Markets." Dissertation, Georgia State University, 2016.
doi: https://doi.org/10.57709/8479651

TWO ESSAYS ON INVESTOR DIFFERENTIATION IN INDUSTRIAL REAL ESTATE MARKETS

BY

YU LIU

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Doctor of Philosophy

In the Robinson College of Business

Of

Georgia State University

GEORGIA STATE UNIVERSITY
ROBINSON COLLEGE OF BUSINESS

2016

ACCEPTANCE

This dissertation was prepared under the direction of the *Yu Liu's* Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my dissertation committee members, Dr. Jonathan Wiley, Dr. Alan Ziobrowski, Dr. Karen Gibler and Dr. Paul Gallimore, for their consistent guidance, advice and support. The help they provided to me is invaluable.

I would like to dedicate this dissertation to my wife, Fangfang Wu, for her sacrifices, trust, encouragement and tremendous support. Without her, I would never be able to finish my doctor degree. To Aurora, our lovely daughter who is also my hope and future. To my parents and my family, who support every of my step.

I am highly thankful to Dr. Lawrence Rose, Dr. Taewon Yang and Dr. Liang Guo for their support and encouragements.

I would also like to thank my colleagues, all the faculty and staff at Georgia State University who were with me throughout the adventure.

ABSTRACT

TWO ESSAYS ON INVESTOR DIFFERENTIATION IN INDUSTRIAL REAL ESTATE MARKETS

BY

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April 11, 2016

Committee Chair: *Dr. Jonathan A. Wiley*

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This dissertation consists of two essays on investor differentiation in industrial real estate markets. The first essay examines the following questions: (1) Do corporates buy or sell at different prices when transacting in the industrial market (as assessed from a comparison between the transactions of corporates and non-institutional investors)? (2) If such a difference does exist, what are the factors that determine its magnitude? Unlike in prior studies on the office market, corporate investors only buy high but do not sell low when transacting in industrial real properties. The pattern of buying high by corporates is consistent during market cycles and across general- and special-purpose property types. The results reflect a higher cost of real capital (acquisition cost) to corporates, and generally imply that the price a corporate is willing to pay is determined primarily from an overall business value perspective, rather than property market value.

In the second essay, I examine the performance of government investors in the industrial market. The analysis reveals that, in general, governments buy high and sell low in comparison to similar property transactions by individuals. On average, governments overpay by an estimated 9.8% and sell at a discount of 17.3%. The results may help governments identify a potential vulnerable point on their real estate management, and reduce their loss if they can mitigate this inefficiency.

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Corporate Investors in Industrial Real Estate Markets

Essay I: Corporate Investors in Industrial Real Estate Markets

1. Introduction

According to Edwards and Ellison (2009), property can be held for one of two purposes: as an investment asset or as an operational asset. Property held as an investment asset is used for generating capital gain. Property held as an operational asset, sometimes called corporate property, is used for supporting business operation. Most owner-occupied industrial real properties can be seen as corporate property[1]. Industrial real property, an important input for many businesses, is used to house the operational activities of firms including manufacturing, warehousing and distribution of goods. Industrial real property transactions are common among corporates as their businesses expand and contract. The transaction price composes the cost of real capital to corporates, and real estate price is often identified as the second-largest cost to businesses, next to labor cost, as documented by Zeckhauser and Silverman (1983), Bon and Luck (1999a), and Bootle and Kalyan (2002).

Research focusing on real asset management and the impact of real property investment on firm value has been well documented. Less studied, however, are the market outcomes from real estate transactions (cost of real capital) made by corporates in real estate markets, especially in the industrial market. Wiley (2012) is a recent study focusing on the market outcomes of corporate real estate transactions. The study shows that non-real estate corporate investors buy high and sell low compared to non-institutional investors in the office market. As possible explanations, the study enumerated and evaluated several theories, such as the difference in operating performance, valuation, tax consequences, cyclical investment, marketing behavior, agency problems, selection bias, and option pricing. Among them, valuation difference, cyclical investment, and impatience are found to significantly contribute to transaction price differences. Inspired by Wiley (2012), this study investigates the market outcomes of transactions by non-real estate corporates in the industrial market and compares them with transactions by non-institutional investors[2]. This study focuses on two questions. First, does the cost of real capital differ between non-real estate corporates and

[1] Due to the limitation of the data, only approximate measure can be used to reflect the proportion of owner-occupied industrial real properties in the sample of this study. If we assume the non-real estate corporate investors are owner-occupiers, then the proportion of owner-occupied industrial real properties in the purchase sample of this study will be 27.67% and the proportion of owner-occupied industrial real properties in the sales sample equals to 28.44%.

[2] As suggested in Wiley (2012), non-institutional investors consist of individuals and developers as categorized in CoStar. If we take a further look on the forms of these business organizations, we can see that they are organized as sole proprietary or partnership.

non-institutional industrial real estate investors, as reflected by transaction prices? Second, if it does, what are the factors that contribute to the difference from perspective of the property, transaction, and investor?

As pointed out by Wheaton and Torto (1990), "the industrial real estate market in the U.S. is substantially different from that for other types of commercial property." In the industrial market, properties are more likely to be owner-occupied[3]. Only a small portion of the sector is available for speculative rental purposes, and most rental properties are designed for single tenant occupancy[4]. Compared to other real estate assets, industrial properties are thinly traded, have a shorter development period, and are more likely to be built for the end user. Thus, industrial real estate has a different market cycle and is subject to different investor behavior. More specifically, Wheaton and Torto (1990) point out that industrial property market only shows little evidence of a traditional real estate cycle and just move slightly with economic cycle, which quite different from the strong cyclic behavior of office market. In addition, industrial properties are built to house firms' operational activities. Thus, the value of an industrial property to the business depends on the operational activities it houses. For property transactions in the industrial market, owner-occupiers are more likely to rely on investment value rather than the estimated market value, and the price a corporation is willing to pay is determined largely from the perspective of the overall business value. As aforementioned, these characteristics of industrial markets suggest that property acquisition and divestiture decisions by corporates are different between the industrial market and other property types, leaving the sector open for potential investigation. For example, a higher investment value of owner-occupiers without correction from market value may push the transaction price up in purchasing and divestitures; and the cyclical effect may not hold same in the industrial market as it has been found in the office market.

Real estate markets have been historically documented as inefficient markets characterized by heterogeneous assets, localized markets, confidential transactions, informational asymmetries, and highly cyclical adjustments to supply. The inefficiencies magnify the impact of decisions made by different group of investors on the value of a property, which is then reflected in the final transaction price. In real

[3] This claim is for the population. Unlike non-institutional investors, corporates tend to make real estate transactions less frequently, so if we only look at the sample of transactions in this study, we may notice that less than one-third of the samples was purchased by corporates. However, as suggested by Wheaton and Torto (1990), owner-occupied properties dominate the population. If we take a look on the new supplies (incremental, property age less than five years), we can get some idea on that corporate purchases dominate the market. For example, 55% of the properties with an age less than five years was bought by corporates. Further break down the data, we can see that 60% of the properties (3/6) with an age less than one year was bought by corporates; 58% of the properties (11/19) with an age of one year was bought by corporates; 31% of the properties (4/13) with an age of two years was bought by corporates; 69% of the properties (29/42) with an age of three years was bought by corporates; 63% of the properties (77/122) with an age of four years was bought by corporates; 50.3% of the properties (171/340) with an age of five years was bought by corporates;

[4] Table 1-1 summary statistics shows that more than 60% of the observations in both purchase and sales samples are single tenant properties.

estate markets, the transaction price of a property is negotiated between potential buyers and sellers based on their estimation of the property's investment value. When investing in real estate markets, different investors make decisions based on their individual backgrounds and considerations, such as the proposed use of the property, specialized market knowledge, experiences, origination, and property attributes. These unique backgrounds and considerations translate into estimations of a property's investment value and its characteristics. The transaction price can then be observed once the maximum investment value of a buyer exceeds the minimum investment value of the seller. The relative success of an acquisition or divestiture can be observed when investors buy or sell at different prices because their investment value perceptions differ. These price differences can also be expected and predicted when the decision- and valuation-driven factors are systematically associated with their unique characteristics.

Market outcome differences between transactions by corporates and non-institutional investors are investigated within the framework of investor clientele effects. The method of testing clientele effects has been well established. The first precise definition of clientele effects can be found in a study by Dale-Johnson (1983). He defines investor clientele effects as the variation in the willingness to pay as a function of investors' segmentation. After this study, the literature has provided strong evidence for investor clientele effects in the real estate markets[5]. Equipped with extant methodologies, I can examine the price differences between transactions by corporates and non-institutional investors and explore the factors that affect market outcomes. According to the theories documented in the literature, this study examines the internal factors of firms based on their distinguishable characteristics, such as firm type, size, location, and the industry in which the firm conducts its main business, to reveal the impacts on market outcomes. Meanwhile, several property and transactional factors are also examined, including the type of industrial real estate asset, market conditions of the transaction, and involvement of brokerage.

1.1 Contribution of the Study

This study adopts and systematically investigates several theories that possibly explain market outcome differences in the industrial market between corporates and non-institutionals. An examination of the potential explanations and impact factors provide answers to question on why corporations perform

[5] Research related to clientele effects can be found in, among others, Vrooman (1978), Dale-Johnson (1983), Miller, Sklarz, and Real (1988), Myer, He, and Webb (1992), Turnbull and Sirmans (1993), Watkins (1998), Harding, Rosenthal, and Sirmans (2003), Lambson, McQueen, and Slade (2004), Wood and Tu (2004), Simonsohn and Loewenstein (2006), Benjamin, Chinloy, Hardin, and Wu (2008), Neo, Ong, and Tu (2008), Ihlanfeldt and Mayock (2012), Wiley (2012), Chernobai and Chernobai (2013), Liu, Gallimore, and Wiley (2013), and Zhou, Gibler, and Zahirovic-Herbert (2014).

differently in the industrial market and sheds light on investigating on the discordant messages from the literature.

The contributions of this study are manifold. First, this study presents the results of the corporate investment policy and discloses the scale of market outcome differences between the transactions of corporates and non-institutional investors in the industrial market. The market outcome difference reveals the cost of real capital in corporate investment. Identifying the difference in cost could help corporates to refine their investment policy.

Second, this study further examines the factors that determine the magnitude of the market outcome difference in transactions made within corporates. To reveal the magnitude of the difference, a number of internal factors such as firm type, size, location, and the industry in which the firm conducts its main business are examined. The correlation among firms' characteristics and magnitude of underperformance reveals areas of vulnerability that corporate investors should consider.

Third, as pointed out by Wheaton and Torto (1990), the substantial differences between the characteristics of industrial real property and other types of commercial property would cause property values in the industrial market vary among different investors in a different way. Thus, the special characteristics of industrial real properties are considered and controlled for a thorough and accurate analysis in this study. For example, in contrast to prior studies, industrial real estate properties are often categorized into two different subcategories based on the purpose of their use: the general-purpose and special-purpose submarkets. This distinction in the purpose of use affects the availability of the market value and comparable recent prices for a transaction. Therefore, failure to control for the property attributes based on the purpose of use could potentially bias the investor differentiation effects. In this study, I control for the purpose of property use based on specified property types[6].

1.2 Organization of the Study

The remainder of this study is organized as follows. Section 2 reviews the related literature and presents the hypotheses related to the research questions. Section 3 describes the data and the empirical methods used to test the alternative expectations. Section 4 discusses the empirical results. The final chapter offers the concluding remarks, and a list of references is provided at the end.

[6] For example, the property types include distribution, food processing, manufacturing, refrigeration/cold storage, service, showroom, telecom hotel/data hosting, truck terminals, and warehouses.

2. Theoretical Background and Hypotheses

Corporate investors and corporate real estate have drawn increased attention over the past several decades, and the asset management and real estate strategies of non-real estate corporates have been studied more extensively. For example, as outlined by Edwards and Ellison (2009), property is a vital component of business, which supports its operational activities. Miles, Pringles, and Webb (1989) and Liow (1995) suggest that corporate real estate decisions should be viewed from a combined capital budgeting/corporate financing framework and that a corporation's real estate holdings could affect the firm's cost of capital, debt capacity, systematic risk, operating revenues, and expenses. Rodriguez and Sirmans (1996) evaluate various real estate decisions on firm value, such as leasing, acquisitions, sell-offs, and liquidations. They find that real estate decisions have a significant impact on firm value. Seiler, Chatrath, and Webb (2001) test the diversification benefit of real estate ownership to corporates; however, they do not find any evidence of such a benefit[7].

The literature contains detailed investigations on the relationship between real asset investment decisions and the overall performance of non-real estate companies. However, studies on the market outcomes from the transaction price—the cost of the real capital investment of a firm—are limited. This is probably because data on specific transactions of real estate assets, especially industrial, were not easily available when the research was conducted. For example, as pointed out by Ambrose (1990), "unfortunately, for the most part, industrial property is ignored in the literature. Problems with collecting data and small sample sizes hamper the study of industrial property." Moreover, echoed by Peiser and Hamilton (2012), "Few market data sources segment industrial space beyond the three main categories warehouse/distribution, manufacturing, and flex, and in many cases, secondary market data are lumped into a single category labeled industrial, making it difficult to assess the performance of individual

[7] This study does not tend to focus on the operational or event factors that potentially affect the market outcomes when businesses transact in the industrial real estate market, such as change in chief management, change in value of the businesses' stocks, merger or acquisition of the companies, industry consolidation or vertical integration, or the event of SEO or repurchase programs. Only narrative or anecdotal evidence will be provided where relevant. Acquisitions or divestitures are corporate decisions made for various reasons. For a few examples, in 2007, Toyota Boshoku, interior parts supplier for automakers, acquired a 47,782 sq. ft. class B building as a technical center in Corporate Campus at Novi, Michigan, to meet its growing demand. In 2008, the International Paper Co. acquired 155,000 sq. ft. class C warehouse space in Chemway Industrial Park, North Carolina, to expand its operation. In 2010, Kohl's Department Stores acquired a 100,260 sq. ft. class B building to house its new state-of-the-art photo studio in Milwaukee, Wisconsin. In 2008, the Real Estate Department of Kodak Corporation sold its 2,000,000 sq. ft. class B Kodak Distribution Center at Rochester, NY, as part of its divestiture program for real estate the corporation no longer needed. In 2007, Coca-Cola sold its 100-year-old Coca-Cola Bottling Building located at Tacoma, WA, following its relocation to a larger facility.

subtypes." Whatever the reason, market outcome studies on transaction prices, particularly for the industrial market, represent a gap in the literature that needs to be filled.

Wiley (2012) was the first study that tried to fill the gap in the literature. In his study, Wiley enumerates the reasons that might possibly lead to market outcome differences in corporate transactions in the office market, and finds that corporate investors buy high and sell low relative to non-institutional investors in similar office properties. Wiley (2012) provides a foundation for this study. I build on his work, extending the study from the office market to the industrial market, to evaluate transactions made by corporates and further explore the rationale behind their decisions.

This study first investigates the question "Do corporates buy or sell at different prices when transacting in the industrial market (as assessed from a comparison between the transactions of corporates and non-institutional investors)?" Related issues have been discussed in the literature. While Redman and Tanner (1989) suggest that corporations usually conduct a more specific analysis when they purchase a property compared with selling one, Bender (1991) points out that the management of a corporation typically disposes of real estate when it finds that it has to sell surplus property. Moreover, Bender (1991) concludes that knowing a property's value is vital in order to avoid selling at a lower price. In addition, as pointed out by Wiley (2012), a corporate would like to pay a premium during an expansion to outbid other competitors in the market and still enjoy an extra benefit after deducting the overpayment. However, some economic pressure, such as a contraction, or overvaluing a call option drive away corporates from selling at a similar price as compared to non-institutional investors. Moreover, in a survey, Nourse and Kingery (1987) show that even though half of firms ignore the opportunities to sell for a better price in divestiture when they try to sell their surplus properties, the other half try to maximize shareholder value by selling at a higher price. The challenge with industrial markets, in contrast to other real estate markets, is that corporate investment value may differ widely from market value. The reasons of these differences are from two folds. First, Wheaton and Torto (1990) argue that the industrial real estate market is substantially different from that for other types of commercial property, and the characteristics of industrial properties drive a different valuation from different investors. Second, the valuation difference is also suggested by McKinley and Simpson (2005). As they pointed out that "industrial property clearly serve different purposes than other types of property, and it generally has certain characteristics that distinguish it from the appraisal of one of the other major classifications of land use-office, retail, hotel, and residential." Some general features must be accounted for in estimating the value of industrial properties, such as the dearth of alternative uses for special-purpose industrial property. Thus, the question that arises is as follows: Do corporate investors buy high and sell low in the industrial market as

well in industrial market, as suggested under several explanations by the literature? Or, do corporates behave differently due to special features as aforementioned in the industrial market? To answer these questions, I first evaluate the transaction prices on both the purchase and divestiture sides in order to determine if there is a price difference in the transactions. Further, if a difference does exist, the factors that determine the difference are then examined. The following hypotheses are tested.

H1a: Given transactions in similar industrial assets, corporates buy at similar prices as compared to non-institutionals.

H1b: Given transactions in similar industrial assets, corporates sell at similar prices as compared to non-institutionals.

2.1 Determinants of Price Difference

Several theories postulate that the behavior of corporates is different from that of other types of investors (Wiley, 2012).

The Theory of Capital Investment and Option Pricing

One explanation for firms' valuation, buy, and sell decisions on industrial properties is based on the theory of capital investment and option pricing.

Traditional capital theory assumes that investment reversal is costless. Jorgenson (1963) proposes that investment is optimal when the firm's marginal revenue product of capital equals the user cost of capital. Businesses buy or sell capital to balance the marginal revenue product of capital with the user cost of capital. Five years after Jorgenson (1963), Arrow (1968) showed that investment can be irreversible and periods of inactivity can exist even when the marginal revenue product of capital is lower than the value triggering capital purchase. While Jorgenson (1963) and Arrow (1968) delineate the upper and lower limits of investment, the most common situation occurs between the two limits: costly reversibility. Costly reversibility of investment was first introduced by Abel and Eberly (1996) and Abel, Dixit, Eberly, and Pindyck (1995). They describe costly reversibility as a situation in which businesses will divest their real capital at a cheaper price in the future than their current acquisition price. Further, the situation in which businesses would have to pay a higher acquisition price in the future than at present was defined as costly expandability. Corporate investment in real capital is affected by put or call options associated with costly reversibility and costly expandability. Wiley (2012) further shows that, under costly reversibility,

"the price of purchasing capital equals the marginal value of that capital plus a put option to sell, and the price of divestiture equals the marginal value of capital minus a call option to repurchase." Thus, overvaluation on these put or call options will cause firms to buy high and sell low. He also points out the factors that could affect the option values, such as volatility of cash flows, cost of capital, maturity, assumed strike price, and information about the distribution of possible asset values.

The theory of capital investment and option pricing provide us with a framework to understand the timing under which corporates enter into real estate transactions. Although data availability limits the ability to directly test each of the factors suggested by the theory, valuation differences in industrial assets between corporate and non-institutional investors can still be verified. The hypothesis to be tested is provided below.

> H2: Prices for transactions between corporate buyers and corporate sellers are no different than those between non-institutional buyers and sellers.

Market Conditions

Market conditions provide the second theoretical foundation for valuation and transaction price differences between corporate investors and non-institutional investors. Market conditions and market duration may alter the investors' decisions regarding their willingness to buy or sell when they enter into a transaction. During periods of expansion, the property market has increased investment activity and greater liquidity, which perhaps leads to higher competition when purchasing and, in turn, higher acquisition price and selling price, accompanied by a shorter time on market (TOM). However, the story differs for a down market. During contraction, the market has low liquidity and is usually characterized by a greater number of sellers than buyers. As a result, properties may have to be sold at a discount or remain on the market for an extended period of time.

Corporate investors make acquisition or divestiture decisions that appear to be influenced by economic cycles. For example, Wiley (2012) finds, by testing the transaction price differences in the office market between corporate investors and non-institutional investors, that corporate investors pay a significantly higher price when they buy and they sell at a discount upon divesture. The results are explained by the business cycle since corporations overpay during expansions and liquidate during economic contraction.

Corporates use industrial properties to house their manufacturing activities. As Kolbe and Greer (2009) pointed out, "in industrial market, demand for industrial space is largely a function of the demand for products produced by the industrial sector." The forces that cause the demand for manufactured goods to increase or decrease also cause the demand for industrial space to increase or decrease. "Nonetheless, corporates generally adjust their space needs based on long-term projections of product demand so changes in demand for space are not as volatile as changes in demand for industrial goods". As suggested by Kolbe and Greer, to meet the increase in demand for manufactured goods during periods of expansion, corporates might have to pay a premium to outbid their competitors and still enjoy the residual benefits. However, during contraction, corporates might not be willing to sell their properties at a discount in a short period of time in response to the shock of change in demand for industrial goods. In addition, as pointed out by Peiser and Hamilton (2012), industrial space has some advantages over other property types. For example, "The capital expenditures are lower than for other product types, especially office space, and industrial property has a lower ratio of operating expenses to revenue which means that it will perform better in up markets because more income drops to the bottom line" which suggests that corporate investors will have more capital and return when making an investment in industrial market to outbid the non-institutionals. The investment value for corporate investors will be higher than non-institutionals, especially in up markets, so do they will pay an even higher premium in expansion. On the other hand, industrial properties have more specialized purposes of use and could have fewer potential buyers. It often takes a longer time to sell an industrial property[8], and it is may be more difficult for corporates to find substitutable space later on. As a result, corporates are expected to pay a premium when purchasing but might not be willing or able to sell at a different price. Meanwhile, as suggested in the literature, even though corporates have a higher investment value on their industrial properties, however, in divestiture, the asset market is unaffected by what the corporation believes the property is worth for investment value. In the absence of another buyer who holds similar valuation for the asset, it is difficult to recover any of their overpayment in the selling price at the end of the holding period. Moreover, as Wheaton and Torto (1990) pointed out that industrial property market only shows little evidence of a traditional real estate cycle and just move slightly with economic cycle, so the pattern of buy high but sell similar may hold the same in both expansion and contraction. Thus, I formulate the following hypotheses based on the theory and the aforementioned rationale, and I expect corporates pay a premium but sell at a similar price across market cycles and the premium they paid is higher in expansion than contraction:

[8] The marketing duration of industrial transactions is 431.37 days with a standard deviation of 411.69 days when selling. The marketing duration of office transactions is 367.80 days with a standard deviation of 370.31 days when selling.

H3a: Given transactions in similar industrial assets, corporates buy at similar prices as compared to non-institutionals during periods of economic expansion.

H3b: Given transactions in similar industrial assets, corporates sell at similar prices as compared to non-institutionals during periods of economic expansion.

H4a: Given transactions in similar industrial assets, corporates buy at similar prices as compared to non-institutionals during periods of economic contraction.

H4b: Given transactions in similar industrial assets, corporates sell at similar prices as compared to non-institutionals during periods of economic contraction.

Market Duration

Market duration is often viewed as a combined component of market equilibrium with transaction prices. While many studies have focused on marketing duration, evidence for the relation between price and TOM is inconsistent when taken together. For example, Cubbin (1974) shows that a house with a higher price could be sold faster because it may indicate better quality. Similarly, Knight (2002) finds a negative relationship between sales price and TOM. However, Ong and Koh (2000) and Levitt and Syverson (2008) empirically detected a positive relationship between TOM and the price. Moreover, Cheng, Lin, and Liu (2008) theoretically showed a positive relationship between sales price and TOM. Although no consensus appears in the literature on this question, previous studies have demonstrated a strong relationship between transaction price and market duration. In addition, Wiley (2012) points out that market duration can be seen as a behavioral factor reflecting the relative patience of investors, which may help explain the decisions made by an investor in a particular transaction. Moreover, as McKinley and Simpson (2005) and Peiser and Hamilton (2012) suggest corporates have a higher investment value on industrial properties with fewer potential buyers in divestitures, in combination with a relatively less volatile market as suggested by Wheaton and Torto (1990), the time on market for selling an industrial property by corporate investors may no less than the time on market on the selling by non-institutionals if they want to get a better deal in divestitures. For that reason, this research evaluates the respective effects of investor clientele effects on market duration in addition to transaction price, and I expect the time on market will be equal or longer when corporates sell their real assets. The hypothesis tested on this issue is provided below.

H5: Market duration is not significantly different between divestitures of industrial assets made by corporates and non-institutional investors.

Property Types

Corporates are important occupiers of space in the industrial market and are influential user of industrial properties to house their manufacturing activities. According to McKinley and Simpson (2005) and the NAIOP Research Foundation, industrial property can be categorized into two main subcategories, general-purpose and special-purpose properties[9], based on the proposed purposes of use and the ease of adaptation to alternative use. The differences between general- and special-purpose properties are manifold. First, general-purpose properties are substitutable assets while special-purpose properties have few substitutes. Second, as McKinley and Simpson (2005) pointed out that, for special-purpose properties, the investment value is more likely to be used as the reference of the property value, in contrast to the estimated market value used as reference for the general-purpose properties. Third, general-purpose properties tend to have a greater number of interested investors due to their income-generating and relative risk characteristics while special-purpose properties tend to attract owner- occupiers or end users who desire to house a specific function of their operations.

According to McKinley and Simpson (2005), unlike other markets dominated by substitutable assets, such as housing market, non-real estate corporations may have a better understanding of the investment value of an industrial property than real estate investors who are non-users. Consequently, corporates are not necessarily disadvantaged parties as they are in other markets. If market values are easily obtained, it can mitigate the price differentials among investor clienteles. For special-purpose industrial properties, market values are not easily obtained; thus, stronger investor clientele effects are expected for these assets. The hypotheses examining this issue are provided below:

H6a: Given transactions in similar general-purpose industrial assets, corporates buy at similar prices as compared to non-institutionals.

H6b: Given transactions in similar general-purpose industrial assets, corporates sell at similar prices as compared to non-institutionals.

H7a: Given transactions in similar special-purpose industrial assets, corporates buy at similar prices as compared to non-institutionals.

H7b: Given transactions in similar special-purpose industrial assets, corporates sell at similar prices as compared to non-institutionals.

[9] To clarify, single-purpose properties are part of special-purpose properties. Sometimes people use single-purpose properties directly, but they are also special-purpose properties. According to McKinley and Simpson (2005), single-purpose property can be seen as "a special-purpose property classification, some real estate is usually designed for a single-purpose use that typically is not feasible to adapt to other purposes, and the market for these facilities is not confined to narrow geographic boundaries." Also, see the appendix for detailed information on the National Association for Industrial and Office Parks (NAIOP) classification.

Brokerage Intermediation Effects

Although price differences among investor groups may result internally from different considerations related to investors' unique characteristics and backgrounds, external forces may mitigate or exacerbate these effects. The literature has documented the existence of market inefficiency induced by investor clienteles. However, this inefficiency may be mitigated or exacerbated by the impact of brokerage intermediation when involved in the transaction. According to Rutherford, Springer, and Yavas (2005), brokers play a more important role than any other third party in real estate transactions. They are involved in almost every phase of the transaction, from determining the listing price, searching, matching, and bargaining, to obtaining mortgages and closing the deal. As one of the most important parties in real estate transactions, the involvement of brokers has a significant impact on the transaction price.

Since the pioneering work of Yinger (1981), research focus on real estate brokerage has grown significantly. Researchers have intensively studied many aspects of brokerage, such as brokers' and brokerage businesses' characteristics, commission and compensation, price and time on market, market efficiency and legal liability, and international comparisons[10]. However, previous studies mainly focus on the residential real estate market. Compared to investors in the residential real estate market, those in the industrial market are usually more powerful and knowledgeable, and the transactions are more likely to rely on the investment value instead of the estimated market value. Thus, it seems the brokers' role in industrial market might be mainly to facilitate a transaction rather than help their principals to obtain a better deal. However, the absence of a market value could potentially create an agency problem for brokers in the industrial market because reference points to gauge their behavior are difficult to obtain. Without market value as a benchmark, brokers may be better positioned to influence with their principals, such as persuading sellers to sell at a lower price or suggesting that buyers accept a higher price in order to earn a commission faster. In order to obtain more accurate results on transaction price differences between corporates and non-institutionals, brokerage intermediation effects are appropriately controlled for when investor clienteles are examined. The related hypotheses tested in this study are shown below:

[10] For example, one stream of the brokerage literature, close to this study, focuses on the impact that brokerage can have on transactions and the potential agency issue with a dual agent. For example, Jud and Frew (1986) find, examining the role of real estate brokers in the housing market in Charlotte, North Carolina, that broker-assistant sellers can sell at a higher price. However, Elder, Zumpano, and Baryla (2000) examine the effect of using buyer brokers on the selling price. They find that buyer brokers can reduce search time but have no effect on the selling price. Gardiner, Heisler, Kallberg, and Liu (2007) examine the effects of dual agency on the selling price and TOM. They find that dual agency reduces both the selling price and TOM, and that both effects were reduced after the disclosure legislation came into effect.

H8a: Given transactions in similar industrial assets, corporates buy at similar prices as compared to non-institutionals with brokerage intermediation effects controlled.

H8b: Given transactions in similar industrial assets, corporates sell at similar prices as compared non-institutionals with brokerage intermediation effects controlled.

Selection Bias

Sample selection bias, introduced by Heckman (1979) in his paper "*Sample Selection Bias as a Specification Error,"* has caught the serious attention of research scholars. Long after its introduction, the problem of selection bias has now been fully recognized and controlled for in real estate studies. Considering the characteristics of industrial property, sample selection bias can be a serious problem, as evidenced in several studies in the literature. On the one hand, as pointed out by McKinley and Simpson (2005), "The market for industrial real estate reflects the unique characteristics of the property type." For example, investors are reluctant to take a facility that is designed to house a specific industrial process, because such special-purpose industrial real properties are less likely to be adaptable to alternative uses. If they are willing to select a special-purpose asset, a large capital expenditure is typically required to convert the asset to a usable form. On the other hand, Wiley (2012) points out that some investors, such as non-real estate corporations, may systematically overpay when they transact in commercial real estate. Other sophisticated investors, such as institutionals who can easily access the capital market, and even some less-sophisticated investor clienteles may influence the magnitude of overpayment. To present an unbiased estimation, self-selection bias needs to be addressed before testing clientele effects, as suggested by Wiley (2012). This study tests the following hypotheses using a probit model to detect the sample selection problem.

H9a: The properties purchased by corporates are similar to those purchased by non-institutionals.

H9b: The properties sold by corporates are similar to those sold by non-institutionals.

2.2 Magnitude of Difference

Each of the aforementioned theories and potential explanations are carefully evaluated and examined to answer the question on the price difference between corporates and non-institutional investors. The question on the magnitude of these price differences among corporations is studied in the following parts. Discussed below are several factors that can be identified and tested to explain the magnitude of differences among corporate investors.

Firm Size

Company size is probably the first determinant of the magnitude of price differences between transactions of different companies.

Several reasons have been presented in the literature explaining why companies of different size pay different prices when transacting in the real estate market. For example, Stoll (1984) points out that, compared to small firms, large firms usually have lower credit costs and more funding sources, so large companies can afford to pay a premium in order to outbid smaller competitors. In another study, Audretsch and Elston (2000) show that relatively large companies have lower liquidity constraints since larger companies can finance capital expenditures from internal resources, such as issuing equity or debt. Moreover, Manning and Roulac (1999) point out that large companies can achieve lower costs from large volume, spreading certain central administrative and operating costs over a large numbers of workers, spreading costs of highly specialized expertise over larger square footage of occupied business space, and amortizing investments in systems, research, and strategic management less noticeably with higher annual revenues. They also point out that larger companies have a lower overall cost of capital, greater financial strength and accessibility to the public capital markets, higher affordability, and greater visibility that may affect resale values. Overall, the aforementioned reasons generally point out that larger companies can outbid smaller competitors for similar size assets. Larger companies are expected to pay a higher price when they transact deals and can afford to sell at lower prices in divestitures. To test the impact of firm size on market outcomes of real estate transactions by different companies, two hypotheses are proposed and tested as follows:

> H10a: Given transactions in similar industrial assets, relatively large firms buy at similar prices as compared to smaller firms.
> H10b: Given transactions in similar industrial assets, relatively large firms sell at similar prices as compared to smaller firms.

Industry

The industry that encompasses the companies' main business is probably the next determinant of the size difference between the market outcomes of different companies' transactions.

As pointed out by Edwards and Ellison (2009), "Firms need property in order to generate turnover and profits, and the degree of importance of this functional role of property in the business differs with each organization." Johnson and Keasler (1993) present an analysis of corporate real estate holdings based on the industry sector and property subtypes for 1984 and 1991. They show that companies in different industries and business sectors have different preferences for their real estate holdings. For example, they find that in the year 1984, the top five industry groups, based on absolute real estate holdings at cost, were transportation equipment (SIC 3700), chemicals and allied products (SIC 2800), industrial and commercial machinery and computer equipment (SIC 3500), electrical and other equipment excluding computer equipment (SIC 3600), and paper and allied products (SIC 2600). In 1991, the top five industry groups based on real estate holdings as a percentage of assets were primary metal industries (SIC 3300), general merchandise stores (SIC 5300), paper and allied products (SIC 2600), chemicals and allied products (SIC 2800), and printing and publishing (SIC 2700).

In another study, Schaefers (1999) highlights differences in companies' attitudes and efforts toward real estate asset management across different industries. He shows that heavy manufacturing/engineering, retail/wholesale, and banking/insurance/services companies select real estate in strategic locations and are more likely to actively manage their real estate assets. Companies in energy/utility/mining, chemical and associated, and light manufacturing industries are less attentive to their real estate assets and more likely to passively manage their real estate portfolio.

The apparent differences in the importance and ownership of real estate among different industries imply that the estimated investment value of a real asset would differ by company and sector. Therefore, I can reasonably expect that the price a company is willing to pay for a transaction would differ by sector and industry[11].

[11] According to Nasdaq (http://www.nasdaq.com/screening/companies-by-industry.aspx), the sectors and industries in which firms conduct business are as follows: basic industry (major chemicals, agricultural chemicals, metal fabrications, mining & quarrying of nonmetallic mineral, precious metals, steel/iron ore, engineering & construction, homebuilding, paints/coatings, forest products, paper); capital goods (aerospace, auto manufacturing, auto parts: O.E.M., automotive aftermarket, building materials, construction/ag equipment/trucks, electrical products, electronic components, industrial machinery/components, pollution control equipment); consumer durables (consumer electronics/appliances, containers/packaging, home furnishings, industrial specialties, miscellaneous manufacturing industries); consumer non-durables (apparel, beverages [production/distribution], farming/seeds/milling, meat/poultry/fish, package goods/cosmetics, packaged foods, specialty foods, plastic products); consumer services (advertising, clothing/shoe/accessory stores, department/specialty retail stores, office equipment/supplies/services), energy (coal mining, industrial machinery/components), finance (consumer services, life insurance, savings institutions, major banks), health care (major pharmaceuticals, medical specialties, medical/dental instruments), miscellaneous (industrial machinery/components, publishing), public utilities (environmental services, telecommunications equipment), technology (computer manufacturing, diversified commercial services, electrical products, industrial machinery/components, semiconductors), and transportation (air freight/delivery services, marine transportation, trucking freight/courier services).

H11a: Corporates in different industries buy industrial assets at similar prices.

H11b: Corporates in different industries sell industrial assets at similar prices.

Locality and Its Impact

Another important characteristic that affects transaction price is locality, which has recently received increased attention in the real estate literature.

As the literature shows[12], the locality issue has been studied extensively for residential and commercial office markets, but as pointed out earlier in this study, its impact in the industrial market could be different. As aforementioned, many industrial properties serve and compete in a relatively large geographic area, and their investment values are determined from a broader perspective that combines the geographic dimension with various production factors, such as access to labor and natural resources, transportation, and business clustering.

Dunse, Jones, Brown, and Fraser (2005) point out those industrial properties generally serve a broader area such as a regional or national market instead of just a local market. Similarly, Thrall (2002) shows that, in contrast to other markets where demand arises from the local economy, the demand for industrial property is the result of larger national or even global considerations. As a result, the impact of locality-induced investor clientele effects in industrial property markets is different compared with other markets. For example, information on value determinants may not be limited to a narrowly defined market boundary. An industrial property can be evaluated according to the views of corporates within an industrial corridor across several states. In this regard, the investment value is determined with broader

[12] The earliest work in this area was conducted by Vrooman (1978). He points out, finding that a premium was paid by nonlocal buyers for forestland parcels in the Adirondack Park, that the overpayment comes from a combination of information asymmetry and anchoring. After Vrooman, out-of-market premium paid by nonlocal buyers has been studied extensively in the residential real estate market although the empirical evidence is mixed. Miller, Sklarz, and Real (1988) find that Japanese buyers paid significantly high prices in the Hawaiian residential real estate market during the 1980s. However, Myer, He, and Webb (1992) find no evidence of a non-U.S. buyer premium. Further, Turnbull and Sirmans (1993) find that, compared to local buyers, out-of-town buyers do not pay significantly different prices in the housing market of Baton Rouge, Louisiana. In a later study, Watkins (1998) finds no evidence that in-migrants pay a premium compared with intra-market movers. In contrast to the work of Myer, He, and Webb (1992), Turnbull and Sirmans (1993), Watkins (1998), and Neo, Ong, and Tu (2008) study the acquisitions made by foreign investors and find that a significant premium has been paid by foreigners for low-rise houses in the Singapore housing market. Further, Ihlanfeldt and Mayock (2012) find that inter-market movers pay different prices to those of intra-market movers for single-family house transactions and that inter-market movers suffer from disadvantages of information asymmetry and a diminishing anchoring effect. In addition, Zhou, Gibler, and Zahirovic-Herbert (2014) examine new condominium sales in Chengdu, China, and find that nonlocal buyers pay a higher price and are subject to the anchoring effect. Moreover, nonlocally induced clientele effects have been investigated in the commercial real estate market. Lambson, McQueen, and Slade (2004) find that out-of-market buyers pay a significant premium for apartment complexes in the Phoenix area. Further, Liu, Gallimore, and Wiley (2013) find that nonlocal investors pay a significant premium when purchasing and sell at a significant discount when divesting. Such investors also experience information asymmetry and the anchoring effect.

considerations in terms of geographic dimensions or production factors, such as access to labor and natural resources, transportation, and business clustering. Therefore, if the investment value of an industrial property is estimated in the context of a relatively large area with broadly distributed factors, the locality impact could be diluted. In addition, compared to other real estate markets for certain property types, such as general-purpose industrial property, it has a shorter development period and a relatively simple construction structure. Therefore, nonlocal and local investors may rely on the same information beyond a narrowly defined market boundary, in relative terms, in order to estimate the value of a property with less information asymmetry; thus, the impact of locality could be different compared to the impact in other markets. In this study, the price difference induced by locality is examined when corporate investors transact in the industrial market. The following hypotheses are tested.

H12a: Given transactions in similar industrial assets, non-local corporates buy at similar prices as compared to locals.

H12b: Given transactions in similar industrial assets, non-local corporates sell at similar prices as compared to locals.

Public vs. Non-Public Firms

Firms can choose to fund their investment and operations from different sources. They can choose to keep business running as private firms and raise capital from private equity funds. Alternatively, they can choose to go public to enjoy the benefits of increased access to capital markets and increased liquidity for shareholders. The advantages and disadvantages to a firm that goes public have been well documented in the finance literature. For example, as Ross, Westerfield, and Jordan (2014) and Brigham and Houston (2011) point out, the advantages of being a public company may include increased liquidity due to easier transfer of ownership and fund-raising in the secondary market, enhanced credibility and improved terms with customers, suppliers, and lenders, and increased public awareness and drawing power to customers. On the other hand, the disadvantages of being public include high regulation and processing costs, reduced confidentiality, flexibility, and control. In addition, the decision of going public and the choice of being in public or private structures have also been intensively discussed in the literature. Studies focusing on these topics include Shah and Thakor (1988), Zingales (1995), Pagano and Roell (1998), Subrahmanyam and Titman (1999), Chemmanur and Fulghieri (1999), Ritter and Welch (2002), Boot, Gopalan, and Thakor (2006), and Brau and Fawcett (2006), among others. Compared to private firms, public firms often have better access to capital with a lower cost, so public firms are able to pay a higher price to win a competitive bid. For these reasons, the following hypotheses are provided.

H13a: Given transactions in similar industrial assets, public corporates buy at similar prices as compared to non-public firms.

H13b: Given transactions in similar industrial assets, public corporates sell at similar prices as compared to non-public firms.

3. Data and Methodology

3.1 Data

The data used in this study are from two sources: data of property transactions are from the CoStar COMPs® database, and data of public companies are from NASDAQ, NYSE, and AMEX.

CoStar is one of the leading information providers for commercial real estate transactions. The dataset provides detailed and verified information for commercial property transactions in 138 major metropolitan markets[13] throughout the U.S. For each property, the information includes price per square foot, land area, building size, building class, building address, transaction date, sale conditions[14] as well as

[13] A total of 138 markets are identified on CoStar. The markets are Albany/Schenectady/Troy, Albuquerque, Anchorage; Asheville, Atlanta, Augusta/Richmond County, Austin, Bakersfield, Baltimore, Baton Rouge, Beaumont/Port Arthur, Birmingham, Boise City/Nampa, Boston, Bremerton/Silverdale, Brownsville/Harlingen, Buffalo/Niagara Falls, Charleston WV, Charleston/N Charleston, Charlotte, Chattanooga, Chicago, Cincinnati/Dayton, Cleveland, Colorado Springs, Columbia, Columbus, Columbus GA, Corpus Christi, Dallas/Ft Worth, Davenport/Moline/Rock Island, Deltona/Daytona Beach, Denver, Des Moines, Detroit, Duluth, East Bay/Oakland, El Paso, Erie, Evansville, Fayetteville, Fayetteville/Springdale/Rogers. Fort Smith; Fort Wayne, Fresno, Green Bay, Greensboro/Winston-Salem, Greenville/Spartanburg, Hampton Roads, Hartford, Hawaii, Houston, Huntington/Ashland, Huntsville, Indianapolis, Inland Empire (California), Jackson, Jacksonville (Florida), Kansas City, Killeen/Temple/Fort Hood, Kingsport/Bristol/Bristol, Knoxville, Lafayette, Las Vegas, Lexington/Fayette, Lincoln, Little Rock/N Little Rock, Long Island (New York), Los Angeles, Louisville, Lubbock, Marin/Sonoma, McAllen/Edinburg/Pharr, Memphis, Milwaukee/Madison, Minneapolis/St Paul, Mobile, Montgomery, Myrtle Beach/Conway, Nashville, New Orleans/Metairie/Kenner, New York City, Northern New Jersey, Ocala, Oklahoma City, Olympia, Omaha/Council Bluffs, Orange County (California), Orlando, Pensacola, Peoria, Philadelphia, Phoenix, Pittsburgh, Port St Lucie/Fort Pierce, Portland, Portland/South Portland, Providence, Raleigh/Durham, Reno/Sparks, Richmond VA, Roanoke, Rochester, Sacramento, Salinas, Salt Lake City, San Antonio, San Diego, San Francisco, San Luis Obispo/Paso Robles, Santa Barbara/Sta Maria/Goleta, Santa Cruz/Watsonville, Savannah, Seattle/Puget Sound, Shreveport/Bossier City, South Bay/San Jose, South Bend/Misawaka, South Florida, Southwest Florida, Spokane, Springfield, St. Louis, Stockton/Modesto, Syracuse, Tallahassee, Tampa/St Petersburg, Toledo, Tucson, Tulsa, Utica/Rome, Visalia/Porterville, Washington, DC, West Michigan, Westchester/So Connecticut, Wichita, Wilmington, Yakima, and Youngstown/Warren/Boardman.

[14] The list of possible sale conditions identified by CoStar includes 1031 exchange, assemblage, auction sale, bankruptcy sale, build-to-suit, building contamination issue, building in shell condition, business value added, condo conversion, court appointed sale, debt assumption, deed restriction, deferred maintenance, direct exchange, distress sale, double escrow, estate/probate sale, excess land, exercise of option, expansion, ground lease (leased fee simple), ground lease (leasehold), high vacancy property, historical site, land contract, lease option, note purchase, partial interest transfer, purchase by tenant, recapitalization, redevelopment project, real estate owned (REO sale), rolling option/takedown, sale leaseback, short sale, and soil contamination issues. An alternative approach is to include only transactions that occur under normal sale conditions.

details of the buyer's and seller's companies, their addresses, the broker on the buyer's and seller's sides, and investor type classification[15].

Information on public companies is gathered from nasdaq.com, which provides information on all public companies from the three major stock markets: NASDAQ, NYSE, and AMEX. Information is obtained from NASDAQ for 3,132 companies, from NYSE for 3,259 companies, and from AMEX for 391 companies. Company information includes company name, transaction symbol, last sale price, market cap, country, IPO year, business sector, industry, and company summary.

In the first step of the data collection, data are collected from the CoStar website under the category of each corporate and non-institutional investor type and for the purchase and divestiture sides. During the data collection process, I first select one type of investor on the purchase side. I then adjust the property size from one square foot and gradually increase it to infinity to obtain all the transaction records that satisfy my search criteria. Because CoStar allows no more than 500 observations to be downloaded each time, several batches[16] of data under one investor type are collected and then combined to compose the full sample for each investor type. This procedure is repeated for each investor type to obtain all available data. To test the impact on transaction prices from company characteristics, the data collected from CoStar are matched and merged with data collected from Nasdaq.com based on the name of the company and transaction date.

The full sample collected from CoStar for industrial transactions made by corporates and non-institutionals includes 14,150 observations on the purchase side and 13,464 observations on the divestiture side. Among the data, the purchases and divestitures made by corporates include 3,915 and 3,829 observations, respectively. Likewise, purchases and sales made by non-institutionals include 10,235 and 9,635 observations, respectively[17]. The sample applies to 138 U.S. markets from 1991 through 2012.

The summary statistics for the transaction samples are shown in Table 1-1. Panel A of Table 1 provides the purchase sample, Panel B the sale sample, and Panel C the paired transactions. On the purchase side, a

[15] Investor types listed in CoStar are bank/finance, corporate, national developer, regional developer, educational, endowment, equity funds, government, individual, insurance, investment manager, listed fund, medical, nonprofit, other private, other unknown institution, pension fund, private REIT, REIT, religious, REOC, sovereign, special, tenants, and trust.

[16] For example, in the purchase sample, 35 batches of data under the category of corporates, 57 batches of data under the category of individuals, and 28 batches of data under the category of developers are collected.

[17] Because legal forms of business organization are important in this analysis, to get an accurate estimation, I eliminate the observations that cannot be identified as corporates from their name. The method I used to double check if the observations under the category of corporates are identifiable corporates is that I use the "search" function in excel to find the observations under the category of corporates that have "Inc." or "Corporation" in their name. Similarly, for non-institutional group, I eliminate the investors whose names are missing from the sample.

typical industrial building is 41,526 square feet, sitting on an 183,925-square-foot lot and over 33 years old. While Class A buildings represent only 1% and Class B 35% of the sample, Class C account for the majority, at 63%. The average transaction price in the purchase sample is $66.67 per square foot, and corporate investors pay $68.06 per square foot compared to non-institutional investors, who pay, on average, $66.14 per square foot. Corporate investors tend to acquire larger, newer buildings on larger lots, more in Class A and B. Similarly, on the divesture side, a typical industrial building is 43,159 square feet, sitting on a 195,937-square-foot lot and over 35 years old. While Class A buildings represent only 1% and Class B 34% of the sample, Class C accounts for 66%. The average transaction price in the sales sample is $70.60 per square foot. Corporate investors sell at $64.96 per square foot, and non-institutional investors at $72.84 per square foot.

Industrial properties can further be divided into two main sub-categories: general-purpose property and special-purpose property. The summary statistics for the transaction sample in each of these sub-categories are shown in Table 2-1 and Table 3-1.

Panel A of Table 2-1 provides the purchase sample and Panel B the sale sample of general-purpose property transactions. On the purchase side, a typical general-purpose industrial building is 44,054 square feet, sitting on an 188,266-square-foot lot and over 33 years old. Only 2% of the sample is Class A, 36% is Class B, and 62% is Class C. The average transaction price in the purchase sample is $63.68 per square foot, with corporate investors paying $63.54 and non-institutional investors an average of $63.74 per square foot. Corporate investors tend to buy larger, newer buildings on much larger lots, more of them in Classes A and B. Similarly, on the divesture side, a typical industrial building is 45,871 square feet, sitting on a 200,639-square-foot lot and over 34 years old. While Class A buildings represent only 1% and Class B 35% of the sample, Class C account for 64%. The average transaction price in the sales sample is $67.64 per square foot. Corporate investors sell at $61.00 per square foot, and non-institutional investors at $67.64 per square foot.

Panel A of Table 3-1 provides the purchase sample and Panel B the sales sample of special-purpose property transactions. On the purchase side, a typical special-purpose industrial building is 17,797 square feet, sitting on a 141,997-square-foot lot and over 34 years old. While Class A buildings represent only 1% and Class B 24% of the sample, Class C account for the majority, at 74%. The average transaction price in the purchase sample is $96.20 per square foot, with corporate investors paying $ 118.18 and non-institutional investors an average of $88.63 per square foot. Corporate investors tend to buy larger, newer buildings on larger lots, more of them Class A and B. Similarly, on the divesture side, a typical industrial

building is 17,501 square feet, sitting on a 147,379 square foot lot and over 35 years old. While Class A buildings represent only 1% and Class B 26% of the sample, Class C account for 73%. The average transaction price in the sales sample is $98.17 per square foot. Corporate investors sell at $106.14 and non-institutional investors at $95.00 per square foot.

The summary statistics provide evidence that tends to support the valuation difference between corporate investors and non-institutional investors, especially for special-purpose properties. We can see from the summary statistics that, as suggested by McKinley and Simpson (2005), industrial properties have more value to corporates than to non-institutional investors. Furthermore, the values to non-institutional investors decrease significantly, as property adaptability reduces.

Moreover, the summary statistics for all the samples suggest that investor clienteles are subject to a self-selection issue when they engage in transactions, and this selection bias needs to be controlled for before the hypotheses are tested. To control for selection bias, a propensity score matching procedure is applied. This correction of selection bias by using propensity score matching maximizes the randomization assumption of the sample and eliminates the potential damage to causal inference. In the propensity score matching procedure, I match each transaction made by corporates with the most similar transaction made by the control group. Before matching, a probit model with control variables for the property characteristics is used to calculate the probability of a transaction made by different investor groups. After obtaining the propensity scores, the subsample is constructed by matching with transactions of the closest scores. The matching process helps to ensure that observations that have similar distributions of covariates and equal number of observations for subject and control groups in the analysis. Results from the probit estimations for each of the subsamples are presented in Tables 1-2, 2-2, and 3-2.

3.2 Methodology

The methodology used to measure the differences in the market outcomes of transactions and clientele effects is well established in the real estate literature. The model used in this study is based on such research. As aforementioned, related research models can be found in work such as Vrooman (1978), Dale-Johnson (1983), Miller, Sklarz, and Real (1988), Myer, He, and Webb (1992), Turnbull and Sirmans (1993), Watkins (1998), Harding, Rosenthal, and Sirmans (2003), Lambson, McQueen, and Slade (2004), Wood and Tu (2004), Simonsohn and Loewenstein (2006), Benjamin, Chinloy, Hardin, and Wu (2008), Neo, Ong, and Tu (2008), Ihlanfeldt and Mayock (2012), Wiley (2012), Chernobai and Chernobai (2013), Liu, Gallimore, and Wiley (2013), and Zhou, Gibler, and Zahirovic-Herbert (2014). The conventional

method used to examine clientele effects is to include an indicator variable in the regression model for the various clienteles. The estimated coefficient of the indicator variable then measures the performance difference among various investor clienteles. In addition, the control variables used in my analysis are supported by existing studies in order to effectively isolate the pricing differential attributable to clientele effects. These variables include property characteristics, geographic locations, sales conditions, and market timing. For example, Ambrose (1990) finds that the asking price is a function of a group of property characteristics such as building and land size. Fehribach, Rutherford, and Eakin (1993) add age, tenant type (single versus multiple tenants) to the model, and find significant results. Lockwood and Rutherford (1996) find that the most significant impact on property price is from parcel size. Black, Wolverton, Warden, and Pittman (1997) examine the southeast region of the U.S. market and find that the distance to a metropolitan area and building condition also contribute to the price equation. Jackson (2001) considers environmental factors and finds that they have a significant impact on property price. Following such research, I include each of these relevant control variables in the respective estimations.

However, many of the analyses in the literature potentially suffer from the problem of endogeneity or sample selection bias. Quite commonly, selection bias is not empirically measured or controlled in prior studies. For example, Wiley (2012) points out that some investors, such as non-real estate corporations, may systematically overpay when making a commercial real estate transaction. Other more sophisticated investors, such as institutional investors who can easily access capital markets, or some less-sophisticated investor clienteles, may also affect the magnitude of overpayment. As suggested by Wiley (2012), self-selection bias needs to be addressed appropriately before testing clientele effects. In order to control for selection bias and compare similar assets across my targeted subsamples, I apply a propensity score matching procedure in addition to ordinary least squares (OLS) regression.

The propensity score matching method, introduced by Rosenbaum and Rubin (1983), addresses the issue of selection bias and is often used in studies when a randomization assumption is not a given. The rationale behind the matching procedure is that I first calculate the likely outcome of each observation in the treatment group and the control group, given certain characteristics, by using prediction models (such as probit or logit models). Then, based on the calculated propensity scores, I match observations in the treatment group with observations in the control group. The propensity score matching method became popular in empirical research soon after its introduction and appears in studies such as Rosenbaum and Rubin (1984, 1985), Rosenbaum (1989), Gu and Rosenbaum (1993), D'Agostino (1998), D'Agostino and Rubin (2000), and Rubin (2004, 2007). Because of the contribution made by these statisticians and researchers, the method has been developed to cover not only univariate but also multivariate dimensions

with various matching algorithms; for example, matching can be done by using "the nearest available neighbor, caliper, and radius matching methods with or without replacement and matching treated observations to one or many controls" (Coca-Perraillon, 2007). The nearest available neighbor matching method without replacement is used to obtain the most accurate matching results.

The results from summary statistics suggest that selection bias issues are present in each sample. To resolve this bias, a propensity score matching procedure is applied. I match each transaction by a corporate investor with the most similar transaction by a non-institutional investor. A large number of variables controlling for the property characteristics are used to measure the probability that the non-institutional investor transaction is similar to a corporate investor transaction by the probit model. The probit model for this is specified in Equation (1).

$$(1) \qquad \Pr\{Corporate = 1\} = \Phi\{\beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M\}.$$

The binary dependent variable, *Corporate*, is used on the left-hand side of the equation, taking on a value of one for corporate investors and zero for non-institutional investors. I perform the probit estimation for both the purchase and sales samples separately, controlling for property characteristics (*X*) and other indicator variables, including secondary property type (*T*), calendar year of the transaction date (*Y*), unique set of sale conditions (*C*), and metropolitan market (*M*). The set of property characteristics (*X*) includes land area, building size, property age, and property class. Because industrial property is highly heterogeneous, 10 distinct secondary property types (*T*) are used to control for this heterogeneity. Calendar year indicators (*Y*) range from 1991 through 2012. CoStar identifies 36 individual sale conditions, and the set of indicators for the unique sale conditions (*C*) represents each of the possible combinations that appear in the samples. Also represented in the two samples are 138 metropolitan markets (*M*). The same approach is used to control for selection bias in both general- and special-purpose property transaction subsamples.

Table 1-2 presents the probit estimation results. Panels A and B of Table 1-2 report the estimation for the purchase and sales samples, respectively. The results in Panel A show that corporate buyers prefer relatively large-size industrial buildings on recently developed lots. Panel B reveals that corporate sellers are significantly more likely to divest larger, older, and lower class assets. Overall, corporate investors prefer to have properties with intensive improvements instead of inefficient land usage. I use the propensity score method without replacement to match each transaction by a corporate buyer (seller) to a transaction by a non-institutional buyer (seller) based on the probability. After matching, the final sample

on the purchase side includes 3,915 observations from each corporate and non-institutional investor, and 3,829 observations are evenly drawn from each side to compose the sales sample. Table 1 also reports the summary statistics for the propensity score matched sample of non-institutional investors, where we can see, through the matching procedure, that the selection bias on the transactions has been corrected. Similar results can also be seen in Tables 2-2 and 3-2 for both general- and special-purpose subsamples.

Following the probit model in Equation (1), Equation (2) is used to identify whether corporate investors pay or receive different prices. Propensity score matched samples are used in the estimation.

$$(2) \quad ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_N \cdot I\{\text{Corporate investor}\} + \varepsilon.$$

The dependent variable is price per square foot, logged. The independent variables include a set of property characteristics (*X*), along with indicator variables controlling for secondary property type (*T*), calendar year (*Y*), sale conditions (*C*), and geographic market (*M*). I use Equation (2) to estimate for the purchase and sales samples individually. $I\{\text{Corporate investor}\}$ takes a value of one for transactions by corporate investors and a value of zero for transactions by non-institutionals. The coefficient of β_N estimates percentage changes on price in transactions made by corporate investors versus non-institutionals. Based on the theory, I expect the estimated coefficient for β_N to be positive and significant in the purchase sample and in the sales sample, with a similar pattern across general-and special-purpose subsamples.

Corporate investors may hold a different valuation for similar assets. The next step in the analysis attempts to identify the valuation difference between corporate investors and non-institutionals. I use Equation (2) again with a paired transaction sample to estimate the valuation difference. The paired transaction sample is composed of corporation-to-corporation transactions and transactions between non-institutionals. $I\{\text{Corporate investor}\}$ takes a value of one for transactions by corporate investors and a value of zero for transactions by non-institutionals.

Moreover, the decision to purchase or divest of property may be influenced by market conditions. I divide the purchase and sales samples into subsamples for the expansion and contraction periods. Contraction begins in the first quarter of 2008 and continues through the second quarter of 2009. During this period, quarterly GDP growth was negative in the U.S. Expansion is defined for pre-2008 transactions and those that followed Q2 2009. I run Equation (2) under each period and on purchase and sales samples separately.

The estimated coefficients of β_N show the different pricing levels of transactions between corporate investors and non-institutionals.

Along with transaction prices, marketing duration also contributes to industrial market equilibrium. I consider the time of transactions to reveal seller skill and patience. The marketing duration model is provided in Equation (3).

(3) $ln(\text{Marketing duration}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta P \cdot ln(\text{Price per square foot}) + \beta_N \cdot I\{\text{Corporate investor}\} + \varepsilon.$

The estimated coefficient for β_N in equation (3) identifies the percentage difference in marketing duration for properties sold by corporate investors relative to similar assets sold by non-institutionals.

Brokerage intermediation effects are controlled for in Equation (4). In the CoStar database, I am able to differentiate between buying brokers and listing brokers. The buyer and seller of commercial real estate can have a dedicated buying broker and listing broker to represent the buyer's and seller's interests separately. Without controlling for the possible impact of using a broker, the market outcomes from different investor clienteles might be biased.

(4) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_N \cdot I\{\text{Corporate investor}\} + \beta_{BB} \cdot I\{\text{Buyer broker}\} + \beta_{SB} \cdot I\{\text{Same broker}^{18}\} + \beta_{LB} \cdot I\{\text{Listing broker}\} + \varepsilon.$

Equation (4) extends Equation (2) by adding dummy variables for broker usage. The estimated coefficient for β_N in Equation (4) identifies percentage difference in price per square foot for properties bought or sold by corporate investors, with buying broker, same broker, or listing broker impacts controlled for, relative to similar assets bought or sold by the control group.

In addition, the magnitudes of price differences based on the characteristics of firms are tested by the following equations.

Equation (5) is used to test the magnitudes of price difference between public and non-public corporations.

[18] Same broker is dual agent

(5) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_P \cdot I\{\text{Public corporation}\} + \varepsilon.$

In Equation (5), the estimated coefficient for β_P shows the percentage transaction price difference for properties bought or sold by public firms relative to similar assets bought or sold by non-public corporations.

Equation (6) is used to test the magnitudes of price difference between local and non-local corporations.

(6) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_L \cdot I\{\text{Local corporation}\} + \varepsilon.$

In Equation (6), the estimated coefficient for β_L shows the percentage difference in transaction prices between properties bought or sold by local firms and similar assets bought or sold by non-local corporations.

Equation (7) is used to test the magnitudes of price difference among corporations in different industries.

(7) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_I \cdot I\{\text{Industry}\} + \varepsilon.$

In Equation (7), the estimated coefficient for β_I shows the percentage difference in transaction price between properties bought or sold by corporations operating in different industries. A total of 12 industries are tested.

Equation (8) is used to test the magnitudes of price difference based on firm size.

(8) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_{Cap} \cdot MarketCap + \varepsilon.$

In Equation (8), the estimated coefficient for β_{Cap} shows the percentage difference in transaction price for properties based on the corporation's market capitalization.

4. Empirical Results

The main results of this study are shown in Table 1-3. Panel A shows the purchase sample estimations, and Panel B shows the results of the sales sample with selection bias controlled. The results indicate that corporate investors overpay by an estimated 12.4% when purchasing but sell at no discount relative to the prices of similar assets transacted by non-institutional investors.

To get a more accurate estimation, the impact of brokerage representation is considered. Table 4 shows the results controlled for the involvement of brokers. The results, with brokerage intermediation effects controlled for, show a consistent pattern of overpayment.

Similar price difference patterns can be found under different market conditions. Table 5 provides the results for expansion in Panel A and contraction in Panel B. Panels A.1 and B.1 respectively reveal that corporates pay premiums of 13.9% during expansion and 9.8% during contraction when acquiring properties; a higher premium is paid during expansion than in the contraction period[19]. Panels A.2 and Panel B.2 show that no discount appears in the sale of properties during the expansion and contraction periods.

As shown in Table 2-3 and Table 3-3, the estimated coefficients for corporate investors are again consistent in sign and significance across the general- and special-purpose property markets, where they pay premiums of 11.1% and 20.8%, respectively. From the results, the premium paid by the corporates is much higher in the special-purpose market than in the general-purpose market[20].

Differences in asset valuation by corporate investors are reported in Table 6. The difference is estimated by Equation (2) with a subsample of observations of transactions between corporate investors matched to transactions between their non-institutional counterparts in similar assets. The estimated coefficient for corporate investors indicates that they significantly overvalue similar assets by an estimated 7.2% relative to non-institutionals. The property overvaluation by corporate investors accords with our expectation,

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19 $t_{calculated} = ((\overline{X_1} - \overline{X_2})/\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}})$=22.18

20 $t_{calculated} = ((\overline{X_1} - \overline{X_2})/\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}})$=33.12

considering that corporate investors see the property not only as an investment but also as a business necessity.

In addition to price effects, Table 7 shows the estimation for marketing duration for the sales sample only. The estimation reveals that, everything being equal, marketing durations do not significantly differ between corporate investors and non-institutional investors. The impatience demonstrated in the office market does not appear pronounced in the industrial market. The lack of speculative opportunity may help explain this phenomenon. As pointed out by McKinley and Simpson (2005), "Industrial buildings take a relatively short time to build, and when vacancy rates are low, the amount of construction can increase quickly, so it no longer makes financial sense to build speculatively. The industrial market can respond much more quickly to demand changes than other real estate markets." In addition, the industrial market is thinly traded, and lacks easily observed investment values. Using industrial property for speculative purposes is a high-risk undertaking. Thus, even though corporates are willing to sell their properties quicker for a lower price, the market does not provide such an opportunity from the demand side. Therefore, we find no difference in market duration.

Tables 1 through 7 provide us a better understanding of the price difference between transactions by corporate and non-institutional investors. I next examine the impact of the corporations' characteristics on the size of the premium.

Table 8 shows that larger corporates do not pay a higher price than smaller corporations do; neither do they sell at a lower price than smaller corporations do as capital alone increases. However, Table 9-3 shows that public corporations do pay a higher price than non-public corporations do when transacting in the industrial market. The results may imply that greater capital accessibility and liquidity do play a role in variation of the overpayment. In addition, Table 10-3 shows that nonlocal corporations pay a higher price during acquisition, which is consistent with the literature. Moreover, Table 11 shows that public utilities, technology firms, and transportation companies are more likely to pay or sell at a higher price when compared to companies in the basic industries. On the other hand, corporations involved in consumer durables, consumer goods, energy, health-care, and miscellaneous purchase at a higher price but appear to sell at a price that is no different from similar assets. In addition, capital, finance, and consumer non-durable companies neither pay nor sell at a different price than those in basic industries.[21]

[21] I admit this is the limitation of this study, and Table 11 only provides informative results. The rationale behind the results I can see might be that the differences in degree of importance of this functional role of property in the business as suggested out by Edwards and Ellison (2009), or different preferences for their real estate holdings as pointed out by Johnson and Keasler (1993). Further study can be done in this area in the future.

4.1 Robustness Checks

To evaluate the robustness of the empirical results, clustering effects are considered in addition to propensity score matching. Moulton (1986, 1990) and Bertrand, Duflo, and Mullainathan (2002) point out the importance of controlling for clustering effects since a failure to do so may cause an underestimation of the standard errors and overstate the corresponding *t* value. Many studies discuss methods to control for clustering effects—Liang and Zeger (1986), Rogers (1994), Wooldridge (2003), Cameron, Gelbach, and Miller (2008), and White (2014), for example. In order to ensure robustness, all the results are conducted with standard errors clustered by geographic locations and market timings. Table 12 provides the corrected results, which show a consistent buy-high but not sell-low pattern in the industrial market.

5. Conclusion

Investor heterogeneity in specialized market knowledge, experiences, and origination drive investors into different classifiable groups. These unique clientele characteristics in turn show a significant impact on asset pricing through estimation of the property's investment value. In this study, I focus on transaction price differences between corporates and non-institutional investors in the industrial market for property acquisitions or divestitures. I evaluate the transaction price on both the purchase and divesture sides to check for any difference between the two prices. If a difference does exist, what are the factors that determine its magnitude?

In this study, I find that corporate investors in industrial property buy high but do not sell low. The pattern of buying high but not selling low does not support the claim by Bender (1991) that the management of a corporation typically disposes of real estate when it has surplus property to sell in the industrial market. However, the results do echo the claim of Bender (1991) that knowing the property value is vital to avoid selling at a lower price. For example, from table 1-3 and table 6 we can see that corporates do have a higher valuation on industrial real properties, and they do not sell their property at lower price. This study also provides some empirical evidence to verify the conflicting survey findings of Nourse and Kingery (1987) that while half of the businesses ignore the opportunities to divest their surplus properties at a better price, the other half try to maximize shareholder value by selling at a higher price. The results from table 1-3 generally show that corporates do not sell at significant different price than their counterparts in industrial market.

The pattern of buy high but do not sell low in industrial market differs from office market, and it is consistent during market cycles and across general- and special-purpose property types. The differences from office markets could be ascribed to a combination of higher investment value of corporates and the characteristics of industrial real properties. As pointed out by Wheaton and Torto (1990), industrial real properties are more likely to be owner-occupied, have a shorter development period, and are more likely to be built for the user. Investment for speculative rental purposes is limited in the industrial markets, and single tenant properties dominate the rental market. Due to the characteristics of industrial properties, market value sometimes is not easily to obtain and to be used to mitigate the price differentials among investor clienteles, and the cyclical effects in industrial market are weak. As a result, corporation's behavior and performance are different in industrial market. The findings generally suggest that corporate buyers pay a premium when purchasing, and a large portion of the premium is attributable to higher valuations applied by corporate investors. However, in divestiture, the asset market is unaffected by what the corporation believes the property is worth for investment value. In the absence of another buyer who holds similar valuation for the asset, it is difficult to recover any of their overpayment in the selling price at the end of the holding period. When compared to transactions in office market, corporate sellers in the industrial market are more patient and do not require significantly shorter marketing periods. The lengthier time to sale in the industrial market reduces the disparity between prices received by other investors in divestitures. The magnitude of overpayment is correlated with corporate characteristics. Public corporations and nonlocal corporations tend to pay more than local and private corporates, with the magnitude of overpayment varied across industrial sectors. However, the size of the corporation, in terms of market capitalization, has no impact on the degree of overpayment. The results reflect a higher cost of real capital to corporates[22], and generally imply that the price a corporate is willing to pay is determined primarily from an overall business value perspective, rather than property market value.

[22] The real capital here is defined as assets used to produce goods, such as real estate, equipment and machinery. Cost of real capital is just the cost of acquisition price over real property, the transaction price. Different from cost of capital, which is defined as the minimum required return on a new investment. In this study, I only focus on the price difference.

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Table 1-1. Summary Statistics Corporate vs. Non-institutional

Panel A. Purchase sample

	Full Sample (n=14,150)		Corporate (n=3,915)		Non-institutional: pre-match (n=10,235)		Non-institutional: post-match (n=3,915)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	66.67	59.89	68.06	66.06	66.14	57.35	60.05	53.67
Land area (SF)	183,925	556,088	284,697	787,837	145,378	429,858	253,056	561,783
Building size (SF)	41,526	91,088	63,891	132,804	32,972	66,794	58,008	95,143
Property age (years)	33.5	21.71	30.91	19.50	34.53	22.42	31.54	21.47
Class A	0.01	0.12	0.03	0.16	0.01	0.12	0.02	0.15
Class B	0.35	0.47	0.41	0.49	0.33	0.47	0.40	0.49
Class C	0.63	0.48	0.57	0.50	0.66	0.47	0.57	0.49
Multi-tenant	0.40	0.49	0.38	0.49	0.41	0.49	0.39	0.49
Corporate buyer	0.28	0.45	1	0	0	0	0	0

Panel B. Sales sample

	Full Sample (n=13,464)		Corporate (n=3,829)		Non-institutional: pre-match (n=9,635)		Non-institutional: post-match (n=3,829)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	70.60	66.20	64.96	66.00	72.84	66.15	63.56	60.30
Land area (SF)	195,937	586,336	322,679	785,778	145,569	475,572	257,534	658,978
Building size (SF)	43,159	99,086	69,948	134,378	32,513	78,400	58,620	116,960
Property age (years)	35.17	21.81	34.43	20.79	34.43	20.79	34.97	21.70
Class A	0.01	0.11	0.02	0.15	0.01	0.10	0.02	0.13
Class B	0.34	0.47	0.39	0.49	0.32	0.47	0.38	0.49
Class C	0.65	0.48	0.58	0.49	0.67	0.47	0.60	0.49
Multi-tenant	0.39	0.48	0.38	0.49	0.42	0.47	0.38	0.48
Corporate seller	0.28	0.45	1	0	0	0	0	0
Marketing duration	445.49	417.98	485.00	445.09	429.93	405.79	465.38	429.52

Panel C. Paired transactions

	Full Sample (n=5,043)		Corporate (n=793)		Non-institutional: pre-match (n=4,250)		Non-institutional: post-match (n=793)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	67.33	58.97	62.76	64.61	68.53	57.33	54.02	48.45
Land area (SF)	189,736	568,096	406,708	951,218	132,337	391,385	309,013	568,184
Building size (SF)	40,785	105,583	84,260	184,001	29,285	67,194	67,216	99,638
Property age (years)	37.36	21.54	33.47	18.70	38.38	22.12	34.35	20.09
Class A	0.01	0.10	0.02	0.13	0.01	0.09	0.02	0.13
Class B	0.34	0.47	0.46	0.50	0.31	0.46	0.44	0.50
Class C	0.65	0.48	0.53	0.50	0.69	0.46	0.55	0.50
Multi-tenant	0.38	0.49	0.35	0.48	0.39	0.49	0.35	0.48
Corporate investors	0.16	0.41	1	0	0	0	0	0

Notes: This table presents summary statistics for the purchase sample, in Panel A, the sales sample, in Panel B, and the subsample of paired transactions, in Panel C. The first column lists the variable name. The subsequent columns report the sample mean (Mean) and standard deviation (Std dev) for the full sample, the subsample of transactions by Corporate investors, the subsample of transactions by Non-institutional investors before (pre-match) and after the propensity-score matching (post-match) sequentially.

Variable definitions: Price per square foot is the transaction price for the industrial property, in U.S. dollars, divided by building size. Land area is the gross square footage of the lot. Building size is the rentable building area, measured in square foot (SF). Property age is measured in years relative to the sale date. Class A, Class B and Class C are indicator variables taking on a value of one for the respective property class and zero otherwise. Corporate buyer and corporate seller are indicator variables, taking on a value of one if the property is bought or sold by corporate buyer (seller). Marketing duration is the time to sell the property from the date of listing, measured in calendar days.

Table 1-2. Probit Estimation, Corporate vs. Non-institutional

Panel A1. Probit for corporate buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-7.998		0.00
ln(land area)	0.093	***	39.41
ln(building size)	0.164	***	94.61
ln(property age)	-0.060	***	12.67
Class A	-0.148		2.44
Class B	0.012		0.19
Multi-tenant	-0.069	***	8.17
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [79 variables]		
Market indicators[23]:	Included [134 variables]		
pseudo-R^2:	7.29%		
Observations:	14,150		

Panel B1. Probit for corporate seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-3.111	***	45.86
ln(land area)	0.097	***	43.01
ln(building size)	0.183	***	116.49
ln(property age)	0.045	**	6.10
Class A	0.116		1.18
Class B	0.063	**	5.11
Multi-tenant	-0.068	***	7.37
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [59 variables]		
Market indicators:	Included [131 variables]		
pseudo-R^2:	9.16%		
Observations:	13,464		

Panel A2. Probit for corporate buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	-0.360	0.45
ln(land area)	0.010	0.29
ln(building size)	-0.012	0.31
ln(property age)	0.023	1.22
Class A	0.054	0.27
Class B	0.023	0.50
Multi-tenant	-0.014	0.22
Secondary type indicators:	Included [9 variables]	
Year indicators:	Included [9 variables]	
Sale conditions:	Included [66 variables]	
Market indicators:	Included [107 variables]	
pseudo-R^2:	0.78%	
Observations:	7,830	

Panel B2. Probit for corporate seller (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	0.604	0.73
ln(land area)	0.002	0.02
ln(building size)	0.026	1.57
ln(property age)	-0.001	0.00
Class A	0.175	2.32
Class B	0.018	0.29
Multi-tenant	-0.001	0.00
Secondary type indicators:	Included [9 variables]	
Year indicators:	Included [9 variables]	
Sale conditions:	Included [48 variables]	
Market indicators:	Included [99 variables]	
pseudo-R^2:	1.05%	
Observations:	7,658	

Notes: This table presents the probit estimation results for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is corporate buyer (seller), which has a value of one if the property is bought (sold) by a corporate. The variables land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the Wald X^2 test statistics in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 79 (59) indicators to control for unique sale conditions, and 134 (131) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 66 (48) indicators to control for unique sale conditions, and 107 (99) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

[23] Market indicators are indicators to control for geographic property markets

Table 1-3. Estimated Premiums, Corporate vs. Non-institutional

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	7.096	***	23.57
ln(Land area)	-0.075	***	-7.21
ln(Building size)	-0.227	***	-19.44
ln(Property age)	-0.203	***	-17.36
Class A	0.265	***	4.57
Class B	0.096	***	5.20
Multi-tenant	-0.081	***	-4.85
Corporate buyer	0.124	***	7.77
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [66 variables]		
Market indicators:	Included [107 variables]		
Adjusted R^2:	30.87%		
Observations:	7,830		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	8.177	***	22.11
ln(Land area)	-0.072	***	-6.92
ln(Building size)	-0.244	***	-20.71
ln(Property age)	-0.206	***	-15.94
Class A	0.273	***	4.13
Class B	0.125	***	6.59
Multi-tenant	-0.056	***	-3.22
Corporate seller	0.017		0.99
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [48 variables]		
Market indicators:	Included [99 variables]		
Adjusted R^2:	30.38%		
Observations:	7,658		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score matched seller sample. The variables Price per square foot, Land area, Building size and Property age are each logged. The panels present the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions and markets, with one suppressed. *** and ** indicate statistical significance of the estimated coefficient based on the corresponding *t*-statistic at the 1% and 5% levels, respectively.

Table 2-1. Summary Statistics, Corporate vs. Non-institutional (General-Purpose Subsamples)

Panel A. Purchase sample

	Full Sample (n = 12,508)		Corporate (n=3,520)		Non-institutional: pre-match (n=8,988)		Non-institutional: post-match (n=3,520)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	63.68	53.71	63.54	55.66	63.74	52.93	57.72	49.80
Land area (SF)	188,266	558,899	290,092	817,948	148,388	408,768	259,745	581,383
Building size (SF)	44,054	94,783	67,231	137,422	34,977	69,391	61,037	98,928
Property age (years)	33.22	21.60	30.68	19.33	34.22	22.35	31.27	20.39
Class A	0.02	0.13	0.03	0.16	0.01	0.12	0.02	0.15
Class B	0.36	0.48	0.42	0.49	0.34	0.47	0.41	0.49
Class C	0.62	0.49	0.55	0.50	0.64	0.48	0.57	0.50
Multi-tenant	0.40	0.49	0.39	0.49	0.01	0.12	0.39	0.49
Corporate buyer	0.28	0.45	1	0	0	0	0	0

Panel B. Sales sample

	Full Sample (n = 11,832)		Corporate (n=3,368)		Non-institutional: pre-match (n=8,464)		Non-institutional: post-match (n=3,368)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	67.64	60.87	61.00	56.96	67.64	60.87	60.15	54.02
Land area (SF)	200,639	592,340	331,927	822,118	200,639	592,340	267,242	691,493
Building size (SF)	45,871	103,528	74,392	139,513	45,871	103,528	62,592	122,631
Property age (years)	34.91	21.79	34.23	20.90	34.91	21.79	34.64	21.57
Class A	0.01	0.12	0.02	0.16	0.01	0.12	0.02	0.14
Class B	0.35	0.48	0.41	0.49	0.35	0.48	0.39	0.49
Class C	0.64	0.48	0.57	0.50	0.64	0.48	0.59	0.49
Multi-tenant	0.41	0.49	0.40	0.49	0.41	0.49	0.41	0.49
Corporate seller	0.28	0.45	1	0	0	0	0	0

Notes: This table presents summary statistics for the general-purpose subsample of the purchase sample in Panel A and the sales sample in Panel B. The first column lists the variables' names. The subsequent columns report the sample means (Mean) and standard deviations (Std dev) for the subsample of transactions by corporate investors and the subsample of transactions by non-institutionals before (pre-match) and after (post-match) the propensity score matching, respectively.

Table 2-2. Probit, Corporate vs. Non-institutional (General-Purpose Subsamples)

Panel A1. Probit for nonlocal buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-8.214		0.00
ln(land area)	0.083	***	26.63
ln(building size)	0.178	***	95.90
ln(property age)	-0.065	***	13.19
Class A	-0.207	**	4.32
Class B	0.008		0.07
Multi-tenant	-0.069	**	5.23
Secondary type indicators:	Included [5 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [79 variables]		
Market indicators:	Included [131 variables]		
pseudo-R^2:	7.16%		
Observations:	12,508		

Panel B1. Probit for nonlocal seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-3.358	***	52.55
ln(land area)	0.093	***	33.42
ln(building size)	0.190	***	107.47
ln(property age)	0.041	**	4.53
Class A	0.143		1.64
Class B	0.067	**	5.17
Multi-tenant	-0.058	**	4.76
Secondary type indicators:	Included [5 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [58 variables]		
Market indicators:	Included [130 variables]		
pseudo-R^2:	8.54%		
Observations:	11,832		

Panel A2. Probit for nonlocal buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	0.384	0.28
ln(land area)	-0.002	0.01
ln(building size)	0.004	0.03
ln(property age)	0.012	0.28
Class A	0.106	0.90
Class B	0.031	0.79
Multi-tenant	-0.013	0.16
Secondary type indicators:	Included [5 variables]	
Year indicators:	Included [9 variables]	
Sale conditions:	Included [64 variables]	
Market indicators:	Included [105 variables]	
pseudo-R^2:	0.72%	
Observations:	7,040	

Panel B2. Probit for nonlocal seller (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	0.204	0.11
ln(land area)	0.013	0.42
ln(building size)	0.005	0.04
ln(property age)	0.007	0.08
Class A	0.175	2.27
Class B	0.033	0.88
Multi-tenant	-0.028	0.77
Secondary type indicators:	Included [5 variables]	
Year indicators:	Included [9 variables]	
Sale conditions:	Included [46 variables]	
Market indicators:	Included [94 variables]	
pseudo-R^2:	0.74%	
Observations:	6,736	

Notes: This table presents the probit estimation results for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is nonlocal buyer (seller), which has a value of one if the property is bought (sold) by a nonlocal. The variables land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the Wald X^2 test statistics in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 5 (5) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 79 (58) indicators to control for unique sale conditions, and 131 (130) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 5 (5) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 64(46) indicators to control for unique sale conditions, and 105 (94) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

Table 2-3. Estimated Premiums, Corporate vs. Non-institutional tors (General-Purpose Subsamples)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	6.824	***	17.39
ln(land area)	-0.095	***	-8.60
ln(building size)	-0.205	***	-16.70
ln(property age)	-0.228	***	-19.02
Class A	0.194	***	3.18
Class B	0.098	***	5.20
Multi-tenant	-0.087	***	-5.05
Corporate buyer	0.111	***	6.75
Second type indicators:	Included [5 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [64 variables]		
Market indicators:	Included [105 variables]		
Adjusted R^2:	31.02%		
Observations:	7,040		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	8.161	***	23.79
ln(land area)	-0.105	***	-9.33
ln(building size)	-0.212	***	-16.52
ln(property age)	-0.221	***	-16.31
Class A	0.250	***	3.78
Class B	0.114	***	5.74
Multi-tenant	-0.065	***	-3.52
Corporate seller	0.017		0.95
Second type indicators:	Included [5 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [46 variables]		
Market indicators:	Included [94 variables]		
Adjusted R^2:	29.70%		
Observations:	6,736		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity score matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 5 (5) indicators to control for secondary property types, 9 (9) indicators to control for year of transaction, 64 (46) indicators to control for unique sale conditions, and 105 (94) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 3-1. Summary Statistics, Corporate vs. Non-institutional (Specific-Purpose Subsamples)

Panel A. Purchase sample

	Full Sample (n = 1,642)		Corporate (n=263)		Non-institutional: pre-match (n=1,379)		Non-institutional: post-match (n=263)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	96.20	89.99	118.18	114.05	88.63	78.73	32.10	20.48
Land area (SF)	141,997	246,430	232,915	302,224	110,700	215,559	192,851	313,259
Building size (SF)	17,797	31,269	26,332	49,208	14,859	21,202	21,152	28,145
Property age (years)	34.42	20.70	31.02	18.88	35.60	21.17	32.10	20.48
Class A	0.01	0.12	0.02	0.15	0.01	0.10	0.02	0.12
Class B	0.24	0.43	0.27	0.45	0.23	0.42	0.28	0.45
Class C	0.74	0.44	0.70	0.46	0.76	0.43	0.71	0.46
Multi-tenant	0.39	0.49	0.36	0.48	0.40	0.49	0.36	0.48
Corporate buyer	0.26	0.44	1	0	0	0	0	0

Panel B. Sales sample

	Full Sample (n = 1,632)		Corporate (n=290)		Non-institutional: pre-match (n=1,342)		Non-institutional: post-match (n=290)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	98.17	98.99	106.14	120.80	95.00	88.72	94.43	95.19
Land area (SF)	147,379	241,622	257,788	320,894	103,397	184,216	180,534	255,097
Building size (SF)	17,501	26,863	25,621	39,939	14,266	18,402	21,208	25,166
Property age (years)	35.69	20.24	34.87	18.73	36.02	20.81	35.27	20.80
Class A	0.01	0.09	0.00	0.06	0.01	0.10	0.00	0.00
Class B	0.26	0.44	0.28	0.45	0.25	0.43	0.26	0.44
Class C	0.73	0.44	0.72	0.45	0.74	0.44	0.74	0.44
Multi-tenant	0.40	0.49	0.35	0.48	0.42	0.49	0.37	0.48
Corporate seller	0.28	0.45	1	0	0	0	0	0

Notes: This table presents summary statistics for the specific-purpose subsamples of the purchase sample in Panel A and the sales sample in Panel B. The first column lists the variables' names. The subsequent columns report the sample means (Mean) and standard deviations (Std dev) for the subsample of transactions by corporate investors and the subsample of transactions by non-institutional before (pre-match) and after (post-match) the propensity score matching, respectively.

Table 3-2. Probit, Corporate vs. Non-institutional (Specific-Purpose Subsamples)

Panel A1. Probit for nonlocal buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	3.921		0.00
ln(land area)	0.196	***	12.24
ln(building size)	0.024		0.12
ln(property age)	-0.141	*	3.33
Class A	0.420		0.88
Class B	0.028		0.05
Multi-tenant	-0.071		0.49
Secondary type indicators:	Included [2 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [50 variables]		
Market indicators:	Included [67 variables]		
pseudo-R^2:	22.03%		
Observations:	1,642		

Panel B1. Probit for nonlocal seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	3.272		0.00
ln(land area)	0.226	***	14.48
ln(building size)	0.056		0.60
ln(property age)	0.051		0.35
Class A	-0.413		0.44
Class B	0.059		0.22
Multi-tenant	-0.124		1.39
Secondary type indicators:	Included [2 variables]		
Year indicators:	Included [8 variables]		
Sale conditions:	Included [41 variables]		
Market indicators:	Included [60 variables]		
pseudo-R^2:	30.09%		
Observations:	1,632		

Panel A2. Probit for nonlocal buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	4.554	0.00
ln(land area)	-0.011	0.03
ln(building size)	0.069	0.76
ln(property age)	-0.040	0.19
Class A	0.212	0.20
Class B	-0.021	0.02
Multi-tenant	0.002	0.00
Secondary type indicators:	Included [2 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [22 variables]	
Market indicators:	Included [30 variables]	
pseudo-R^2:	6.15%	
Observations:	526	

Panel B2. Probit for nonlocal seller (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	5.564	0.00
ln(land area)	0.033	0.23
ln(building size)	0.000	0.00
ln(property age)	0.032	0.11
Class A	6.457	0.00
Class B	0.079	0.32
Multi-tenant	-0.046	0.15
Secondary type indicators:	Included [2 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [23 variables]	
Market indicators:	Included [26 variables]	
pseudo-R^2:	11.73%	
Observations:	580	

Notes: This table presents the probit estimation results for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is nonlocal buyer (seller), which has a value of one if the property is bought (sold) by a nonlocal. The variables land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the Wald X^2 test statistics in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 2 (2) indicator variables to control for secondary property types, 9 (8) indicators to control for year of transaction, 50 (41) indicators to control for unique sale conditions, and 67 (60) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 2 (2) indicator variables to control for secondary property types, 7 (7) indicators to control for year of transaction, 22 (23) indicators to control for unique sale conditions, and 30 (26) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

Table 3-3. Estimated Premiums, Corporate vs. Non-institutional (Specific-Purpose Subsamples)

Panel A. Buyers, propensity score matched sample

Variable	*Coefficient*		*(t stat)*
Constant	9.597	***	11.04
ln(land area)	0.001		0.03
ln(building size)	-0.359	***	-7.97
ln(property age)	-0.028		-0.53
Class A	0.381		1.38
Class B	-0.068		-0.82
Multi-tenant	-0.100		-1.41
Corporate buyer	0.208	***	3.11
Secondary type indicators:	Included [2 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [22 variables]		
Market indicators:	Included [30 variables]		
Adjusted R^2:	27.62%		
Observations:	526		

Panel B. Sellers, propensity score matched sample

Variable	*Coefficient*		*(t stat)*
Constant	6.958	***	7.62
ln(land area)	-0.002		-0.05
ln(building size)	-0.361	***	-7.93
ln(property age)	-0.074		-1.33
Class A	1.584	*	1.76
Class B	0.004		0.05
Multi-tenant	-0.129	*	-1.88
Corporate seller	-0.024		-0.35
Secondary type indicators:	Included [2 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [23 variables]		
Market indicators:	Included [26 variables]		
Adjusted R^2:	29.20%		
Observations:	580		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity score matched buyer sample, while Panel B provides results for the propensity score matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 3. In addition to the variables listed in the first column, the estimation includes 2 (2) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, 22 (23) indicators to control for unique sale conditions, and 30 (26) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels respectively.

Table 4. Estimated Premiums with Brokerage Intermediation, Corporate vs. Non-institutional

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	7.178	***	24.17
ln(Land area)	-0.066	***	-6.36
ln(Building size)	-0.244	***	-21.03
ln(Property age)	-0.195	***	-16.89
Class A	0.243	***	4.24
Class B	0.090	***	4.94
Multi-tenant	-0.080	***	-4.85
Corporate buyer	0.113	***	7.15
Buyer broker	0.297	***	14.39
Same broker	-0.040	*	-1.68
List broker	-0.191	***	-9.11
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [66 variables]		
Market indicators:	Included [107 variables]		
Adjusted R^2:	34.50%		
Observations:	7,830		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	8.206	***	22.42
ln(Land area)	-0.065	***	-6.22
ln(Building size)	-0.255	***	-21.79
ln(Property age)	-0.201	***	-15.71
Class A	0.269	***	4.13
Class B	0.122	***	6.53
Multi-tenant	-0.052	***	-3.01
Corporate seller	0.017		1.02
List broker	-0.211	***	-10.06
Same broker	-0.091	***	-3.37
Buyer broker	0.249	***	11.55
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [48 variables]		
Market indicators:	Included [99 variables]		
Adjusted R^2:	33.43%		
Observations:	7,658		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. The *t* statistics and reported significance levels are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 9 (9) indicators to control for secondary property types, 9 (9) indicators to control for year of transaction, 66 (48) indicators to control for unique sale conditions, and 107 (99) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 5. Cyclical Premiums, Corporate vs. Non-institutional

Panel A. Expansion

Panel A.1 Propensity-score-matched sample of buyers

Variable	*Coefficient*		*(t-stat)*
Constant	7.698	***	21.89
ln(Land area)	-0.082	***	-7.53
ln(Building size)	-0.224	***	-18.25
ln(Property age)	-0.217	***	-17.24
Class A	0.279	***	4.35
Class B	0.123	***	6.27
Multi-tenant	-0.094	***	-5.32
Corporate buyer	0.139	***	8.19
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [8 variables]		
Sale conditions:	Included [64 variables]		
Market indicators:	Included [104 variables]		
Adjusted R^2:	30.65%		
Observations:	6,998		

Panel A.2 Propensity-score-matched sample of sellers

Variable	*Coefficient*		*(t-stat)*
Constant	7.807	***	23.80
ln(Land area)	-0.073	***	-6.58
ln(Building size)	-0.245	***	-19.36
ln(Property age)	-0.212	***	-15.09
Class A	0.324	***	4.49
Class B	0.131	***	6.50
Multi-tenant	-0.049	***	-2.62
Corporate seller	0.024		1.33
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [8 variables]		
Sale conditions:	Included [46 variables]		
Market indicators:	Included [94 variables]		
Adjusted R^2:	29.90%		
Observations:	6,690		

Panel B. Contraction

Panel B.1 Propensity-score-matched sample of buyers

Variable	*Coefficient*		*(t-stat)*
Constant	6.292	***	9.77
ln(Land area)	0.016		0.43
ln(Building size)	-0.302	***	-7.75
ln(Property age)	-0.150	***	-4.23
Class A	0.484	***	2.63
Class B	0.027		0.44
Multi-tenant	-0.027		-0.48
Corporate buyer	0.098	*	1.85
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [1 variables]		
Sale conditions:	Included [24 variables]		
Market indicators:	Included [44 variables]		
Adjusted R^2:	29.09%		
Observations:	832		

Panel B.2 Propensity-score-matched sample of sellers

Variable	*Coefficient*		*(t-stat)*
Constant	7.200	***	7.18
ln(Land area)	-0.041		-1.35
ln(Building size)	-0.296	***	-8.59
ln(Property age)	-0.138	***	-3.99
Class A	0.191		1.05
Class B	0.081		1.45
Multi-tenant	-0.114	**	-2.24
Corporate seller	-0.052		-1.05
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [1 variables]		
Sale conditions:	Included [28 variables]		
Market indicators:	Included [37 variables]		
Adjusted R^2:	30.33%		
Observations:	968		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples for two periods. Contraction begins in the first quarter of 2008 and continues through the second quarter of 2009. During this period, quarterly GDP growth was negative in the U.S. Expansion is defined for pre-2008 transactions and those that followed Q2 2009. Panel A presents results for the propensity-score-matched samples under expansion, (A.1 buyer sample, and A.2 seller sample), while Panel B provides results for the propensity-score-matched samples under contraction (B.1 buyer sample, and B.2 seller sample). The variables Price per square foot, Land area, Building size and Property age are each logged. The table presents the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions, and markets, with one suppressed. ***, ** and * indicate statistical significance of the estimated coefficient based on the corresponding *t*-statistic at the 1%, 5% and 10% levels, respectively.

Table 6. Valuation Differences, Corporate vs. Non-institutional

Variable	*Coefficient*		*(t-stat)*
Constant	6.462	***	5.35
ln(Land area)	0.011		0.28
ln(Building size)	-0.300	***	-6.71
ln(Property age)	-0.282	***	-6.17
Class A	0.394	*	1.73
Class B	0.050		0.76
Multi-tenant	-0.021		-0.33
Corporate investor	0.072	*	1.93
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [28 variables]		
Market indicators:	Included [60 variables]		
Adjusted R^2:	18.82%		
Observations:	1,586		

Notes: This table presents the estimation results of price per square foot. Propensity score matching is performed again (results unreported) between corporate investors and non-institutional investors for transactions in comparable assets. Corporate investor is an indicator variable for transactions involving both a corporate buyer and corporate seller, representing exactly one-half of the sample. Transactions involving a corporate investor on only one side of the transaction are excluded from the sample. The variables Price per square foot, Land area, Building size and Property age are each logged. The table presents the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions, and markets, with one suppressed. *** and ** indicate statistical significance of the estimated coefficient, based on the corresponding *t*-statistic at the 1% and 5% levels respectively.

Table 7. Marketing Duration, Sales Sample, Corporate vs. Non-institutional

Variable	*Coefficient*		*(t-stat)*
Constant	5.163	***	6.16
ln(Land area)	0.018		0.97
ln(Building size)	0.069	***	3.24
ln(Property age)	0.045	*	1.92
Class A	-0.024		-0.20
Class B	0.137	***	4.27
Multi-tenant	0.091	***	3.09
Logged price per square foot	-0.180	***	-8.74
Corporate seller	0.026		0.90
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [46 variables]		
Market indicators:	Included [91 variables]		
Adjusted R^2:	10.67%		
Observations:	4,775		

Notes: This table presents the estimation results of marketing duration for the sales sample of transactions. Due to missing observations for the marketing duration variable, sample transactions between corporates are again propensity score matched (results unreported) with comparable assets sold by non-institutional investors, where marketing duration information is available. The variables Marketing duration, Land area, Building size and Property age are each logged. The table presents the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions, and markets, with one suppressed. *** and * indicate statistical significance of the estimated coefficient, based on the corresponding *t*-statistic at the 1% and 10% levels respectively.

Table 8-1. Summary Statistics, Corporates Investors Only (Large vs. Small)

	Purchase sample (n = 312)		Sales sample (n = 540)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	90.57	104.14	57.00	63.67
Land area (SF)	646,866	1,695,277	639,449	1,217,652
Building size (SF)	132,014	273,031	132,579	194,753
Property age (years)	30.23	19.81	35.28	18.72
Class A	0.04	0.18	0.03	0.18
Class B	0.43	0.50	0.47	0.50
Class C	0.53	0.50	0.50	0.50
Multi-tenant	0.30	0.46	0.32	0.47
MarketCap ($)	26,349,707,849	58,672,397,518	26,474,306,522	52,112,514,438

Notes: This table presents summary statistics for the purchase sample in Panel A and the sales sample in Panel B. The first column lists the variables' names. The subsequent columns report the sample means (Mean) and standard deviations (Std dev) respectively.

Table 8-2. Estimated Premiums, Corporates Investors Only (Large vs. Small)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	6.859	***	5.51
ln(land area)	-0.007		-0.11
ln(building size)	-0.337	***	-5.34
ln(property age)	-0.178	***	-2.50
Class A	0.228		0.71
Class B	-0.031		-0.29
Multi-tenant	-0.128		-1.23
LnMarketCap	0.026		1.03
Second type indicators:	Included [9 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [29 variables]		
Market indicators:	Included [35 variables]		
Adjusted R^2:	32.52%		
Observations:	312		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	7.846	***	8.39
ln(land area)	-0.011		-0.23
ln(building size)	-0.285	***	-6.01
ln(property age)	-0.334	***	-5.12
Class A	-0.028		-0.12
Class B	0.138	*	1.84
Multi-tenant	-0.240	***	-3.10
LnMarketCap	0.012		0.64
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [27 variables]		
Market indicators:	Included [43 variables]		
Adjusted R^2:	35.57%		
Observations:	540		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 9 (9) indicators to control for secondary property types, 6 (9) indicators to control for year of transaction, 29 (27) indicators to control for unique sale conditions, and 35 (43) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 9-1. Summary Statistics, Corporates Investors Only (Public vs. Private)

Panel A. Purchase sample

	Public (n = 306)		Private: pre-match (n = 3,609)		Private: post-match (n = 306)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	91.75	104.79	66.05	61.27	67.05	67.28
Land area (SF)	654,263	1,710,757	253,362	642,929	700,349	1,501,703
Building size (SF)	133,080	275,376	58,025	110,823	119,674	163,630
Property age (years)	29.80	19.48	32.09	19.49	29.35	19.66
Class A	0.04	0.19	0.02	0.15	0.05	0.22
Class B	0.43	0.50	0.41	0.49	0.43	0.50
Class C	0.53	0.50	0.57	0.50	0.52	0.50
Multi-tenant	0.30	0.46	0.39	0.49	0.27	0.45
Public buyer	1	0	0	0	0	0

Panel B. Sales sample

	Public (n = 539)		Private: pre-match (n = 3,290)		Private: post-match (n = 539)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	58.11	66.09	66.08	65.93	59.47	74.62
Land area (SF)	640,061	1,218,717	270,683	675,624	724,124	1,426,399
Building size (SF)	132,484	194,961	59,703	118,546	127,662	230,642
Property age (years)	35.19	18.63	35.47	21.12	35.63	19.22
Class A	0.03	0.18	0.02	0.14	0.03	0.16
Class B	0.47	0.50	0.38	0.49	0.47	0.50
Class C	0.50	0.50	0.60	0.49	0.51	0.50
Multi-tenant	0.31	0.46	0.40	0.49	0.33	0.47
Public seller	1	0	0	0	0	0

Notes: This table presents summary statistics for the purchase sample in Panel A and the sales sample in Panel B. The first column lists the variables' names. The subsequent columns report the sample means (Mean) and standard deviations (Std dev) for the subsample of transactions by public corporate investors and the subsample of transactions by privates before (pre-match) and after (post-match) the propensity score matching, respectively.

Table 9-2. Probit, Corporates Investors Only (Public vs. Private)

Panel A1. Probit for Public corporate buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-8.898		0.13
ln(land area)	0.203	***	21.03
ln(building size)	0.062		1.70
ln(property age)	-0.064		1.68
Class A	-0.377	*	2.91
Class B	-0.101		1.66
Multi-tenant	-0.182	**	6.09
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [66 variables]		
Market indicators:	Included [107 variables]		
pseudo-R^2:	21.65%		
Observations:	3,915		

Panel B1. Probit for Public corporate seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-0.081		0.00
ln(land area)	0.292	***	68.46
ln(building size)	0.042		1.24
ln(property age)	0.160	***	11.47
Class A	0.031		0.03
Class B	0.082		1.69
Multi-tenant	-0.209	***	11.93
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [48 variables]		
Market indicators:	Included [99 variables]		
pseudo-R^2:	18.44%		
Observations:	3,829		

Panel A2. Probit for Public corporate buyer (post-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	6.127		0.00
ln(land area)	-0.132	*	3.32
ln(building size)	0.098		1.73
ln(property age)	-0.028		0.13
Class A	-0.328		1.02
Class B	-0.013		0.01
Multi-tenant	0.081		0.43
Second type indicators:	Included [9 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [29 variables]		
Market indicators:	Included [35 variables]		
pseudo-R^2:	5.37%		
Observations:	612		

Panel B2. Probit for Public corporate seller (post-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	5.944		0.00
ln(land area)	-0.089	*	2.94
ln(building size)	0.071		1.77
ln(property age)	0.005		0.01
Class A	0.158		0.35
Class B	0.020		0.05
Multi-tenant	-0.050		0.33
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [27 variables]		
Market indicators:	Included [43 variables]		
pseudo-R^2:	4.35%		
Observations:	1,078		

Notes: This table presents the probit estimation results for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is public corporate buyer (seller), which has a value of one if the property is bought (sold) by a public corporate. The variables land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the Wald X^2 test statistics in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 66 (48) indicators to control for unique sale conditions, and 107 (99) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 6 (9) indicators to control for year of transaction, 29 (27) indicators to control for unique sale conditions, and 35 (43) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

Table 9-3. Estimated Premiums, Corporates Investors Only (Public vs. Private)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	7.378	***	8.45
ln(land area)	-0.019		-0.48
ln(building size)	-0.309	***	-7.45
ln(property age)	-0.198	***	-4.54
Class A	0.306	*	1.70
Class B	0.033		0.46
Multi-tenant	-0.133	*	-1.92
Public corporate buyer	0.248	***	4.16
Second type indicators:	Included [9 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [29 variables]		
Market indicators:	Included [35 variables]		
Adjusted R^2:	34.30%		
Observations:	612		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t stat)*
Constant	9.234	***	12.83
ln(land area)	-0.014		-0.43
ln(building size)	-0.319	***	-9.84
ln(property age)	-0.307	***	-7.10
Class A	0.081		0.50
Class B	0.138	***	2.60
Multi-tenant	-0.158	***	-2.98
Public corporate seller	-0.021		-0.44
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [27 variables]		
Market indicators:	Included [43 variables]		
Adjusted R^2:	34.14%		
Observations:	1,078		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 9 (9) indicators to control for secondary property types, 6 (9) indicators to control for year of transaction, 29 (27) indicators to control for unique sale conditions, and 35 (43) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 10-1. Summary Statistics, Corporates Investors Only (Nonlocals vs. Locals)

Panel A. Purchase sample

	Nonlocal (n = 790)		Local: pre-match (n = 3,125)		Local: post-match (n = 790)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	68.86	71.76	66.07	63.18	60.41	59.96
Land area (SF)	420,046	1,118,329	261,672	781,644	435,409	1,212,831
Building size (SF)	91,576	191,963	56,540	104,039	86,020	148,380
Property age (years)	30.46	19.52	32.58	19.47	31.00	19.23
Class A	0.04	0.19	0.02	0.14	0.04	0.19
Class B	0.43	0.50	0.40	0.49	0.44	0.50
Class C	0.53	0.50	0.58	0.49	0.52	0.50
Multi-tenant	0.37	0.48	0.39	0.49	0.37	0.48
Nonlocal buyer	1	0	0	1	0	0

Panel B. Sales sample

	Nonlocal (n = 1,033)		Local: pre-match (n = 2,796)		Local: post-match (n = 1,033)	
Variable	*Mean*	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
Price per square foot ($)	65.04	68.75	65.28	62.69	63.33	61.62
Land area (SF)	414,830	891,735	280,023	722,380	379,745	855,971
Building size (SF)	83,326	132,395	62,941	133,791	79,585	150,339
Property age (years)	34.46	19.66	36.00	21.40	35.05	20.62
Class A	0.02	0.15	0.02	0.14	0.03	0.16
Class B	0.43	0.49	0.37	0.48	0.41	0.49
Class C	0.55	0.50	0.61	0.49	0.56	0.50
Multi-tenant	0.37	0.48	0.41	0.49	0.38	0.49
Nonlocal seller	1	0	0	1	0	0

Notes: This table presents summary statistics for the purchase sample in Panel A and the sales sample in Panel B. The first column lists the variables' names. The subsequent columns report the sample means (Mean) and standard deviations (Std dev) for the subsample of transactions by nonlocal investors and the subsample of transactions by locals before (pre-match) and after (post-match) the propensity score matching respectively.

Table 10-2. Probit, Corporates Investors Only (Nonlocals vs. Locals)

Panel A1. Probit for nonlocal buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-7.089		0.00
ln(land area)	0.135	***	15.22
ln(building size)	0.112	***	8.73
ln(property age)	-0.143	***	13.95
Class A	-0.052		0.09
Class B	-0.040		0.43
Multi-tenant	-0.121	**	4.75
Buyer type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [64 variables]		
Market indicators:	Included [104 variables]		
pseudo-R^2:	15.21%		
Observations:	3,915		

Panel B1. Probit for nonlocal seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	2.131		0.00
ln(land area)	0.260	***	65.43
ln(building size)	-0.022		0.38
ln(property age)	0.003		0.00
Class A	-0.097		0.28
Class B	0.119	**	4.31
Multi-tenant	-0.203	***	14.35
Seller type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [48 variables]		
Market indicators:	Included [94 variables]		
pseudo-R^2:	15.24%		
Observations:	3,829		

Panel A2. Probit for nonlocal buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	4.238	0.00
ln(land area)	0.004	0.01
ln(building size)	0.002	0.00
ln(property age)	-0.050	1.18
Class A	-0.069	0.12
Class B	-0.060	0.65
Multi-tenant	0.046	0.42
Second type indicators:	Included [9 variables]	
Year indicators:	Included [9 variables]	
Sale conditions:	Included [39 variables]	
Market indicators:	Included [57 variables]	
pseudo-R^2:	3.90%	
Observations:	1,580	

Panel B2. Probit for nonlocal seller (post-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	4.105		0.00
ln(land area)	0.079	**	4.90
ln(building size)	-0.017		0.20
ln(property age)	-0.012		0.07
Class A	-0.149		0.62
Class B	0.044		0.49
Multi-tenant	-0.050		0.65
Second type indicators:	Included [9 variables]		
Year indicators:	Included [8 variables]		
Sale conditions:	Included [38 variables]		
Market indicators:	Included [63 variables]		
pseudo-R^2:	4.96%		
Observations:	2,066		

Notes: This table presents the probit estimation results for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is nonlocal buyer (seller), which has a value of one if the property is bought (sold) by a nonlocal. The variables land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the Wald X^2 test statistics in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 9 (9) indicators to control for year of transaction, 64 (48) indicators to control for unique sale conditions, and 104 (94) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 9 (8) indicators to control for year of transaction, 39 (38) indicators to control for unique sale conditions, and 57 (63) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

Table 10-3. Estimated Premiums, Corporates Investors Only (Nonlocals vs. Locals)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.843	***	8.76
ln(land area)	-0.027		-1.12
ln(building size)	-0.274	***	-10.68
ln(property age)	-0.156	***	-6.34
Class A	0.276	***	2.64
Class B	0.156	***	3.88
Multi-tenant	-0.076	**	-1.99
Nonlocal corporate buyer	0.170	***	4.85
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [39 variables]		
Market indicators:	Included [57 variables]		
Adjusted R^2:	32.75%		
Observations:	1,580		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	8.312	***	17.03
ln(land area)	-0.056	**	-2.72
ln(building size)	-0.276	***	-12.65
ln(property age)	-0.275	***	-10.61
Class A	0.279	***	2.54
Class B	0.133	***	3.64
Multi-tenant	-0.128	***	-3.64
Nonlocal corporate seller	0.043		1.30
Second type indicators:	Included [9 variables]		
Year indicators:	Included [8 variables]		
Sale conditions:	Included [38 variables]		
Market indicators:	Included [63 variables]		
Adjusted R^2:	35.41%		
Observations:	2,066		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 9 (9) indicators to control for secondary property types, 9 (8) indicators to control for year of transaction, 39 (38) indicators to control for unique sale conditions, and 57 (63) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 11. Estimated Premiums, Corporates Investors Only (Industrial Differences)

Panel A. Buyers sample

Variable	*Coefficient*		*(t stat)*
Constant	7.038	***	6.50
ln(land area)	0.018		0.27
ln(building size)	-0.337	***	-5.12
ln(property age)	-0.148	**	-2.08
Class A	0.179		0.56
Class B	-0.142		-1.31
Multi-tenant	-0.128		-1.23
DSector2	0.174		0.89
DSector3	0.416	*	1.73
DSector4	0.239		1.02
DSector5	0.343	*	1.89
DSector6	0.594	*	1.71
DSector7	0.620		1.52
DSector8	0.906	***	3.57
DSector9	1.040	*	1.90
DSector10	0.587	***	2.68
DSector11	0.758	***	3.21
DSector12	0.658	***	2.89
Second type indicators:	Included [9 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [29 variables]		
Market indicators:	Included [35 variables]		
Adjusted R^2:	36.37%		
Observations:	307		

Panel B. Sellers, propensity score matched sample

Variable	*Coefficient*		*(t stat)*
Constant	8.027	***	8.81
ln(land area)	-0.042		-0.88
ln(building size)	-0.253	***	-5.22
ln(property age)	-0.351	***	-5.28
Class A	0.155		0.66
Class B	0.147	**	1.99
Multi-tenant	-0.232	***	-2.99
DSector2	0.154		1.10
DSector3	-0.003		-0.02
DSector4	0.136		0.91
DSector5	0.059		0.40
DSector6	0.328		1.20
DSector7	0.201		0.66
DSector8	0.243		1.37
DSector9	-0.262		-1.10
DSector10	0.527	***	2.68
DSector11	0.384	***	2.33
DSector12	0.581	***	2.40
Second type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [29 variables]		
Market indicators:	Included [43 variables]		
Adjusted R^2:	39.53%		
Observations:	536		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 9 (9) indicators to control for secondary property types, 6 (9) indicators to control for year of transaction, 29 (29) indicators to control for unique sale conditions, and 35 (43) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

According to Nasdaq (http://www.nasdaq.com/screening/companies-by-industry.aspx), the business sectors are divided into: Basic industry (DSector1), Capital (DSector2), Consumer Durables (DSector3), Consumer Non-Durables (DSector4), Consumer Service (DSector5), Energy (DSector6), Finance (DSector7), Health Care (DSector8), Miscellaneous (DSector9), Public Utilities (DSector10), Technology (DSector11), and Transportation (DSector12).

Appendix 1: Table 12. Estimated Premiums, Corporate vs. Non-institutional (Robustness Check)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.962	***	10.45
ln(Land area)	-0.023	***	-3.73
ln(Building size)	-0.259	***	-16.66
ln(Property age)	-0.269	***	-17.51
Class A	0.150	***	3.75
Class B	0.082	***	3.34
Multi-tenant	-0.014	***	-2.66
Corporate buyer	0.090	***	2.65
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [66 variables]		
Market indicators:	Included [107 variables]		
Adjusted R^2:	32.18%		
Observations:	7,830		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.990	***	14.98
ln(Land area)	-0.010	***	-3.75
ln(Building size)	-0.258	***	-16.05
ln(Property age)	-0.280	***	-16.42
Class A	0.234	***	2.30
Class B	0.071	***	2.78
Multi-tenant	-0.009	***	-2.39
Corporate seller	0.058		0.24
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [9 variables]		
Sale conditions:	Included [48 variables]		
Market indicators:	Included [99 variables]		
Adjusted R^2:	31.22%		
Observations:	7,658		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables Price per square foot, Land area, Building size and Property age are each logged. The Panels present the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. The *t*-statistic and reported significance level are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions and markets, with one suppressed. *** and ** indicate statistical significance of the estimated coefficient based on the corresponding *t*-statistic at the 1% and 5% levels, respectively.

Appendix 2: NAIOP Terms and Definitions

Industrial Building: A facility in which the space is used primarily for research, development, service, production, storage or distribution of goods and which may also include some office space. Industrial buildings are further divided into three primary classifications: manufacturing, warehouse and flex buildings. Typical characteristics of the different types of Industrial Buildings are shown in the matrix. Buildings must exhibit more than one of the characteristics but need not exhibit all characteristics to be considered under a specific classification.

Manufacturing Building: A facility used for the conversion, fabrication and/or assembly of raw or partly wrought materials into products/goods.

Warehouse: A facility primarily used for the storage and/or distribution of materials, goods, and merchandise.

Distribution Building: A type of warehouse facility designed to accommodate efficient movement of goods.

Truck Terminal: A specialized distribution building for redistributing goods from one truck to another as an intermediate transfer point. These facilities are primarily used for staging loads (rather than long-term storage) and possess very little if any storage area.

Flex Facility: As its name suggests, an industrial building designed to allow its occupants flexibility of alternative uses of the space, usually in an industrial park setting. Specialized flex buildings include service center/showroom properties.

Service Center/Showroom: A type of flex facility characterized by a substantial showroom area, usually fronting a freeway or major road.

Building Type						
	Manufacturing	***Warehouse***			***Flex***	
		Warehouse	***Distribution***			
Primary Type	*General Purpose*	*General Purpose Warehouse*	*General Purpose Distribution*	*Truck Terminal*	*General Purpose Flex*	*Service Center/ Showroom*
Primary Use	Manufacturing	Storage, Distribution	Distribution	Truck Trans-shipment	R&D, Storage, Office, Lab, Light Mfg, High Tech Uses, Data/Call Center	Retail Showroom, Storage
Sub-Sets	Heavy, Light Manufacturing	Bulk Warehouse, Cold/Refrigerator Storage, Freezer Storage, High-Cube	Overnight Delivery Services, Air Cargo	Heavy, Light Manufacturing		
Size (SF)	Any	Any	Any	Any	Any	Any
Clear Height (ft)	10+	16+	16+	12-16	10-24	Any
Loading Docks/Doors	Yes	Yes	Yes	Cross-dock	Yes	Yes
Door-to-Square-Foot Ratio	Varies	1:5k-15k	1:3k-10k	1:500-5k	1:15k+	1:10k
Office Percentage	<20%	<15%	<20%	<10%	30-100%	30+%
Vehicle Parking Ratio	Varies	Low	Low	Varies	High	High
Truck Turning Radius (ft)	130	130	120-130	130	110	110

Source: NAIOP Research foundation (www.naiop.org).

Notes: This matrix is intended to be an aid in classifying properties between the principal industrial building types, subject to the following considerations:

1. These are intended to be TYPICAL characteristics of different properties, but actual characteristics may vary.
2. In classifying properties, the user should select the classification that most closely fits a given property.
3. The most important characteristics of each type are highlighted. While these characteristics are not "acid tests," they should guide the user in most instances.
4. Divisibility varies depending on building size and configuration.
5. Truck turning radius is an important consideration and varies by building size. Large pure distribution facilities have a turning radius of 130 feet; medium to large facilities are 120 feet and smaller facilities are typically 110 feet.
6. Truck Turning Radius: The tightest turn a truck can make depending on several variables of truck configuration, trailer size and location of adjacent objects that obstruct the inner turn radius.

Essay II

Government Investors in Industrial Real Estate Markets

Essay II: Government Investors in Industrial Real Estate Markets

1. Introduction

Governments play an important role in society. As a result, their actions have a significant impact on the markets under their domain. Government roles and impacts have been widely studied in the real estate literature. While most studies focus on externalities and the consequences of government policies and actions, the involvement of governments as direct investors in the real estate market is an issue rarely examined. To the best of my knowledge, only two studies examine governments as direct investors in the real estate market: Allen, Rutherford, and Warner (1997) and Ooi, Sirmans, and Turnbull (2011). Because of the lack of research in this area, how governments engage in real estate property transactions remains unclear. To fill the gap in the literature, this research focuses on governments and their agencies, primarily at the city or township levels, that purchase and sell industrial real estate in U.S. markets. I check for any observable market outcome difference when they transact industrial assets. Further, if such a difference does exist, what might be the reasons that contribute to it? This study extends our knowledge on government real asset transactions and, for the first time, focuses on governments as a direct investor group in industrial real estate.

There are a number of reasons for why governments might perform differently when transacting in the industrial market. Governments may behave differently than other investors due to agency problems, special regulations on property acquisition and disposal, restricted supply at desired locations, high holding costs for government-owned properties, or special circumstances, such as tax delinquency transactions or community redevelopment programs. In this study, each of these possibilities is carefully scrutinized or controlled for whenever feasible.

Government asset management for real estate is a non-trivial issue. According to the U.S. Census Bureau Reports as part of the 2012 Census of Governments, "in 2012, 89,004 local governments existed in the United States. Local governments included 3,031 counties, 19,522 municipalities, 16,364 townships, 37,203 special districts and 12,884 independent school districts." Local governments in California alone as an example, own more than 35,000 properties. The fact that the economic scale and potential impacts are so large has drawn much public attention in the past. Governments have long been criticized by many parties for their low operational efficiency and potential agency problems when spending taxpayer

money[24]. Further, many previous studies have shown that the characteristics of governments that led to such criticism have resulted in financial or economic loss to the public. Several scholars, politicians, and citizens even point out severe government waste on real estate[25].

To disentangle the puzzle on governmental real asset transactions, I extend the work of Allen, Rutherford, and Warner (1997) and Ooi, Sirmans, and Turnbull (2011) on the rental and land markets to the property transactions market. I consider the factors that could potentially explain the market outcome differences for governments. To test the hypotheses, I follow the methodology used in the studies that examine clientele effects in real estate markets and apply the appropriate techniques to control for selection bias[26]. In the analysis, a large dataset of industrial property transactions from the CoStar is used to evaluate the market outcomes of government transactions throughout the major U.S. markets. In doing so, I contribute to understanding government performance by combining the analysis of both purchase and divestiture transactions.

The research questions are evaluated with a large sample of industrial property transactions in 135 major U.S. metropolitan markets. The analysis reveals that, in general, local governments buy high and sell low relative to the prices of similar properties transacted by individuals[27]. On average, governments overpay by an estimated 9.8% and sell at a discount of 17.3%. To evaluate the potential explanations, I first test whether the market outcome differences are due to any special economic motivations or considerations by controlling the potential selection bias and special sales conditions. The results are consistent after potential selection bias and special sales conditions are controlled, ruling out the possibility that the market outcome differences are due to any special economic motivations or considerations. Then, I test whether the unfavorable result for property sales is due to the higher holding cost involved in maximizing the net selling proceeds. The indifference to selling time, shown by a regression on market duration, rules out the possibility that the differences are due to higher holding costs. I also examine whether the market outcome differences are due to brokerage involvement. The results on the impact of brokerage involvement show that using a buyer broker when purchase and using a listing broker when sell have no significant impact on the market outcome differences. Therefore, the results on market outcome

[24] For example, see Friedman, M. (2004). Fox News interview.
[25] For example, reference can be found in Mica, J., Petri, T., Duncan, J., LoBiondo, F., Shuster, B., Boozman, J., & Diaz-Balart, M. (2010). Sitting on My assets: The federal government's misuse of taxpayer-owned assets. U.S. House of Representatives report and analysis. Allen, M. T., Rutherford, R. C., & Warner, L. J. (1997). A comparison of federal government office rents with market rents. *The Journal of Real Estate Finance and Economics, 15*(2), 181-192.
[26] Clientele effect and methodological foundational studies include Dale-Johnson (1983), Harding, Rosenthal and Sirmans (2003), Wood and Tu (2004), Lambson, McQueen and Slade (2004), Benjamin, Chinloy, Hardin and Wu (2008), Wiley (2012), Chernobai and Chernobai (2013), and Zhou, Gibler, and Zahirovic-Herbert (2014).
[27] As defined in CoStar, individuals used in this study are organized as sole proprietary or partnership business.

differences generally suggest the existence of an agency problem and government waste in real asset transactions with direct government participation. In addition, I also examined whether the government budget can affect the degree of government waste. I find that governments with higher budgets do not pay or sell significantly different than their counterparts. However, governments with reduced budgets from previous year tend to sell their real assets at a lower price[28]. In addition, I test the impact of political parties on the transaction price but I did not find a significant difference.

The remainder of this study is organized as follows. Section 2 provides a literature review of related studies. Section 3 introduces the theoretical background and the hypotheses. Section 4 describes the data and empirical methods for the hypothesis testing. Section 5 interprets the empirical results. Section 6 provides the concluding remarks.

2. The Literature on Government Activities in the Real Estate Market

Although government impacts have been widely studied, governments' role as participants in the real estate market has received less attention. Among the studies that consider the government's role in real estate markets, several focus on government spending, programs, and policies. Church (1981) examines the effects of local government expenditure and property taxes on investment and finds that municipal expenditure increases investment while property tax diminishes it. Burge (2011) evaluates the low-income housing tax credit program and finds that the program generates inefficient benefits for low-income households but significant benefits for project developers and owners. Zheng and Kahn (2013) conclude that public investments by metropolitan governments have caused local gentrification.

Several studies also focus on the impact of tax increment financing (TIF) districts and other development districts. Smith (2009) finds that commercial properties located within TIF districts exhibit higher rates of appreciation once the area is designated as a qualifying TIF district. Merriman, Skidmore, and Kashian (2011) study the effect of TIF and find that it has led to significant increases in aggregate property values in commercial TIF districts. Noonan and Krupka (2011) examine historic preservation policies and find negative impacts for properties both within and outside the districts after historic designation. However, Zahirovic-Herbert and Gibler (2014) study the impact of historic district designation in Baton Rouge, Louisiana, and find that historic preservation increases property value within the district and reduces nearby marketing duration. In addition, Billings and Thibodeau (2013) examine the financing of

[28] Budget can change due to various reasons, in this study, I focus on the relationship of change on budget and the price the governments willing to pay or receive.

residential development and find that house prices within development districts are lower than house prices outside such districts.

Lacking from this literature is the investigation of governments as direct investors in real estate markets. To date, studies that come closest to considering governments as participants concern the rental market—Allen, Rutherford, and Warner (1997), for example. This work focuses on government performance in the office rental market and reveals that rents paid by governments during the 1980s were significantly higher than average market rents. Ooi, Sirmans, and Turnbull (2011) examine land sales by governments and find that such sales are modestly different in timing compared with those of private parties. Peng and Thibodeau (2012) consider government interference and find that the market for residential land becomes less efficient after governments gain direct control of land supply. To fill the gap in the literature, the present essay examines governments as a direct real estate investor group.

I follow the methodology used in studies of clientele effects and selection bias to consider government performance and evaluate the research questions. Previous research has demonstrated the presence of numerous persistent clientele effects in real estate markets. For example, in commercial real estate markets, Lambson, McQueen and Slade (2004) examine the out-of-state investor performance in the apartment market and suggest that locality influences the transaction price through the anchoring effect and information asymmetry. Benjamin, Chinloy, Hardin, and Wu (2008) conclude that, in apartment transactions, the price depends on clienteles in addition to characteristics. They find that condo converters outbid rental investors due to a change in systematic risk, which raises their expected returns. Wiley (2012) tests the transaction price difference in the office market between corporate and non-institutional investors and finds that corporate investors pay a significantly higher price when they buy and then sell at a significant discount. The difference between corporate investors and non-institutionals is attributed to the differences in valuation, cyclical investment, and marketing behavior. Further, Liu, Gallimore, and Wiley (2013) find that nonlocal investors pay a significant premium when purchasing and sell at a significant discount when divesting in the commercial office market. Such investors also experience information asymmetry and the anchoring effect.

In addition, the models employed to measure transaction prices are drawn from previous studies that focus on industrial assets. For example, Ambrose (1990) finds that asking price is a function of property characteristics such as building size. Fehribach, Rutherford, and Eakin (1993) add age, and tenant type as components to the model and find improvement in the model fit. Lockwood and Rutherford (1996) find that the most important price determinant of industrial property is parcel size. Black, Wolverton, Warden,

and Pittman (1997) find, examining the southeastern U.S. region, that distance to a metropolitan area, and building condition contribute to the value of industrial assets. I adopt the models and variables from these studies whenever available and appropriate. More detailed discussion on the data and empirical methods used in this study are provided in the Data and Empirical Methods section.

3. Theoretical Background and Hypotheses

Governments as direct investors in real estate markets may behave differently for several reasons. First, governments have been criticized regarding agency issues with the spending of taxpayer money. For example, Friedman (2004) points out a major agency problem associated with governments when he says: "There are four ways in which you can spend money. You can spend your own money on yourself … Then you can spend your own money on somebody else … Then, I can spend somebody else's money on myself … Finally, I can spend somebody else's money on somebody else. And if I spend somebody else's money on somebody else, I'm not concerned about how much it is, and I'm not concerned about what I get. And that's government. And that's close to 40% of our national income." From this, we can see that when using other people's money, it is questionable whether governments have any incentive to obtain the best price when making a transaction in real estate markets.

Second, the fact that governments may behave differently than other investors is evidenced from regulations on the procedural requirements for government property acquisitions and divestitures. In contrast to ordinary investors, governments have a specific process in place for dealing with changes in their real asset holdings. For example, on the federal level[29], according to the *Real Property Acquisition Handbook* issued by the U.S. General Services Administration (GSA), when governments make purchases, they first have to determine which real estate assets they need to acquire, and the locations, according to their plans. After identifying their target real estate assets and notifying the owners, they have to engage in an appraisal process with their own appraisers in order to discover the estimated fair market values of the properties. After the appraisals, the governments then make offers to the property owners or negotiate with the owners about the prices. If the owners accept the offers, then the governments obtain the properties after making payments. If there is a dispute, a government will start the condemnation process. During this, the property owner can work with his or her own attorney and appraiser to reevaluate the property and provide a new offer to the government. If the government accepts the offer, the deal is closed; if not, the issue enters a litigation process to achieve a final settlement. When

[29] Local governments may follow different rules when dealing with their real estate properties based on their own regulation and legislation. An example of real estate regulation at the city level is shown in Appendix 2. A common feature of government divestitures is that the procedure is either complicated or time-consuming.

a government agency determines that it has a property that it does not need any more, the property is first offered to other agencies to enable them to screen it for potential use. If the other agencies cannot find a potential use, the property is considered for other public uses. If the property is truly redundant, then its value is appraised, after which it can be offered for public sale, through either a sealed bid or a public auction. The highest bidder becomes the owner.

With such a complicated and lengthy process, several reasons could cause governments to underperform when they engage in transactions. First, governments usually miss the best opportunities to buy or sell their properties because the process may take years to complete, whereas markets are constantly changing and private entities (which lack the procedural requirements) are more agile to take advantage of shifts in market conditions. Second, the lengthy process is costly, and it is difficult to reverse the process once it begins. For example, a government agency is usually required to pay a fee in order to deal with any property-related issues, such as environmental problems, repairs, and maintenance, before it can place a property on the market. Moreover, a non-recourse fee must be paid during the screening process when the government agency is looking for a use of the property by other agencies or for public benefit[30]. Thus, once the process begins, it is rarely cancelled. Third, engaging in litigation during the acquisition process is both time-consuming and costly. The best way to avoid litigation is to submit a competitive offer at the earliest practical point.

To test whether the agency role of governments combined with special regulations cause differences in market outcomes of government real estate transactions, two hypotheses are provided below:

> H1a: Given transactions in similar industrial assets, governments buy at similar prices as compared to individuals.
> H1b: Given transactions in similar industrial assets, governments sell at similar prices as compared to individuals.

Government performance may also be explained by market factors such as supply constraints and higher holding costs for centrally-located assets. For example, a government might prefer to acquire a property that is located close to the center of its citizens for convenience rather than along the urban periphery. Consequently, there is a scarcity of centrally-located sites and competition from other investors is heightened, which means that the acquisition price that the government pays may be higher as a result of

[30] According to Mica, Petri, Duncan, LoBiondo, Shuster, Boozman, and Diaz-Balart (2010)

locational factors. However, due to the nature of data used in this study, only submarkets can be controlled whereas proximity to a central urban point cannot.

As pointed out by Mica, Petri, Duncan, LoBiondo, Shuster, Boozman, and Diaz-Balart (2010), government-owned properties usually have a higher holding costs because of regulations that require governments to maintain a higher maintenance standard during ownership. Therefore, the higher holding cost of government-owned property may cause the government to divest the property more quickly, and at a lower price. If so, selling government-owned property at a lower price could be a rational decision to limit excessive holding costs. To test whether the differences in the market outcomes of government transactions are due to considerations of maximizing the net selling proceeds because of higher holding costs, I propose the following hypothesis:

> H2: Given transactions in similar industrial assets, the market duration is not significantly different in divestitures made by governments and individuals.

All the aforementioned reasons suggest that governments may buy high and sell low when they enter into transactions and that governments may sell properties more quickly than other investors may. In addition, several other reasons exist for why governments may buy or sell industrial properties at a different price including tax delinquency or considerations of boosting the local economy. In this dissertation, different sale conditions are controlled for to test the difference in outcomes for government acquisitions and divestitures.

The fact that the agency role of governments in the use of taxpayers' money may lead to government waste in industrial real estate leads to the next question: Does the adequacy of funds matter? In other words, does the adequacy of or a change in the government budget affect the degree of overpayment or discount when governments buy or sell real assets? To test the impact of the government budget on the market outcomes of government transactions, four hypotheses are proposed:

> H3a: Given transactions in similar industrial assets, governments with higher budgets buy at similar prices as compared to those with lower budgets[31].

[31] Budget amount relative to population or budget per capita might be another import consideration when governments make a decision. However, when governments make a decision to purchase real property, this might already be counted into the characteristics of the property they are going to acquire. For example, if the budget per capita is high for a government, then government might be willing to buy a larger or better real property to provide a larger or better space per capita, but the overall budget already set the limitation on how much the government can afford. For aforementioned reason, when purchasing real estate, the overall budget might be more relevant than per capita budget.

H3b: Given transactions in similar industrial assets, governments with higher budgets sell at similar prices as compared to those with lower budgets.

H4a: Given transactions in similar industrial assets, governments with increased budgets buy at similar prices as compared to governments with reduced budgets.

H4b: Given transactions in similar industrial assets, governments with increased budgets sell at similar prices as compared to governments with reduced budgets.

Although price differences among investor groups for both payments and receipts may be due to several internal factors related to unique investor characteristics and backgrounds, external forces may mitigate or exacerbate these effects. Therefore, the question that arises is as follows: Could using real estate brokers mitigate these differences for their principals when governments buy high and sell low? To test whether using brokers could mitigate the market outcome differences, two hypotheses are proposed:

H5a: Given transactions in similar industrial assets, governments buy at similar prices as compared to individuals regardless of whether or not brokers are used.

H5b: Given transactions in similar industrial assets, governments sell at similar prices as compared to individuals regardless of whether or not brokers are used.

Lastly, the impacts from political parties are considered in this study. Based on historical presidential election statistics for the period 1992 to 2012, which matches our transaction sample period, the impacts from political parties are examined. The states are divided into Republican and Democratic[32] based on the dominant political party in the state according to the statistics in Appendix 3. The transactions are then examined to detect the difference between Republican and Democratic governments. The hypotheses tested on this issue are as follows:

[32] The sample was divided into Democratic or Republican state based on the total number of presidential election votes in favor of Democratic or Republican candidate in each state during the time of 1992 to 2012. And, if the majority of vote support Democratic candidate during the time of 1992 to 2012, then I categorize that state as Democratic (Blue) state, vice versa, as Republican (Red) state. The terms used to colorize the states are first introduced by Tim Russert in the year of 2000 and are popularized later on. The definition can also be seen from Levendusky and Pope (2011), "Red states are those carried by Republicans at the presidential level; Blue states are those carried by Democrats". I need to admit there is a limitation of this study, because the local politician's information is not easily to acquire, thus the results might not best reflect the political impacts at local level. However, analyses on political impacts and difference between Democratic and Republican states are well documented and their research design dominates in the literature, although still lacking of consensus. For example, Barry (2004) suggests Americans are deeply divided and differences are prominent. While, Fiorina, Abrams, and Pope (2005) argue that people live in red or blue states are quite similar. However, Abramowitz and Saunders (2008) and Bafumi and Shapiro (2009) suggest differences between red and blue states are sizable. Later, Levendusky and Pope (2011) point out that even though the average opinion in red states is significantly more conservative and red and blue states are polarized, but red- and blue-state citizens often hold very similar issue positions. For aforementioned reasons, by following their research design, I examine the difference on government transactions in industrial real estate markets between red and blue states.

H6a: Given transactions in similar industrial assets, governments in Republican states buy at similar prices as compared to governments in Democratic states.

H6b: Given transactions in the similar industrial assets, governments in Republican states sell at similar prices as compared to governments in Democratic states.

4. Data and Empirical Methods

4.1 Data

Data used in this study are from the CoStar COMPS® database. CoStar is one of the leading information providers for commercial real estate transactions. The database provides detailed and verified information for commercial property transactions in 138 major metropolitan markets[33] throughout the U.S. For each property, the information includes price per square foot, land area, building size, building class, building address, transaction date, and sale conditions as well as details of the buyer's and seller's companies, their addresses, the broker on the buyer's and seller's sides, and investor type classification[34].

Data for the empirical tests are collected from the CoStar website under the category of either governments or individuals and for the purchase and divestiture sides. I draw the sample of government and individual transactions with a time range from 1991 through 2012. During the data collection process, I first select one type of investor on the purchase side. I then adjust the property size from one square foot and gradually increase it to infinity to obtain all the transaction records that satisfy my search criteria.

[33] A total of 138 markets are identified on CoStar. The markets are Albany/Schenectady/Troy, Albuquerque, Anchorage, Asheville, Atlanta, Augusta/Richmond County, Austin, Bakersfield, Baltimore, Baton Rouge, Beaumont/Port Arthur, Birmingham; Boise City/Nampa, Boston, Bremerton/Silverdale, Brownsville/Harlingen, Buffalo/Niagara Falls, Charleston WV, Charleston/N Charleston, Charlotte, Chattanooga, Chicago, Cincinnati/Dayton, Cleveland, Colorado Springs, Columbia, Columbus, Columbus GA, Corpus Christi, Dallas/Ft Worth, Davenport/Moline/Rock Island, Deltona/Daytona Beach, Denver, Des Moines, Detroit, Duluth, East Bay/Oakland, El Paso, Erie; Evansville, Fayetteville, Fayetteville/Springdale/Rogers, Fort Smith, Fort Wayne, Fresno, Green Bay, Greensboro/Winston-Salem, Greenville/Spartanburg, Hampton Roads, Hartford, Hawaii, Houston, Huntington/Ashland, Huntsville, Indianapolis, Inland Empire (California), Jackson, Jacksonville (Florida), Kansas City, Killeen/Temple/Fort Hood, Kingsport/Bristol/Bristol, Knoxville, Lafayette, Las Vegas, Lexington/Fayette, Lincoln, Little Rock/N Little Rock, Long Island (New York), Los Angeles, Louisville, Lubbock, Marin/Sonoma, McAllen/Edinburg/Pharr, Memphis, Milwaukee/Madison, Minneapolis/St Paul, Mobile, Montgomery, Myrtle Beach/Conway, Nashville, New Orleans/Metairie/Kenner, New York City, Northern New Jersey, Ocala, Oklahoma City, Olympia, Omaha/Council Bluffs, Orange County (California), Orlando, Pensacola, Peoria, Philadelphia, Phoenix, Pittsburgh, Port St Lucie/Fort Pierce, Portland, Portland/South Portland, Providence, Raleigh/Durham, Reno/Sparks, Richmond VA, Roanoke, Rochester, Sacramento, Salinas, Salt Lake City, San Antonio, San Diego, San Francisco, San Luis Obispo/Paso Robles, Santa Barbara/Sta Maria/Goleta, Santa Cruz/Watsonville, Savannah, Seattle/Puget Sound, Shreveport/Bossier City, South Bay/San Jose, South Bend/Mishawaka, South Florida, Southwest Florida, Spokane, Springfield, St. Louis, Stockton/Modesto, Syracuse, Tallahassee, Tampa/St Petersburg, Toledo, Tucson, Tulsa, Utica/Rome, Visalia/Porterville, Washington, DC, West Michigan, Westchester/So Connecticut, Wichita, Wilmington, Yakima, and Youngstown/Warren/Boardman.

[34] Investor types listed in CoStar are bank/finance, corporate, national developer, regional developer, educational, endowment, equity funds, government, individual, insurance, investment manager, listed fund, medical, nonprofit, other private, other unknown institution, pension fund, private REIT, REIT, religious, REOC, sovereign, special, tenants, and trust.

Because CoStar allows no more than 500 observations to be downloaded each time, several batches[35] of data under one investor type are collected and then combined to compose the full sample for the investor type. This procedure is repeated for each investor type to obtain all necessary data. The combined purchase sample includes 11,104 observations, and the combined sales sample includes 12,229 observations. Governments represent 3% of the purchase sample and 4% of the sales sample[36].

The data used to test the impact of the government budget on market outcomes are collected from each local government's website. To collect the data, I first go to the website of the local government. Then, I search the budget reports on the website. The documents are provided usually under the finance department of the local government and categorized as financial documents. I download the documents for the year in which the transaction happened and one year prior to the transaction year. After that, I read each of the reports to find the approved budget for the transaction year and prior year, and then record and match them with the Costar data[37].

Summary statistics for the full sample of government and individual transactions are shown in Table 1. Panels A and B of Table 1 provide the results of the purchase and sales samples, respectively. For example, the average industrial structure in the purchase sample is around 25,275 square feet, situated on a 2.7-acre lot. The structure itself is over 36 years old. Just 1% of the sample is Class A, while 31% is Class B and 68%-69% is Class C. The average transaction price is around US$72 per square foot. A similar pattern can be found in the sales sample.

4.2 Methodology

The summary statistics show that the average property selected by governments is substantially different from the average asset selected by individuals. In order to control for selection bias and compare similar assets across the government and individual subsamples, the propensity score matching procedure is

[35] For example, 7 batches of data under the category of governments on the buyer side have been collected, and 57 batches of data under the category of individuals on the buyer side have been collected.

[36] Most transactions are made by governments at the city and township levels, while only a few transactions are by state or federal governments. For example, the original data contain 24 transactions by state governments and 3 transactions by the federal government.

[37] I need to admit that I cannot expect an immediate change in government behavior (price accepted) when budget goes up or down, but by taking a consideration from two years (transaction year and the year before transaction year), it allow governments to have 730 days to adjust their decision, which is more than the sample average of 480 days of time on market. And the most probable time the government is willing to make a change on price is the time close to the transaction happens. I also have to admit I do not think there is a perfect linear relationship between premium been paid by government and the percent change of the budget from year to year, but that might be the best assumption on the relationship so far when the exactly relationship is unknown, and it makes common sense. An alternative method is to include squared budget change as an independent variable to correct the relationship, but the squared budget change does not make significant difference on the coefficient estimation.

applied. I match the most similar transactions made by government buyers/sellers with individual buyers/sellers based on the calculated propensity score. The probit estimation for generating the propensity scores is shown in Equation (1).

$$(1) \qquad \Pr\{Government = 1\} = \Phi\{\beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M\}.$$

Government is the binary dependent variable used on the left-hand side of the equation, where a value of one indicates government investors and zero identifies individual investors. Probit estimations are performed separately for the purchase and sales samples. Property characteristics (*X*) and other indicator variables, including secondary property type (*T*), calendar year of the transaction date (*Y*), unique set of sale conditions (*C*), and metropolitan market (*M*), are controlled. I include a set of variables for property characteristics (*X*), such as land area, building size, property age, and property class. In addition, I use 10 distinct secondary property types (*T*)[38] to control for subtype heterogeneity and 21 calendar year indicators (*Y*) for 1991 through 2012 to control for the timing impact. Moreover, 36 unique sale condition (*C*) indicators are used to represent each of the possible combinations that appear in the samples, and 138 metropolitan markets (*M*) are represented in the two samples to control for geographic differences.

Equation (2) is used repeatedly to identify whether government buyers/sellers pay or sell at a different price in the market for industrial buildings, compared to individuals. When running Equation (2), the propensity score matched samples are used in the estimation. I expect the coefficient for government to be positive for purchases and negative for sales.

$$(2) \qquad ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_G \cdot I\{\text{Government investor}\} + \varepsilon.$$

The dependent variable price per square foot, logged, is used on the left-hand side of the equation. The independent variables used in Equation (2) are similar to those specified in Equation (1) and include a set of independent variables used to control for property characteristics (*X*), secondary property type (*T*), calendar year (*Y*), sale conditions (*C*), and geographic market (*M*). The estimation based on Equation (2) is performed individually for the purchase and sales samples. *I* {Government investor} indicates whether the transactions are made by government investors (valued one) or individuals (valued zero). The

[38] Secondary property types include distribution, food processing, manufacturing, refrigeration/cold storage, service, showroom, telecom hotel/data hosting, truck terminal, and warehouse.

coefficient of β_G estimates the percentage difference in transaction prices of government investors versus individuals.

In addition to transaction prices, marketing duration can also affect the industrial market equilibrium. It can be seen as an indicator of an investor's skill and patience. In this study, it also shows whether the market outcome differences are due to the higher holding cost incurred to maximize net selling proceeds. Marketing duration can be observed in the sales sample only. Equation (3) provides the model to test the differences among investor groups.

(3) $ln(\text{Marketing duration}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_P \cdot ln(\text{Price per square foot}) + \beta_G \cdot I\{\text{Government investor}\} + \varepsilon.$

In Equation (3), the estimated coefficient for β_G shows the percentage difference in marketing duration for properties sold by government investors relative to similar assets sold by individuals.

To test the impact of the government budget on market outcomes of government transactions, Equation (4) and Equation (5) are used as shown below.

(4) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_B \text{LnBudget} + \varepsilon.$

The independent variables used in Equation (4) are similar to those specified in Equation (1) plus the continuous variable of government budget (*B*), logged. The estimated coefficient for β_B in Equation (4) identifies the percentage difference in price per square foot for properties based on the total amount of the government budget in log form.

Similarly, to investigate the impact of budget changes on market outcomes, Equation (6) is applied.

(5) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_{BC} \text{BudgetChange} + \varepsilon.$

The independent variables used in Equation (5) are similar to those specified in Equation (1) plus the indicator variable of change in government budget (*BC*). The estimated coefficient for β_{BC} in Equation (5) identifies the percentage difference in price per square foot for properties bought or sold by government investors with an increased budget relative to similar assets bought or sold by government investors with a reduced budget.

Brokerage intermediation effects are examined by using Equation (6). In the CoStar database, I am able to differentiate among buying brokers and listing brokers. The buyer and seller of commercial real estate can have a dedicated buying broker and listing broker who represent the buyer's and seller's interests, respectively. This provides an opportunity to examine the brokerage intermediation effects on the purchase and selling sides of the transaction.

(6) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_{GB} \cdot I\{\text{Government investor}\} \cdot I\{\text{broker}\} + \beta_G \cdot I\{\text{Government investor}\} + \beta_{BB} \cdot I\{\text{Buyer broker}\} + \beta_{SB} \cdot I\{\text{Same broker}[39]\} + \beta_{LB} \cdot I\{\text{Listing broker}\} + \varepsilon.$

Equation (6) extends Equation (2) by adding a dummy for broker usage. The estimated coefficient for β_{GB} in Equation (6) identifies the percentage difference in price per square foot for properties bought or sold by government investors using buying brokers, or listing brokers relative to similar assets bought or sold by individuals.

In addition, the impacts of political parties are examined using Equation (7).

(7) $ln(\text{Price per square foot}) = \beta_0 + \beta_X X + \beta_T T + \beta_Y Y + \beta_C C + \beta_M M + \beta_G \cdot I\{\text{Government investor}\} + \beta_R \cdot I\{\text{Republican state}\} + \beta_{RG} \cdot I\{\text{Republican*Government}\} + \varepsilon.$

Equation (7) extends Equation (2) by adding a dummy for the impact from political parties and an interactive term of government investor with political parties. The estimated coefficient for β_{RG} in Equation (7) identifies the percentage difference in price per square foot for properties bought or sold by Republican state governments relative to similar assets bought or sold by Democratic states governments.

5. Empirical Results

Table 2 presents the results of the propensity score matching procedure. Panels A1 and A2 of Table 2 report the estimations for the purchase sample, while Panels B1 and B2 report the estimation results for the sales sample. Prior to the matching, land area and property age, along with other control variables, significantly affect government asset selection. The results in Panel A1 reveal that government buyers

[39] Same broker is dual agent.

prefer older industrial assets on large lots. Panel B1 shows that government sellers tend to divest somewhat larger properties and those with larger land area (relative to the average non-government asset sale). After matching, the purchase sample includes 670 observations, and the sales sample includes 958 observations, which are evenly drawn from the government and individual investor samples. Table 1 also provides the summary statistics for the propensity score matched sample of individual investors. Selection bias has been corrected since all coefficients are insignificant and the pseudo-R^2 values have dropped drastically.

Table 3 presents the central empirical results of this study. Panel A of Table 3 shows the estimation for the purchase sample and Panel B for the sales sample. Governments overpay by an estimated 9.8% and sell at a discount of 17.3% relative to the prices for similar assets transacted by individual buyers or sellers. The estimated coefficients are significant, and the signs of the coefficients match the expectations. Converting the percentage differences to real numbers, I can see that the government pays, on average, a premium of $6.56 per square foot and sells at discount of $12.45 per square foot, considering that the average transaction price is $66.96 per square foot in the purchase sample and $72.03 per square foot in the sales sample (see Table 1).

The differential is nontrivial when converted into aggregate waste. The degree of overpayment is approximately $371,316 per asset purchased. The amount of money left on the table upon exit averages $541,749 per asset sold. With nearly 90,000 state and local governments in the U.S., the cumulative effect of the systematic waste and inefficiency from poor investment decisions should be deserving of more attention.

Table 4 provides the analysis result of the test for market duration differences in divestiture. The insignificant result suggests that the discount in divestiture is not due to the higher holding costs involved in maximizing overall sales proceeds.

Criticism of government fiscal policy and government waste has a long history. This study provides empirical evidence to demonstrate its scale and impact in the industrial market, and to evaluate among alternative explanations. Burgeoning government deficits and soaring public debt levels have increased concerns about potential adverse impacts on aggregate economic health, limitations to future policy flexibility, and increasing costs of government finance as the risk mounts. As shown in 2012 Census of Governments - Surveys of State and Local Government Finances, the combined outstanding debt of U.S. state and local governments was nearly 3 trillion dollars. And during the past few years, governments

have tried to reduce the budget deficit and retire the public debt, through various methods, such as cutting expenses on unnecessary programs and increasing tax revenue, according to the Budget and Economic Outlook 2014 of Congressional Budget Office (CBO). The analysis of the relationship between government waste and budgets is shown in Tables 5 and 6.

Table 5 shows the test results for the fourth hypothesis. The results indicate that the magnitude of government waste does not relate to the government budget, where governments with a higher budget do not pay or sell significantly different for purchases or divestiture.

Table 6 shows the results with a change in the government budget taken into consideration. The results indicate that if the budget changes, governments with a reduced budget tend to sell their real assets at a lower price.

Table 7 provides the results of the impact of using brokers in the transactions. From interactive variables of the results, we can see that using brokers have no significant impact on the price paid or received by governments in the transactions.

Finally, Table 8 provides the test results for the difference in the impact of political parties. The results show no significant difference between the Republican and Democratic states.

Robustness test

Since matching plays an important role in this study, in order to ensure that the results of my analyses are robust, I run analysis with the sample when using one-to-one matching with nearest available neighbor and allowing replacement. One-to-one matching is performed by matching one observation in the treatment group with one observation in the control group based on criteria such as the nearest available neighbor, a defined caliper, and a defined radius until each observation in the treatment group is matched to one observation in the control group. In the nearest available neighbor matching method, one observation in the treatment group is matched with one observation in the control group until the matching provides the smallest difference (pscoreT – pscoreC) in absolute terms, while in caliper matching, the observations are matched if the difference (pscoreT – pscoreC) is within a certain defined distance (such as 0.01) so that bad matches are avoided. In addition, observations can be matched with or without sample replacements. With replacements, observations in the control group can be selected more

than once in the matching process so that the propensity score distance is minimized. Otherwise, matching takes place without replacement.

Tables 10 and 11 show the results of the robustness test. Table 10 presents the empirical results without controlling for sales conditions. Table 11 presents the results of the propensity score matching procedure with replacement. Panel A of Table 11 shows the estimation for the purchase sample and Panel B for the sales sample. Governments overpay by an estimated 17.7% and sell at a discount of 8.8% relative to prices on similar assets transacted by individual buyers or sellers. The estimated coefficients are both significant.

6. Conclusion

After controlling for selection bias and eliminating alternative explanations, I find that governments buy high and sell low. The results show that governments underperformed in the market compared to individuals. The results generally point to government inefficiencies in the use of taxpayer dollars. Increasing concerns surround growing budget deficits and government use of debt. Any research that exposes habitual inefficiencies and exposes a drain on government resources, with potential consequences to the health of the aggregate economy, merits serious attention.

While I am able to provide a direct measure for the quantity of government waste associated with investment decisions, other factors that may affect the results remain unobservable during my research. For instance, to what extent government transactions in industrial assets are represented in the CoStar database is unclear. The sample period of 1991 to 2012 includes the 2008 financial crisis that crippled many state and local governments. Thus, some of the asset sales are possibly motivated by financial distress. Some industrial properties may have been policy-targeted for urban redevelopment, and the low exit price may be rationalized as a write-off toward the goodwill of the local community, even though I controlled for the redevelopment as a transaction condition in the analysis. Such redevelopment projects can increase employment, expand the tax base, and have social benefits—if successful. In addition, there are political timing issues, such as occur during re-election years, where politically strategic investment decisions fail to coincide with financially strategic investment decisions. Taken together, regardless of the motivation or rationale, the research in this study exposes governments as underperformers relative to individual investors. The results indicate room for improvement in government commercial real estate investment decisions.

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Table 1. Summary Statistics Government vs. Individual

Panel A. Purchase sample

	Full Sample (n=11,104)		Government (n = 335)		Individual: pre-match (n = 10,769)		Individual: post-match (n = 335)	
Variable	Mean	Std dev	Mean	Std dev	Mean	Std dev	Mean	Std dev
Price per square foot ($)	66.96	61.42	82.89	86.24	66.31	60.09	61.71	70.32
Land area (SF)	116,685	345,614	258,879	551,495	110,817	333,149	196,311	290,065
Building size (SF)	25,275	48,188	56,603	105,954	23,982	43,744	43,707	59,901
Property age (years)	36.53	22.96	40.32	24.00	36.38	22.91	38.14	24.91
Class A	0.01	0.09	0.02	0.14	0.01	0.08	0.02	0.13
Class B	0.31	0.46	0.30	0.46	0.31	0.46	0.33	0.47
Class C	0.69	0.46	0.68	0.47	0.69	0.46	0.65	0.48
Government buyer	0.03	0.20	1	0	0	0	0	0
Budget Revenue ($)	n/a	n/a	1,823,053,085	7,708,679,651	n/a	n/a	n/a	n/a
Budget Change (%)	n/a	n/a	0.037	0.088	n/a	n/a	n/a	n/a

Panel B. Sales sample

	Full Sample (n=12,229)		Government (n = 479)		Individual: pre-match (n = 11,750)		Individual: post-match (n = 479)	
Variable	Mean	Std dev	Mean	Std dev	Mean	Std dev	Mean	Std dev
Price per square foot ($)	72.03	65.90	41.32	46.88	73.56	66.34	48.31	62.55
Land area (SF)	114,053	305,865	229,327	959,324	108,305	227,397	162,753	341,157
Building size (SF)	26,282	51,280	43,514	106,486	25,422	46,699	37,770	71,148
Property age (years)	36.95	22.68	36.06	23.14	36.99	22.66	35.87	22.13
Class A	0.01	0.09	0.01	0.11	0.01	0.08	0.01	0.11
Class B	0.31	0.46	0.31	0.46	0.31	0.46	0.27	0.45
Class C	0.68	0.46	0.68	0.47	0.68	0.46	0.71	0.45
Government seller	0.04	0.21	1	0	0	0	0	0
Marketing duration	427.54	415.94	480.48	454.42	426.59	415.19	470.87	441.52
Budget Revenue ($)	n/a	n/a	816,242,938	939,512,881	n/a	n/a	n/a	n/a
Budget Change (%)	n/a	n/a	0.030	0.157	n/a	n/a	n/a	n/a

Notes: This table presents summary statistics for the purchase sample, in Panel A, the sales sample, in Panel B. The first column lists the variable name. The subsequent columns report the sample mean (Mean) and standard deviation (Std dev) for the full sample, the subsample of transactions by Government investors, the subsample of transactions by Individual investors before (pre-match) and after the propensity-score matching (post-match) sequentially.

Variable definitions: Price per square foot is the transaction price for the industrial property, in U.S. dollars, divided by Building size. Land area is the gross square footage of the lot. Building size is the rentable building area, measured in square foot (SF). Property age is measured in years relative to the transaction date. Class A, Class B, and Class C are indicator variables taking on a value of one for the respective property class and zero otherwise. Government buyer and Government seller are indicator variables, taking on a value of one if the property is bought or sold by Government buyer (seller). Budget Revenue is the adopted budget revenue of the local government in the fiscal year when the transaction taken, measured in dollars. Budget Change is calculated as current year (budget revenue – last year revenue) / last year revenue[40].

[40] In this study, budget revenue is used as a cross sectional measure. It measures the budget revenue on different governments and then compare, no repeat sale. Budget change in this study measures the year to year change on the same government.

Table 2. Probit, Governments vs. Individuals

Panel A1. Probit for government buyer (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-8.023		0.00
ln(land area)	0.181	***	31.01
ln(building size)	-0.012		0.12
ln(property age)	0.115	***	7.53
Class A	-0.131		0.30
Class B	-0.071		1.20
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [17 variables]		
Sale conditions:	Included [55 variables]		
Market indicators:	Included [136 variables]		
pseudo-R^2:	16.71%		
Observations:	11,104		

Panel B1. Probit for government seller (pre-match)

Variable	*Coefficient*		*(Wald X^2)*
Constant	-3.179	***	17.12
ln(land area)	0.068	**	4.99
ln(building size)	0.041		1.53
ln(property age)	0.050		2.11
Class A	-0.302		2.04
Class B	-0.094		2.70
Secondary type indicators:	Included [9 variables]		
Year indicators:	Included [19 variables]		
Sale conditions:	Included [62 variables]		
Market indicators:	Included [127 variables]		
pseudo-R^2:	22.36%		
Observations:	12,229		

Panel A2. Probit for government buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	1.262	1.20
ln(land area)	0.017	0.07
ln(building size)	-0.055	0.62
ln(property age)	-0.093	1.09
Class A	-0.129	0.06
Class B	-0.176	1.20
Secondary type indicators:	Included [8 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [26 variables]	
Market indicators:	Included [79 variables]	
pseudo-R^2:	8.10%	
Observations:	670	

Panel B2. Probit for government seller (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	-5.017	0.00
ln(land area)	0.041	0.50
ln(building size)	-0.064	1.01
ln(property age)	-0.021	0.08
Class A	0.778	2.10
Class B	0.149	1.63
Secondary type indicators:	Included [8 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [25 variables]	
Market indicators:	Included [76 variables]	
pseudo-R^2:	23.47%	
Observations:	958	

Notes: This table presents the results from the probit estimation for buyer (seller) identity. Panel A1 (B1) represents the initial probit for the buyer (seller) sample, pre-matching. Panel A2 (B2) provides results for the probit estimation using the post-match samples to confirm success in propensity score matching. The dependent variable is government buyer (seller), which has a value of one if the property is bought (sold) by government. The variables land area, building size, and property age, are each logged. The panels present the variables' names in the first column, the estimated coefficient in the second, and the Wald X^2 test statistic in the third. All variables are defined in the notes to Table 1. In addition, before matching, the estimation includes 9 (9) indicator variables to control for secondary property types, 17 (19) indicators to control for year of transaction, 55 (62) indicators to control for unique sale conditions, and 136 (127) indicators to control for geographic property markets, with one suppressed. After matching, the estimation includes 8 (8) indicator variables to control for secondary property types, 7 (7) indicators to control for year of transaction, 26 (25) indicators to control for unique sale conditions, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding Wald statistic at the 1%, 5%, and 10% levels, respectively.

Table 3. Estimated Premiums, Governments vs. Individuals

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	4.651	***	7.61
ln(land area)	0.095	***	2.78
ln(building size)	-0.324	***	-8.81
ln(property age)	-0.131	***	-2.80
Class A	0.350		1.26
Class B	0.148	**	2.14
Government buyer	0.098	*	1.78
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [26 variables]		
Market indicators:	Included [79 variables]		
Adjusted R^2:	54.57%		
Observations:	670		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.830	***	22.73
ln(land area)	0.150	***	6.19
ln(building size)	-0.363	***	-13.49
ln(property age)	-0.283	***	-9.58
Class A	0.110		0.49
Class B	0.055		1.14
Government seller	-0.173	***	-3.99
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [25 variables]		
Market indicators:	Included [76 variables]		
Adjusted R^2:	54.01%		
Observations:	958		

Notes: This table presents the results from the estimation of price per square foot for the purchase and sales samples. Panel A presents results for the propensity score matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. The *t* statistics and reported significance levels are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, 26 (25) indicators to control for unique sale conditions, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 4. Marketing Duration, Sales Sample, Governments vs. Individuals

Variable	*Coefficient*		*(t-stat)*
Constant	4.557	***	4.58
ln(Land area)	-0.057		-0.86
ln(Building size)	0.166	**	2.24
ln(Property age)	-0.048		-0.56
Class A	-0.058		-0.10
Class B	0.284	**	2.02
Government seller	-0.068		-0.49
Secondary type indicators:	Included [7 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [17 variables]		
Market indicators:	Included [68 variables]		
Adjusted R^2:	5.36%		
Observations:	426		

Notes: This table presents the estimation results for marketing duration, considering the sales sample of transactions. Due to missing observations for the marketing duration variable, the propensity-score-matched sample is performed again (results unreported) matching transactions between corporate sellers with comparable assets sold by non-institutional investors, where marketing duration information is available. The variables Marketing duration, Land area, Building size and Property age are each logged. The table presents the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. The *t*-statistic and reported significance level are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes indicators to control for secondary property types, transaction years, sale conditions, and markets, with one suppressed. *** and * indicate statistical significance of the estimated coefficient, based on the corresponding *t*-statistic at the 1% and 10% levels respectively.

Table 5. Estimated Premiums, Government Budget (Government Only)

Panel A. Buyers sample

Variable	*Coefficient*		*(t-stat)*
Constant	4.510	**	3.73
ln(Land area)	0.161	**	2.47
ln(Building size)	-0.366	***	-5.95
ln(Property age)	-0.120	*	-1.72
Class A	-0.482		-1.00
Class B	-0.046		-0.35
Ln(Budget Revenue)	0.047		0.60
Secondary type indicators:	Included [7 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [12 variables]		
Market indicators:	Included [29 variables]		
Adjusted R^2:	73.01%		
Observations:	195		

Panel B. Sellers sample

Variable	*Coefficient*		*(t-stat)*
Constant	9.380	***	4.35
ln(Land area)	0.160	*	1.73
ln(Building size)	-0.538	***	-4.86
ln(Property age)	-0.432	*	-1.90
Class A	-2.093	*	-1.66
Class B	-0.097		-0.42
Ln(Budget Revenue)	-0.096		-1.06
Secondary type indicators:	Included [6 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [13 variables]		
Market indicators:	Included [28 variables]		
Adjusted R^2:	68.24%		
Observations:	120		

Notes: This table presents the results from the estimation of price per square foot for the purchase and sales samples. Panel A presents results for the buyer sample, while Panel B provides results for the seller sample. The variables Price per square foot, Land area, Building size, Property age and Budget Revenue are each logged. The Panels present the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 7 (6) indicators to control for secondary property types, 6 (6) indicators to control for year of transaction, 12 (13) indicators to control for unique sale conditions, and 29 (28) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 6. Estimated Premiums, Government Budget Fluctuation (Government Only)

Panel A. Buyers sample

Variable	*Coefficient*		*(t-stat)*
Constant	4.257	*	1.95
ln(Land area)	0.234	*	1.67
ln(Building size)	-0.455	***	-2.97
ln(Property age)	-0.211		-0.92
Class A	0.312		1.15
Class B	0.480		1.41
Budget Change	0.014		1.06
Secondary type indicators:	Included [7 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [12 variables]		
Market indicators:	Included [26 variables]		
Adjusted R^2:	49.41%		
Observations:	146		

Panel B. Sellers sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.657	***	3.86
ln(Land area)	0.173	*	1.90
ln(Building size)	-0.430	***	-4.18
ln(Property age)	-0.671	***	-2.73
Class A	0.122		0.54
Class B	-0.234		-0.92
Budget Change	0.015	**	2.07
Secondary type indicators:	Included [4 variables]		
Year indicators:	Included [6 variables]		
Sale conditions:	Included [13 variables]		
Market indicators:	Included [23 variables]		
Adjusted R^2:	76.54%		
Observations:	107		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the buyer sample, while Panel B provides results for the seller sample. The variables Price per square foot, Land area, Building size, Property age and Change are each logged. The Panels present the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 7 (4) indicators to control for secondary property types, 6 (6) indicators to control for year of transaction, 12 (13) indicators to control for unique sale conditions, and 26 (23) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 7. Estimated Premiums with Brokerage Intermediation, Governments vs. Individuals

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	4.704	***	7.69
ln(Land area)	0.097	***	2.83
ln(Building size)	-0.332	***	-8.93
ln(Property age)	-0.123	***	-2.59
Class A	0.368		1.32
Class B	0.148	**	2.13
Government buyer* Buyer broker	0.177		1.25
Government buyer	0.053	*	1.81
Buyer broker	0.025		0.25
Same broker	-0.200	*	-1.79
List broker	-0.017		-0.25
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [26 variables]		
Market indicators:	Included [79 variables]		
Adjusted R2:	54.66%		
Observations:	670		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	6.734	***	22.06
ln(Land area)	0.153	***	6.29
ln(Building size)	-0.364	***	-13.53
ln(Property age)	-0.280	***	-9.44
Class A	0.121		0.54
Class B	0.050		1.04
Government buyer* List broker	-0.038		-0.34
Government seller	-0.137	**	-2.46
List broker	-0.003		-0.04
Same broker	0.087		1.09
Buyer broker	0.135	**	2.00
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [25 variables]		
Market indicators:	Included [76 variables]		
Adjusted R2:	54.07%		
Observations:	958		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. The *t* statistics and reported significance levels are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, 26 (25) indicators to control for unique sale conditions, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Table 8. Estimated Premiums, Governments vs. Individuals (Political Party Impacts)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	4.674	***	7.59
ln(land area)	0.095	***	2.76
ln(building size)	-0.323	***	-8.77
ln(property age)	-0.128	***	-2.72
Class A	0.358		1.29
Class B	0.147	**	2.13
Government buyer	0.089	*	1.79
Republican states	0.246		0.75
Republican Government	0.026		0.20
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [26 variables]		
Market indicators:	Included [79 variables]		
Adjusted R^2:	63.25%		
Observations:	670		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	5.391	***	12.31
ln(land area)	0.148	***	6.10
ln(building size)	-0.346	***	-12.98
ln(property age)	-0.266	***	-8.96
Class A	-0.047		-0.21
Class B	0.054		1.12
Government seller	-0.176	***	-3.76
Republican states	-0.406		-1.45
Republican Government	0.085		0.69
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [25 variables]		
Market indicators:	Included [76 variables]		
Adjusted R^2:	57.58%		
Observations:	958		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. The *t* statistics and reported significance levels are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, 26 (25) indicators to control for unique sale conditions, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Appendix 1-1: Table 9. Estimated Premiums, Governments vs. Individuals (Without Controlling for Sale Conditions)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	7.632	***	16.61
ln(land area)	0.128	***	3.38
ln(building size)	-0.426	***	-10.16
ln(property age)	-0.135	***	-2.57
Class A	0.345		0.96
Class B	0.153	**	2.01
Government buyer	0.203	***	3.38
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Market indicators:	Included [79 variables]		
Adjusted R^2:	52.41%		
Observations:	670		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	5.007	***	10.60
ln(land area)	0.175	***	5.98
ln(building size)	-0.393	***	-12.39
ln(property age)	-0.193	***	-5.61
Class A	-0.120		-0.50
Class B	0.107	**	1.98
Government seller	-0.195	***	-4.06
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Market indicators:	Included [76 variables]		
Adjusted R^2:	47.04%		
Observations:	958		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables price per square foot, land area, building size, and property age are each logged. The panels present the variables' names in the first column, the estimated coefficients in the second, and the *t* statistics in the third. The *t* statistics and reported significance levels are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Appendix 1-2: Table 10-1. Probit, Government vs. Individual (Robustness Check, with Replacement)

Panel A. Probit for Government buyer (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	6.733	0.001
ln(Land area)	-0.078	1.599
ln(Building size)	0.005	0.006
ln(Property age)	-0.118	2.413
Class A	-0.112	0.070
Class B	0.058	0.216
Secondary type indicators:	Included [8 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [26 variables]	
Market indicators:	Included [79 variables]	
Psuedo-R^2:	13.56%	
Observations:	670	

Panel B. Probit for Government seller (post-match)

Variable	*Coefficient*	*(Wald X^2)*
Constant	11.380	0.002
ln(Land area)	-0.027	0.231
ln(Building size)	-0.043	0.488
ln(Property age)	0.012	0.028
Class A	-0.508	1.084
Class B	-0.046	0.185
Secondary type indicators:	Included [8 variables]	
Year indicators:	Included [7 variables]	
Sale conditions:	Included [25 variables]	
Market indicators:	Included [76 variables]	
psuedo-R^2:	13.14%	
Observations:	958	

Notes: This table presents the probit estimation results for buyer (seller) identity, in Panel A (Panel B). The dependent variable is Government buyer (seller), which takes on a value of one if the property is bought or sold by the government. The variables Land area, Building size, and Property age are each logged. The panels present the variable name in the first column, the estimated coefficient in the second, the Wald X2 test statistic (in parentheses) in the third, and the average marginal effect in the fourth. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation also includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for transaction years, 26 (25) indicators to control for sale conditions, and 79 (76) indicators to control for markets, with one suppressed. *** indicate statistical significance of the estimated coefficient, based on the Wald X2 test statistic at the 1% levels, respectively.

Appendix 1-3: Table 10-2. Estimated Premiums, Government vs. Individual (Robustness Check, with Replacement)

Panel A. Buyers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	7.096	***	17.20
ln(Land area)	0.047		1.13
ln(Building size)	-0.324	***	-7.73
ln(Property age)	-0.214	***	-7.91
Class A	0.310	**	2.04
Class B	0.052	*	1.77
Government buyer	0.177	**	2.02
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [26 variables]		
Market indicators:	Included [79 variables]		
Adjusted R^2:	59.49%		
Observations:	670		

Panel B. Sellers, propensity-score-matched sample

Variable	*Coefficient*		*(t-stat)*
Constant	5.690	***	52.94
ln(Land area)	0.131	***	4.50
ln(Building size)	-0.371	***	-13.29
ln(Property age)	-0.285	***	-6.00
Class A	0.046		0.22
Class B	0.113	***	2.49
Government seller	-0.088	**	-2.14
Secondary type indicators:	Included [8 variables]		
Year indicators:	Included [7 variables]		
Sale conditions:	Included [25 variables]		
Market indicators:	Included [76 variables]		
Adjusted R^2:	53.41%		
Observations:	958		

Notes: This table presents the estimation results of price per square foot for the purchase and sales samples. Panel A presents results for the propensity-score-matched buyer sample, while Panel B provides results for the propensity-score-matched seller sample. The variables Price per square foot, Land area, Building size, and Property age are each logged. The Panels present the variable name in the first column, the estimated coefficient in the second, and the *t*-statistic (in parentheses) in the third. The *t*-statistic and reported significance level are based on standard errors clustered by market and calendar year. All variables are defined in the notes to Table 1. In addition to the variables listed in the first column, the estimation includes 8 (8) indicators to control for secondary property types, 7 (7) indicators to control for year of transaction, 26 (25) indicators to control for unique sale conditions, and 79 (76) indicators to control for geographic property markets, with one suppressed. ***, **, and * indicate statistical significance of the estimated coefficient based on the corresponding *t* statistic at the 1%, 5%, and 10% levels, respectively.

Appendix 2

Sales Process for City-Owned Property, City of New Orleans

(*Source:* http://www.nola.gov/city-owned-property/)

1. The City may sell (through public auction) immovable property (real estate) that is no longer needed for public purpose. These particular auctions are different than the Sheriff's auctions or NORA's auctions. The process for bringing property any city owned property to auction is lengthy. The steps are as follows:

2. The Department of Property Management, through the Division of Real Estate and Records, locates property that the City is not using. A constituent may bring a request regarding a particular property to the Division and request that it will be sold at public auction.

3. If the property is deemed saleable, the requested sale is presented to the Planning Advisory Committee (PAC) for review, comments, and recommendations. If any city department may determine that the property is still needed for public use then the sale will not move forward.

4. If approved by PAC, the requested sale is then submitted to the City Planning Commission (CPC) for approval or denial. CPC may deny, approve, or conditionally approve the auction of a property. CPC may place provisos on the sale of the property, which will require that certain terms and/or obligations are met prior to or as part of the sale.

5. If the sale is approved or conditionally approved with provisos, the property is appraised to determine fair market value.

6. After a value is determined, the auction of the property must be approved by the City Council. An ordinance containing the property description, appraised value, and any provisos set by the CPC is introduced to the City Council.

7. If the Ordinance is passed and approved by the Mayor, an auction date and time is set and an advertisement runs in the Times Picayune Newspaper three times over a span of thirty days. The property may have an "open house" during this period.

8. At least thirty days after the ordinance has been signed by the Mayor, the property auction is held. The starting bid is the fair market value of the property. Auctions are held in the City Council Chambers at City Hall.

9. A winning bidder must deposit 10% of the winning bid amount with the Real Estate and Records Division (Room 5W06) within one (1) hour of the completion of the auction. The deposit must be in cash, certified check, or money order and is NON-REFUNDABLE. If a deposit is not timely made, the property is offered to the second highest bidder.

10. The act of sale is sent to the City Law Department for review and signature. The purchaser typically has 120 days to coordinate with the Law Department to complete the sale. If there is a proviso attached to the property sale by the CPC, it will become part of the act of sale. The remainder of the payment, as well as costs associated with promulgation of the ordinance and advertising are all due at the signing of the act of sale.

Appendix 3

The Statistics of U.S. Presidential Election 1992–2012[41]

State / Year	2012		2008		2004		2000		1996		1992	
Democratic/Republican	D	R	D	R	D	R	D	R	D	R	D	R
Alabama		9		9		9		9		9		9
Alaska		3		3		3		3		3		3
Arizona		11		10		10		8	8			8
Arkansas		6		6		6		6	6		6	
California	55		55		55		54		54		54	
Colorado	9		9			9		8		8	8	
Connecticut	7		7		7		8		8		8	
Delaware	3		3		3		3		3		3	
Dist. of Col.	3		3		3		2*		3		3	
Florida	29		27			27		25	25			25
Georgia		16		15		15		13		13	13	
Hawaii	4		4		4		4		4		4	
Idaho		4		4		4		4		4		4
Illinois	20		21		21		22		22		22	
Indiana		11	11			11		12		12		12
Iowa	6		7			7	7		7		7	
Kansas		6		6		6		6		6		6
Kentucky		8		8		8		8	8		8	
Louisiana		8		9		9		9	9		9	
Maine	4		4		4		4		4		4	
Maryland	10		10		10		10		10		10	
Massachusetts	11		12		12		12		12		12	
Michigan	16		17		17		18		18		18	
Minnesota	10		10		9*		10		10		10	
Mississippi		6		6		6		7		7		7
Missouri		10		11		11		11	11		11	
Montana		3		3		3		3		3	3	
Nebraska		5	1*	4*		5		5		5		5
Nevada	6		5			5		4	4		4	
New Hampshire	4		4		4			4	4		4	
New Jersey	14		15		15		15		15		15	
New Mexico	5		5			5	5		5		5	
New York	29		31		31		33		33		33	
North Carolina		15	15			15		14		14		14
North Dakota		3		3		3		3		3		3
Ohio	18		20			20		21	21		21	
Oklahoma		7		7		7		8		8		8
Oregon	7		7		7		7		7		7	
Pennsylvania	20		21		21		23		23		23	
Rhode Island	4		4		4		4		4		4	
South Carolina		9		8		8		8		8		8
South Dakota		3		3		3		3		3		3
Tennessee		11		11		11		11	11		11	
Texas		38		34		34		32		32		32
Utah		6		5		5		5		5		5
Vermont	3		3		3		3		3		3	
Virginia	13		13			13		13		13		13
Washington	12		11		11		11		11		11	
West Virginia		5		5		5		5	5		5	
Wisconsin	10		10		10		11		11		11	
Wyoming		3		3		3		3		3		3

Source: http://www.presidency.ucsb.edu/

[41] The number showing here in the chart is the number of Electoral College votes