VARIATION IN COMMERCIAL PROPERTY TAX APPRAISAL ACCURACY IN TEXAS

by

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Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT ARLINGTON
December 2012

ACKNOWLEDGEMENTS

To all who gave of their time to help me in any way with completing this dissertation: thank you. In particular, that includes my supervising professor, Dr. Fred Forgey, and dissertation committee members Dr. Ivonne Audirac and Dr. Andrew Whittemore. Their patience and helpfulness were extraordinary. Dr. Maria Martinez-Cosio and Dr. Rod Hissong offered timely criticism, support and ideas on theoretical approaches. Dr. G. William Domhoff provided guidance on questions of political power in tax appraisal.

I owe a debt of gratitude to tax appraisers in Texas and elsewhere who either helped with the creation of the survey or completed it. These professionals have a difficult task, balancing the revenue needs of government with the duty of fairness to taxpayers. I hope that shining the light of research and analysis on their corner of the world increases understanding of the obstacles in their path and improves in some small way their ability to perform their job.

I am deeply grateful to my academic cohort partner, Lisa London, for her assistance, leadership and encouragement. It is likely I would not have finished, certainly not in this relatively short period of time, without Lisa's help.

Carole Robinson proofread the manuscript and saved me from egregious errors.

I owe a special debt to Dr. Nasser Haghighat, my coworker and mentor in research, who patiently answered my questions, helped with development of the survey, and provided the online survey capability. He is a role model for all who would do research.

Finally, I could not have made it through this degree program without the unwavering support of my wife, Barbara. It surely seemed like a long road to completing the Ph.D. degree, but she has always been patient and full of kind encouragement in all my academic endeavors.

November 12, 2012

ABSTRACT

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APPRAISAL ACCURACY IN TEXAS

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Article 8 of the Texas Constitution requires property taxation to be “equal and uniform,” and state law requires nearly all real property to be assessed at 100% of market value. Despite these requirements, evidence exists that the appraisals of some high-value commercial properties, specifically downtown class A office buildings, vary widely from market value. According to the state Comptroller’s Property Value Studies, residential property tends to be fully valued for tax purposes. An equity issue arises from the apparent undervaluation of high-value commercial properties, which typically are owned by wealthy individuals and institutional investors.

While residential property tends to be homogeneous with frequent sales to use for comparison, commercial property is largely heterogeneous with infrequent sales. Data on commercial sales is less available and harder to obtain than data on residential sales. Even though Texas state law does not require the disclosure of real estate sale prices, most residential sales are recorded in local real estate multiple listing service databases that are accessible by

county appraisal districts. Information on commercial property sales is more difficult to obtain and is available primarily through non-broker sources such as CoStar and other data providers.

Some of the variation in appraised value of class A office buildings in the downtowns of the five most populous Texas cities can be traced to technical, legal, procedural and political issues in valuation. Other potential causes of appraisal variation are revealed by the theoretical approaches of the new institutional economics and the concept of bounded rationality.

Tax appraisers in the five most populous Texas counties were surveyed to gain insight into obstacles to appraisal accuracy. Solutions proposed involve better use of market data and modeling and changes to administrative procedures and policy at the state and local levels. A valuation model is proposed that may increase the accuracy of high-value property appraisal and could have application beyond the class A office segment of commercial real property.

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INTRODUCTION

1.1 Context

Article 8 of the Texas Constitution requires property taxation to be "equal and uniform," and state law requires nearly all real property to be assessed at 100% of market value. Despite these requirements, it will be shown that the final valuation of some downtown class A office buildings vary widely from market value. According to the state Comptroller's Property Value Studies, residential property tends to be fully valued for tax purposes. An equity issue arises from the apparent undervaluation of high-value commercial properties, which typically are owned by wealthy individuals and institutional investors.

Article 8 "Taxation and Revenue," Section 1 of the Texas Constitution (n.d.) begins:

> (a) Taxation shall be equal and uniform.
> (b) All real property and tangible personal property in this State, unless exempt as required or permitted by this Constitution, whether owned by natural persons or corporations, other than municipal, shall be taxed in proportion to its value, which shall be ascertained as may be provided by law.

Because Texas has no state or local income tax and the state limits municipal sales tax rates to 2% of sales, property taxes make up the bulk of revenue for cities. Other local jurisdictions—counties, school districts, community colleges, public hospitals, business improvement districts and homeowner associations—rely almost exclusively on the property tax as their primary revenue source. Combined local property tax rates can exceed 3% of the appraised value of property. As a result, San Antonio, Fort Worth and El Paso took three of the top five slots in the Fifty Largest [U.S.] City Homestead Tax Rankings for homes valued at both

$150,000 and $300,000 (Minnesota Taxpayers Association and Lincoln Institute of Land Policy, 2011, p. 8).

Texas is one of a dozen or so states without mandatory real estate sale price disclosure (Smoot and Welcome, 2003, p.5). Because sale prices are an essential source of information for appraisals, appraisal districts in Texas face substantial obstacles in performing their constitutionally required duty to value various forms of property at market value. In residential appraisal, this difficulty is mitigated by the availability of generally reliable sale price information from local multiple listing services maintained by real estate brokers.

Recent examples of this apparent difficulty in commercial property appraisal accuracy are found in Tarrant County. Despite constitutional and statutory requirements of equal valuation, Tarrant County tax appraisals of commercial real property exhibited below-market value deviation of about 10% in 2007, 2008 and 2009, according to the Texas Comptroller of Public Accounts (Combs, 2010). An analysis of class A office buildings in downtown Fort Worth, among the highest value properties in the county, suggests that this tendency toward commercial property under-appraisal is more pronounced for this property subset, possibly on the order of 35% below market value as demonstrated below. With comparable residential appraisals in 2007, 2008 and 2009 averaging between 99% and 100% of market value (Combs, 2010), tax appraisal inequity emerges as a concern.

Downtown Fort Worth had the strongest office market in the nation for three consecutive quarters in 2006-2007 based on construction, absorption, vacancy and supply-demand balance (Moody's Investors Service, 2006a, 2006b and 2007). This strength persisted, though not first in the nation status, throughout the 2007-2009 recession with direct office occupancy at 91.3% and class A office asking rents averaging almost $28 per square foot in the fourth quarter of 2009 (Downtown Fort Worth, Inc., 2011), immediately prior to the January 1 valuation date for the 2010 tax year.

Despite this very strong office market performance, 2010 property tax valuations for class A office buildings in Fort Worth were modest. Of the ten class A buildings in downtown larger than 50,000 square feet, using the building sizes in the State of Downtown Fort Worth 2010 (Downtown Fort Worth, Inc., 2010, p. 6), the highest per square foot valuation was $178.99 on the Chase Bank building. The lowest valuation was $75.16 per square foot on the Cash America building. The median valuation was $112.75 per square foot (see Table 1.1). Note that these valuations are strictly from Tarrant Appraisal District records for the building as a stand-alone property, which is not the same methodology used later in this study.

Table 1.1 Appraised Value of Class A Office Buildings in Downtown Fort Worth

Building	2010 Appraised Value	Building Size	Value / SF
Burnett Plaza	$115,045,800	1,024,627	$112.28
Carter Burgess Plaza	$98,015,532	954,895	$102.65
D.R. Horton Tower	$92,896,047	820,509	$113.22
Wells Fargo Tower	$82,756,999	716,533	$115.50
Chesapeake Tower	$57,677,413	460,000	$125.39
Two City Place	$32,297,842	330,000	$97.87
The Carnegie	$30,293,673	280,000	$108.19
CHASE Bank	$36,178,861	202,123	$178.99
Cash America	$10,168,865	135,293	$75.16
Cantey Hanger	$10,000,000	86,300	$115.87
Median:	$46,928,137	395,000	$112.75

Source: Downtown Fort Worth, Inc. (2009); Building size is from CoStar.

All but one of these are true multi-tenant buildings and are therefore best valued by the income approach. An approximate value can be obtained using asking rents, average occupancy, and the national average operating expenses for office buildings of $8.11 per square foot (Fuller, 2010, p. 5) plus fixed expenses. Fixed expenses are real property and other

taxes plus property insurance, equivalent in Fort Worth to about 3% of tax appraised value, which works out to around $3.45 per square foot, assuming that property is appraised for tax purposes at around $115 per square foot. Fixed expenses would increase, and net operating income would decline, if properties were appraised for tax purposes at higher per square foot values.

Multiplying the average occupancy of 91.3% times the average class A asking rent of $28 per square feet ($25.56/SF), and subtracting average operating expenses and approximate fixed expenses ($11.56/SF) yields a net operating income estimate of $14.00 per square foot. On average, class A office buildings in downtown Fort Worth would have had in 2010 a market value, at an 8% capitalization rate[1], of about $175.00 per square foot, more than 55% above the median tax appraised value of $112.75 per square foot. This average valuation implies that these buildings as a group may have been under-appraised by more than 35%.

Several caveats apply to this rough calculation: parking facilities may or may not be included in the appraisal district property record; asking rent probably does not reflect actual income; and national average expense amounts may not accurately describe the experience of particular buildings. Nevertheless, on average one would expect that more a refined appraisal calculation of individual properties will approach this rough estimate of under-appraisal.

Two former single-tenant office buildings in downtown Fort Worth, Pier 1 (now Chesapeake Tower) and RadioShack (now Tarrant County College Trinity River Campus), provide further evidence of unequal appraisal. These two buildings were built in the mid-2000s and later sold. Information about these transactions is available from Securities and Exchange Commission (SEC) public filings. Because the income approach cannot be used on a single-tenant building with no income, the appropriate valuation methods are the cost approach (when

[1] The capitalization rate, which can be derived from the sales prices or appraisals of comparable properties, is a figure that is divided into net operating income to produce an estimate of property value. An 8% capitalization rate approximates the nationwide class A office market capitalization rate in 2009.

built) and the comparable sales approach (when sold). Accurate when-built cost numbers and sale prices are available for both buildings.

The total cost of land and construction for the Pier 1 building, completed in 2004, was $101.1 million, and this value was approximated in the company's forms 10-K for 2004 and 2005 filed with the SEC. The sale of the building to Chesapeake Energy Corp. for $104 million in early 2008 was reported in the press (Dallas Business Journal, 2008). Nevertheless, the building was valued by the Tarrant Appraisal District (TAD) at $64.9 million and $65.4 million from 2006-2008 and at $72 million in 2009, 30.8% below the prior year sale price. In 2010 the tax appraised value dropped to $57.7 million, 44.5% below the 2008 sale price after the peak of the financial crisis.

The land and construction costs of the RadioShack corporate campus, completed in May 2005, were revealed in that company's 2005 form 10-K to total $226.8 million (RadioShack Corporation, 2006), and were approximated in the 2004 form 10-K at $261.5 million (RadioShack Corporation, 2005a). In December 2005 in a widely reported transaction, RadioShack sold the campus and leased it back from KanAm Grund, a German real estate investment trust (REIT), for $222 million (RadioShack Corporation, 2005b). In 2008, RadioShack and the German REIT completed a sale to and partial lease-back from Tarrant County College (TCC) for $237.5 million (RadioShack Corporation, 2008). During this period, the property was never valued by TAD at more than $165.3 million (in 2009, at 30.5% below the final sale price), and for most of that time was valued at $136.8 million to $137.8 million, or 39% below construction cost plus land value.

Are these merely isolated instances of apparent undervaluation, or part of a pattern countywide or perhaps statewide that calls into question the fundamental fairness of property tax assessments? Comptroller property value studies of the five largest Texas counties from 2007 to 2009 (Combs, 2010) show variation in the accuracy of commercial real property

appraisals ranging from undervaluation of around 8% to 12% in Dallas and Tarrant counties to 2% or less in Travis County (see Table 1.2).

Table 1.2 Median Level of Appraisal of Commercial Real Property, 2005-2011

Category F1 – Commercial Real Property, State Comptroller Property Value Surveys							
	2005	2006	2007	2008	2009	2010	2011
Bexar	.98	.97	.97	.99	.98	.97	-
Dallas	1.00	1.00	.92	.93	.92	.98	-
Harris	.96	.92	.94	.96	.98	-	.98
Tarrant	.98	1.00	.88	.88	.91	-	.91
Travis	.96	.98	.99	.98	1.00	.98	-

Any marked difference in appraisal equity between class A office buildings and other real property will result in unequal taxation, contrary to the constitutional requirement of equality of taxation. The undervaluation of a subset of commercial real property will shift the tax burden to other classes of property owners, such as smaller commercial and residential owners (McMillen and Weber, 2008, p. 653), while denying local governments a portion of needed revenues. For example, the total valuation of the ten buildings listed in Table 1.1 is about $565.33 million. These buildings were valued for tax purposes at $112.75 per square foot while the previously estimated market value was $175.00 per square foot. Applying this difference in per square foot value to the total appraised building value generates an under-appraisal of $312.12 million. Using the combined property tax rate of 2.84% (not including a 0.1% public improvement district assessment), the undervaluation of these buildings deprives taxing entities of an estimated $8.9 million in tax revenues in a year. In this scenario, the Fort Worth Independent School District accounts for 47% of lost revenue ($4.2 million), the City of Fort Worth 30% ($2.7 million) and various county-wide jurisdictions 23% ($2.0 million). The effect on the downtown public improvement district is pronounced: at the assessment rate of 10 cents per $100 of value, foregone assessments total more than $312,000 compared to 2011 receipts of $1.9 million (City of Fort Worth, 2011).

Simply raising the ad valorem tax rate to achieve the same revenue could provoke the ire of property owners generally while preserving unequal tax treatment. Tax rate increases are highly visible, subject to limitation or rollback, and often politically controversial for local governments. Specific property valuations, while a matter of public record, rarely become a political issue and are typically considered a private matter between the taxpayer and appraisal district. Unequal valuations, therefore, provide a clear, direct and almost hidden benefit available to those whose properties are undervalued.

1.2 Statement of the Problem

Tarrant County commercial property generally, and class A office buildings particularly, appear to be undervalued for tax purposes. What influences the accuracy of class A office property tax appraisals in urban Texas counties? Is persistent under-valuation in the nature of the appraisal process, or are there other reasons for it? Does accuracy vary from one large urban county to another? If so, what are the underlying causes of this variation?

1.3 Purpose

The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities is to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies.

1.4 Research Questions

The research into the reasons for variation in the accuracy of commercial property tax appraisal will center on these questions:

1. Can a model for valuing a particular type of commercial property be constructed that would be more accurate than historical tax appraisals at predicting market sale prices, and can

this model be applied by appraisal districts to this and other property types to increase the accuracy of tax appraisals?

2. Does appraisal accuracy vary from county to county? If so, what are the likely reasons?

3. Is appraisal accuracy hampered by the diverse character and limited availability of sales data for commercial property?

4. Is appraisal accuracy limited by a lack of tools, training or personnel?

5. Is appraisal accuracy limited by budget constraints for performing appraisals, resolving protests or contesting legal challenges from deep-pocketed taxpayers?

6. Is appraisal accuracy limited by external pressure from potential public relations or political consequences?

7. What is the effect of the protest-appeal-resolution process on final valuation accuracy? Where in the process are values most divergent from market value? What factors or justifications, if any, explain reductions below market value?

8. What policies or laws hamper the accurate tax appraisal of commercial property?

9. Is appraisal accuracy hampered by human cognitive limits?

10. In contrast to human cognitive limits, is appraisal accuracy hampered by the environmental demands of the tax appraisal job?

11. Is appraisal accuracy hampered by the effects of the relationship between tax appraisers and taxpayers?

1.5 Research Design Overview

This project uses a mixed methodology, combining a multiple case study qualitative approach with development of a quantitative valuation model.

The case studies are drawn from the downtowns of the five most populous cities in Texas. These historical centers of commerce are likely to have comparable class A office buildings and a sufficient number of traceable sale transactions to test a valuation model. This

property subset is selected for study because of the high concentration of property value represented by these buildings and for their comparative ease of valuation on the basis of net operating income.

Because these buildings typically compete with one another for tenants in their local office sub-markets, they should be readily comparable on the basis of their rental and occupancy rates, and should have similar operating expenses. Varying lease structures can be assumed to have little effect on underlying property value, given a competitive market.

Specific data sources are detailed in Chapter 3. Data will be used to determine: (1) whether there exists a pattern of misappraisal of class A office buildings in major urban Texas counties; (2) whether variations are present in the level of appraisal of class A office buildings among the downtowns of major Texas cities; and (3) if either condition exists, what factors explain it, and what new policies and procedures might improve it?

This research will explore differences in practices and policies among county appraisal districts (CADs) through a survey of commercial property appraisers. A valuation model for these properties will be tested for accuracy against actual sale prices, where that data is available.

1.6 Assumptions

This study assumes that where there is inaccuracy in Texas urban county appraisal districts' valuation of class A office buildings, it can be measured. While it is not assumed that tax appraisers purposefully undervalue certain properties, it is conjectured there are technical, legal, procedural and perhaps political obstacles that may prevent the accurate valuation of high value commercial properties. A complicating factor relates to the limits of human cognition, a condition known as bounded rationality. Additionally, the "rules of the game" of the property tax appraisal system may produce outcomes contrary to the constitutional and statutory requirements of equal valuation.

These hurdles to appraisal accuracy are presumed to have solutions in process, procedure and law. Adoption of these changes can bring appraisals of class A office buildings closer to market value, allowing for increased property tax collections, possibly in the millions of dollars per year, and a more equitably distributed tax burden.

1.7 Rationale and Significance

Differential valuation of various property types presents important equity issues in society. Unequal assessment may erode public support for or tolerance of the property tax, undermining the legitimacy of the primary source of local government revenue in Texas.

Learning the reasons for unequal appraisal would point toward changes in policies, procedures and laws that would make property appraisals more accurate and equal. Benefits of better appraisal accuracy would extend beyond class A office properties, as similar models may be created for other subsets of commercial property.

1.8 The Researcher

For nearly seven years, the researcher has administered Tax Increment Reinvestment Zone Number Three, City of Fort Worth (the Downtown TIF) as part of his duties in downtown development at a nonprofit organization. In this role, the researcher is responsible for forecasting property tax revenues of the TIF District. For ten years previously, he was a database programmer, preparing him for the data collection and analysis associated with this research project. He holds a Master of Science in Real Estate degree and has completed all coursework and the comprehensive examination for the Ph.D. degree in Urban Planning and Public Policy at the University of Texas at Arlington.

1.9 Definitions

Bounded Rationality: A theory of human behavior developed by economist Herbert Simon that explores the limits on human beings' ability to be fully rational in situations of great complexity.

Capitalization rate: Annual net operating income divided by property value. The capitalization rate is a measure of property yield in the first year of ownership, similar in stock market terms to earnings (or dividend) yield, or the inverse of the price to earnings ratio. In real estate valuation, the capitalization rate (or "cap rate") allows investors to compare the prices of different assets on the basis of yield. A higher cap rate, all else equal, means a lower asset price for a given yield.

Discounted Cash Flow (DCF): A property valuation method that discounts future cash flows of a given investment to the present using the investor's selected discount rate. The DCF calculation provides a maximum price an investor should be willing to pay for a specific property purchase.

Downtown: The historical central business district (CBD) of a city. For the purposes of this analysis, downtown in each of the five large Texas cities is defined as the CBD office submarket used by CoStar Group.

Liquidity: The degree to which an asset can be bought or sold without affecting its price. Real estate by nature is a relatively illiquid asset compared to most securities due to the real estate market's high transaction costs, management requirements, limited information, large transaction amounts and small pools of buyers and sellers.

Net Operating Income (NOI): Income after deducting expenses, before deducting income taxes and interest on loans. NOI provides an investor-situation-neutral measure of investment property performance and is the numerator in the calculation of the capitalization rate.

New Institutional Economics (NIE): A theoretical school that arose out of institutional economics and in contrast to neoclassical microeconomics in its exploration of "what happens concretely in the real world" (Coase, 1998, p. 72) in regard to the costs of economic exchanges and the legal, political, social, educational, and cultural systems that make up society.

Protest-Appeal-Resolution Process: The process through which Texas property owners may resolve concerns informally with an appraiser, bring a protest of their property's taxable value before an Appraisal Review Board, and appeal the ARB decision to one or more of the following venues: to state district court, to an independent arbitrator appointed by the State Comptroller, or to the State Office of Administrative Hearings, depending on where the property is located (Combs, 2012b).

Real Estate Investment Trust (REIT): A form of real estate ownership that allows divided interests to be bought and sold as securities. A REIT overcomes some of the liquidity limitations of direct real estate ownership by providing professional management and a ready market for buyers and sellers with modest amounts to invest.

Retenanting Expense: The cost to a building owner of filling a vacancy, particularly leasing commissions and tenant improvements expense.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The research field of residential property tax appraisal is well plowed, and has for decades produced bumper crops of hedonic multiple regression analyses due to the fortuitous statistical advantage afforded by homogeneous properties, frequent sales and close proximity. These advantages do not, however, extend to commercial property, whose study is akin to the remote, rocky corner of the field by the fence row, just out of reach of the irrigation sprayer. It lies mostly undisturbed, uninviting due to the obstacles of heterogeneous properties, infrequent sales and spatial distances.

Property tax appraisals in Texas are legally required to be uniform and represent market value. The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities is to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies.

Tax appraisals of these properties may not equal market value because of technical, legal, procedural and political obstacles. Technical issues involve the inherent difficulty of appraising property, i.e. deriving unobservable market value from observable phenomena such as net income, construction costs and sale prices of comparable properties, which in practice means “using data gleaned from markets to estimate the current market value of property.” (Almy and Ferguson, 2010, p. 5). The legal framework of valuation may result in under-appraisal due to legislative constraints put on appraisal districts that become hurdles in equitably assessing property. Procedural issues involve appraisal districts’ limited budgets and

the rules of the protest-appeal-resolution process. Political aspects of valuation relate to the suspicion that some classes of taxpayers benefit through the political process.

Because local governments in Texas are highly dependent on property tax revenue, any revenue lost to the undervaluation of a class of property undermines the delivery of public services and shifts part of the burden of funding government from one class of property owners to another. The final section of this literature review explores possible theoretical explanations of tax appraisal inaccuracy based on the ideas of the new institutional economics and the concept of bounded rationality.

2.2 Obstacles to Accuracy in Tax Appraisal

2.2.1 Technical Issues in Valuation

Each piece of real estate occupies a unique place on earth and thus no two parcels are identical. Complicating matters, real estate is put to diverse uses, is often wrapped up with business value (Heaton, 2010, p. 6; Banfield and French, 2005, pp. 36-37), and is subject to dramatic year-to-year changes in value (Owens, 2000, p. 342). These factors complicate the valuation process, whether for tax appraisal or any other purpose.

The three fundamental methods of property valuation are the cost approach, income approach, and sales comparison approach. Each of these depends on transaction data or "some other indicator of how markets price properties" (Kummerow, 2006, p. 362 footnote). The cost approach, "primarily used to value new construction and unique properties," (Allen, 2009, p. 41) requires cost data for material and labor and comparable land sale prices. The income approach either discounts future cash flows to arrive at net present value, or capitalizes current net operating income (NOI) at an appropriate capitalization rate derived from actual sales of comparable properties (Payne and Redman, 2003, pp. 51-52). The sales comparison method directly compares the subject property to similar properties, making value adjustments for differences.

As a consequence, regardless of approach, the valuation of a particular property is derived partly or wholly from the sales transactions of other, ideally similar, properties. Complicating matters, sales transactions nationwide were down sharply due to the 2007-2009 recession. U.S. office CBD "investment activity dropped 63% from $146 billion in 2008 to $52 billion in 2009, and [is] down 90% from the 2007 peak of $522 billion" (CB Richard Ellis, 2010, p. 2). Because there are relatively few transactions year to year, "the [appraisal] process can be quite subjective," (Cornia and Slade, 2005, p. 18) making uniformity of valuation a difficult goal to achieve.

There are standards for property appraisal, including the Uniform Standards of Professional Appraisal Practice (USPAP), which "[aim] to set forth and embody these [generally accepted valuation] principles and practice standards in broad terms" (Kummerow, 2006, p. 361). Even so, there is ample room for interpretation and disagreement within those standards, as recounted in the literature and recorded at the courthouse in tax appraisal lawsuits.

One alternative to appraisal is the use of securities data to value real property. The stock market value of real estate investment trusts (REITs) and other publicly and privately traded securities ostensibly reflects the value of the underlying property portfolios, but differences with direct property ownership make comparisons invalid. Direct ownership of real property entails management duties, potential liability for environmental contamination, and restricted liquidity, or the "ease of buying and selling" (Heaton, 2010, p. 7). The holder of a security, on the other hand, has no management responsibility, limited liability, and generally better liquidity. These shareholder advantages translate into a proportionally higher price and thus a higher aggregate valuation compared to direct ownership of real property.

A common method used by real estate investors to value property is discounted cash flow methodology. In reflecting on the legal environment, Banfield and French (2005) note that courts' "criticism of the use of discounted cash flow (DCF) methodology in determining price…is a common thread throughout a number of cases" (p. 32). The selection of the correct

capitalization rate and the separation of business or investment value from realty value are likewise thorny issues affecting property value that have become the subject of litigation.

A hotel, for example, is not just a building—it is an operating business with a specific flag (or brand) and a more or less skilled management team. These variables greatly affect what the property would bring in a sale. Making an effective protest to separate business value from real estate value, so tax is paid only on the realty value, requires "convincing market evidence of [the] existence and associated value" (Owens, 2000, p. 349) of the business portion.

Another issue is whether the income or sales comparison approach is best for valuing class A office buildings. Getzendanner (2004) argues that REITs and foreign investors have specific advantages and characteristics that cause them to pay higher prices for property compared to local investors. He argues for direct income capitalization as the best approach to value, using market rents and expenses rather than those of the particular property which "are not reliable guides because they represent chance contingencies and the bargaining skills or the special needs of the parties involved" (p. 96).

For McMillen and Weber (2008), the fact that very high-value properties rarely sell is likely to result in more valuation errors than with mid-value properties (p. 654). As noted earlier, sales transactions are needed to adequately support both the income approach (by generating suitable capitalization rates) and the sales comparison approach to valuation. Generally, income-producing commercial properties, including multi-tenant office buildings, are valued through the income approach. The correct capitalization rate would be based on the market—which is difficult to determine without a number of comparable sales.

Owens (2000) identifies several difficulties with the appraisal process, including dramatic swings in value, properties that outperform their local competition, properties assessed at use value, the decision to assess the fee simple or leased fee interest in property, and the array of property types (p. 342). Kummerow (2006) notes that "given the data [appraisers] have

to work with, heterogeneous properties with infrequent trading, and changing market conditions, errors are sometimes embarrassingly large" (p. 358). It is a process that involves judgment and some inevitability of error. Commercial property sales data, which is used in all three valuation methods, is difficult to obtain because of infrequent transactions and the lack of a complete database of commercial properties and their characteristics (Montero-Lorenzo, et al., 2009, p. 408).

In contrast, residential properties are homogenous, sales are frequent, and extensive databases of properties are readily available (Montero-Lorenzo, et al., 2009, p. 408). This makes residential properties much easier to appraise, and therefore more likely to be appraised close to market value.

Despite the fact that property appraisals are required by law to be uniform and at market value, the literature shows many reasons why this condition may not be realized in the appraisal of class A office buildings. Hyman, referenced in Cornia and Slade (2005), "describes the practice of property assessment by public assessors as an 'art,' not a science" (p. 18). The dearth of sales and uncertain applicability of different valuation methods makes accurate valuation a challenge. The valuation of high-value properties is both important to taxing jurisdiction revenue and difficult for appraisal districts to carry out.

The practical necessity of the property tax and the impracticalities inherent in its application have spawned lively debates over the merits of different valuation methods, the importance and difficulty of appraising unique properties, and the measurement of inequity in valuation. Legal constraints impose another set of obstacles to achieving equal valuation.

2.2.2 Legal Framework of Valuation

Property tax assessment is conducted within a framework established by state law. In Texas, appraisal districts are organized by county. Annual property valuations are established as of January 1 with notice to property owners delivered in May. Protests are heard by an Appraisal Review Board (ARB), a quasi-judicial entity whose members are appointed by county

appraisal district (CAD) boards of directors or the administrative district judge but whose operations are entirely separate from the CADs (Combs, 2011a, p. 1). An individual must meet a residency requirement, but does "not need any special qualifications" (Combs, 2011a, p. 5) to serve on an ARB.

Texas taxpayers are allowed to protest on grounds of excess (above market value) appraisal or unequal appraisal. In both cases, "the law states that the appraisal district has the burden of establishing the property's value by preponderance of the evidence, or in certain protests, by clear and convincing evidence presented at the hearing" (Combs, 2011a, p. 40). While both CADs and property owners may appeal an ARB decision to district court, taxpayers also have a right to court-approved, non-binding arbitration (Combs, 2011a, p. 73).

Other provisions of the Tax Code limit the range of actions a CAD may undertake in an appeal:

> The chief appraiser may appeal an ARB order determining a taxpayer protest if he or she has the written approval of the appraisal district board of directors and the appraised or market value of the protested property is $1 million or more. The chief appraiser may appeal an ARB order on property valued at less than $1 million only when the board of directors has given written permission and the chief appraiser alleges the taxpayer or agent committed fraud or made material misrepresentations at the protest hearing (Combs, 2011a, p. 73).

Recent changes in state law have tended to protect property owners by requiring appraisal district compensation for attorney fees in successful appeals, extending the deadline for filing a property tax lawsuit from 45 to 60 days, and providing an alternate appeals process to the State Office of Administrative Hearings for owners of property over $1 million (Popp, 2009). Another protection puts a "substantial burden of evidence" on the chief appraiser for a valuation increase following an agreed or court-ordered settlement on value in the previous year (Popp, 2009). The provision benefits those, including many commercial property owners, who tend to protest more frequently.

Legal constraints on CADs and the taxpayer's incentives and disincentives to protest lead to procedural issues that may obstruct equal valuation. Both parties in a protest must weigh the costs and risks of pursuing an appeal.

2.2.3 Procedural Issues in Valuation

The procedural issues involved in property tax valuation are largely matters of strategy and cost-benefit analysis. For Texas urban CADs, these costs include administering hundreds of thousands of accounts and adjudicating thousands of protests each year. For taxpayers, there is no fee to protest, but there may be substantial costs associated with putting forward a case.

The property tax system has inherent disadvantages such as the profusion and variable nature of local appraisal districts, the cost of administering large numbers of accounts, and the difficulty of appraising different types of property (Owens, 2000, pp. 341-342). These problems jeopardize the natural advantages of the property tax of stability, immobility, ease of identification, the "general connection between local services and property values" (Owens, 2000, p. 341), and if properly administered, increasing economic efficiency and incentivizing optimal land use (Cornia and Slade, 2005, p. 18).

For the property taxpayer, the notice of annual property tax valuation is at best unwelcome. He or she must decide whether to contest the valuation, and if so, how much it will cost and whether the effort will be worthwhile. This is achieved by conducting a cost-benefit analysis that "takes the difference between the assessed value and the actual (sic) estimated value…multiplied by the assessment rate…subtracting the estimated costs [to arrive at] the maximum net benefits" (Zises, 2003, p. 45).

Allen (2009) makes the argument that the 2009 tax year was the optimum year to protest because of the historic collapse in lending, decrease in inflation and property sales market gridlock following the recession of 2007-2009 (p. 41). These developments destroyed value and increased capitalization rates, but due to the absence of market transaction data, this

was unlikely to be reflected in the annual property tax valuation (Allen, 2009, p. 40). However, a protest based on a market downturn must be "weighed to some extent on how long the reduction in taxes will hold" (Owens, 2000, p. 349) since an ensuing market upturn is likely to be followed by a higher assessment.

Because similarly situated properties must by state law be similarly appraised, the valuation of one class A office building will likely set the appraised value of others within the same county (Getzendanner, 2004, p. 87). The unequal appraisal provision of the Tax Code might encourage a small group of protesting taxpayers to adopt a protest strategy similar to pattern bargaining in the auto industry.[2] In order to limit the tax liability of the group, the lead protester might bargain for a precedent-setting agreement with the appraisal district that would then apply to others similarly situated.

Public choice theory posits a barrier to this kind of collective action: the cost to individuals' pursuit of their self-interest through government exceeds the value to one individual of doing so, and the ability to be a "free rider" diminishes one's motivation to participate (Schneider and Ingram, 1997, p. 43). However, organizing a few similarly situated large property owners is much simpler and less costly, and has a higher payout, than creating a mass movement, as would be required for small commercial or residential property owners in a heavily populated urban county.

2 Pattern bargaining in the U.S. auto industry is the practice by which the United Auto Workers Union (UAW) selects one of the (formerly Big Three) automakers as a strike and bargaining target, negotiates an agreement, then negotiates a substantially similar agreement with the other automakers. If no agreement is reached with the selected firm, it is targeted for a strike, putting it at a competitive disadvantage to the non-selected firms. For a full discussion, see "Pattern Bargaining and UAW Wage Determination: An Empirical Examination" by John W. Budd, downloaded February 10, 2011 from http://ideas.repec.org/p/pri/indrel/655.html. In the property tax analogy, the lead taxpayer would negotiate a settlement with the appraisal district that, for example, uses a specific (favorable) capitalization rate in the calculation of property value from net operating income. The remaining similarly situated taxpayers then may apply that capitalization rate to their own properties because of the appraisal district's legal requirement to treat similar taxpayers equally.

While the appraisal district operates with state-mandated restrictions and disclosure requirements, property owners are free to collude, withhold (within limits) or present evidence, and challenge, protest and appeal valuations. Because of the economic and political power of class A office property owners in Fort Worth, for example, it is likely that such a group could effectively persuade a unit of government to conform to its wishes in general terms. In a different environment with, for example, many more class A office building owners who are more geographically dispersed or less socially connected, the opportunity and motivation for collective action would be less and the outcome might be different.

Even without assuming collusion among property owners, the unequal appraisal provision of the Tax Code encourages firms to take advantage of their rivals' success achieving below-market valuations. Class A office building owners have competitive reasons to "seek above all else" (Getzendanner, 2004, p. 98) equal valuations: having a real estate expense in line with competitors maintains a level playing field in setting rents and recruiting tenants.

2.2.4 Political Aspects of Valuation

The opportunity for a small subset of taxpayers to collude legally to lower the group's tax burden introduces political issues into the valuation process.

Even though anti-tax sentiment sparked the American Revolution, states used the property tax as a primary governmental revenue source while "people of influence created systems to protect their interests" (Renne, 2003, p. 103) including property tax exemptions. The perhaps well-founded suspicion of unfairness in the tax code permeates public discourse on taxes. Cornia and Slade (2005, p.17) attribute this suspicion, along with the unavoidability, economic burden and opacity of benefits of the property tax, to fueling the efforts of voters and legislatures to establish tax limitations.

Uniformity of valuations across property types is directly relevant to a study of class A office building valuation. The fact that owners of these buildings are putatively rich and powerful feeds the suspicion that they are being given a break at the expense of the rest of taxpayers

(Getzendanner, 2004, pp. 97-98; Renne, 2003, p. 103) as tax assessors are subject to various forms of internal and external political pressure (Cornia and Slade, 2005, p. 42).

Unequal property tax valuation takes the form either of vertical inequity, related to differently priced properties, or horizontal inequity, related to similarly priced properties (McMillen and Weber, 2008, pp. 653-654). These forms of inequity are statistically detectable and measurable. Harder to detect is inequality affecting a small enough group of property accounts that would not affect overall appraisal ratios and coefficients of dispersion, the usual statistical tests that demonstrate vertical or horizontal inequity.

Regarding differences between classes of taxpayers, Owens (2000) notes that "owners of property in prosperous neighborhoods may be more aware of property values and more likely to challenge an over-assessment than other taxpayers. Moreover, the desire to benefit politically powerful groups has long motivated the relative over- and under-assessment of entire classes of property" (p. 341). Specifically as it might relate to the valuation of class A office buildings, this assertion is of primary interest.

While tax appraisals in Texas are legally required to be at full market value for all property, various classes of property are treated differently by the specific actions of local governments. Commercial properties are generally fully taxed unless taxes have been abated by one or more local governments. This might be the case, for example, when a developer adds significant value to a parcel with new construction or renovation of a historic building. Owner-occupied residential properties, on the other hand, may benefit from exemptions for homesteads, over-65 or disabled persons, or disabled veterans; a 10% limit on annual increases in taxable homestead value; and tax freezes for persons over 65 or disabled (Combs, 2011b, p. 3). In some jurisdictions, residential and commercial property may qualify for tax abatements on increased value due to substantial property investment, as in a historic district or Neighborhood Empowerment Zone. In total, owner-occupied residential properties have a tax

advantage over commercial properties through the operation of exemptions, abatements, limits on annual increases and tax freezes, resulting in lower effective tax rates.

Does the residential property advantage influence property appraisal? It could be the case that appraisal districts view commercial property owners as relatively disadvantaged, since tax exemptions, limits and freezes are obvious markers of the apparent political, specifically voting, power of residential property owners. To Youngman, "the desire to benefit politically powerful groups has long motivated the relative over- and underassessment of entire classes of property [resulting in] over-assessment of business property, and underassessment of sing/le-family residential property nearly everywhere" (cited in Owens, 2000, 341). Tarrant County tax assessments in 2007-2009, of course, favored commercial over residential property owners. However, the relative tax burden may still be in favor of residential owners, given the extent of residential tax breaks proffered by local governments.

Conflict of interest provisions of the Local Government Code (Combs, 2011a, p.15) prohibit ARB members from granting favors to themselves or close relatives. The Open Meetings Act and Public Information Act (Combs, 2011a, p. 14) intend to create a transparent process for property tax valuations and protests. Explanations of unequal tax appraisals must go deeper than a superficial examination of public process and tax records and delve into the design of institutions and the limits of human cognition.

2.3 Explanatory Theories

2.3.1 New Institutional Economics

One bedrock assumption of traditional neoclassical economics is zero transaction costs. To adherents of the new institutional economics (NIE), "transactions are costly" (Furubotn and Richter, 2005, p. 47). The property tax collection system, of which valuation is a part, imposes significant costs on taxpayers directly through maintenance of the countywide

appraisal and collection authorities, and indirectly by imposing a burden of protest and appeal for higher than market valuations.

The inherent disadvantages of the property tax discussed above, such as the profusion and variable nature of local appraisal districts, the cost of administering large numbers of accounts, and the difficulty of appraising different types of property (Owens, 2000, pp. 343-344), are compounded by potential inefficiencies resulting from misappraisal, such as the misallocation of resources and suboptimal land use (Cornia and Slade, 2005, p. 18). The NIE concept of transaction costs encompasses not only these readily evident social costs, but also the opaque causes of misappraisal hidden in a thicket of appraisal district practices. Transaction costs apply to both sides in the protest and appeal process, and the additive effect is likely a significant deviation from economic efficiency.

Ostrom's (2005) delineation of the Institutional Analysis and Development (IAD) framework offers an entry point to discuss both the relationship among protesting property owners and the relationship between them and the appraisal district, all of whom are "actors" who: bring resources to bear, assign a valuation to situations and to actions, acquire and use information, and select particular courses of action (p. 828). For Ostrom (2005), "[w]hen the outcomes are productive for those involved, they may increase their commitment to following the rules and norms that have evolved over time so as to continue to receive positive outcomes" (p. 828). This positive reinforcement can encourage behaviors by taxpayers and by CAD officials to resolve potentially contentious–and costly—tax protests by striking a final valuation different from market value, despite legal requirements to the contrary.

Local governments fund and oversee operations of the appraisal districts. Those governments' susceptibility to political pressure, despite the obvious revenue benefits of high valuations on class A office properties, mean that appraisal districts may be disposed to limit valuations (and thus tax burdens) to a point below the threshold of political pain—pain for themselves or for their parent governments. The situation of higher than market valuations is

likely to be rare due to commercial property owners' propensity to protest and the economic disadvantage of having a higher proportional tax burden than peers.

Class A office building owners operate within a regulatory framework of the tax valuation and protest process governed by state law that encourages cooperation among themselves, due to the legal right to protest based on unequal valuation (Property Tax Code §41.43(b), n.d.). The state constitution, laws and legal traditions protect property rights (Property Taxpayers' Bill of Rights, n.d.) and limit the range of action by the appraisal districts, all of which reinforces the cooperating behavior among protesters by producing mutually beneficial outcomes to valuation protesters, i.e. lower property taxes, and arguably to CADs: expeditious valuations, fewer protests, less litigation.

These institutions and practices include, in the tax appraisal system, an alternative appeals process to the State Office of Administrative Hearings in certain counties for properties valued at $1 million or more (Combs, 2011a, p. 74), and imposition of a "substantial burden of evidence" on the chief appraiser for a valuation increase in the year following an agreed or court-ordered settlement of value (Popp, 2009). Only wealthy property owners clear the $1 million hurdle. Only taxpayers who protest can achieve the type of settlement that shifts a substantial burden of proof to the chief appraiser. Owners of highly valuable commercial property, of all property owners, have the most to gain from protesting and achieving a settlement because of the competitive importance of the property tax expense.

Williamson (2000) views events arising within the formal features of the institutional environment as contractual issues that can be described in terms of transaction cost economics. For example, cooperative behavior of taxpayers on unequal value protests may be viewed contractually as "a problem of reaching and enforcing a cartel agreement" (footnote, p. 608). In the case of protesting property owners, it is conceivable that social and business ties among this small group exert pressure for conformity, and the positive outcome of a reduced tax burden reinforces this behavior. A shared distrust of the power and doubt of the effectiveness

of government, along with a pecuniary motivation to limit operating expenses, may work together to set the behavioral norm of tax protest cooperation.

The NIE recognizes the shifted tax burden that would occur by undervaluing large commercial properties. But as noted by Ostrom (2005), "[w]hen scholars, policy analysts, officials, and citizens try to change the structure of the action situations,…they face a much more demanding task than simply 'assuming law and order and an open, competitive market'" (p. 836). In this case, they face a local political system that has delivered the tax collecting institution that the state legislature and economically and politically powerful local agents have created. According to North (1990), institutions, "or at least the formal rules, are created to serve the interests of those with the bargaining power to devise new rules" (p. 16). If inequality or other problems arise, the solution would likely require the involvement of local officials and the taxpayers to whom the tax burden is shifted cooperating to exert a countervailing pressure on CADs to allocate the tax burden equitably.

The property tax assessment system in Texas is a crucial part of a statewide institution of funding the operation of local government, especially schools. This process of valuing residential, commercial, business personal, industrial, and agricultural property presents significant challenges to 253 variably skilled, funded, and staffed countywide jurisdictions.

On top of the inherent complexities of valuation, county appraisal districts are an integral part of the local political and governance framework. The local taxing jurisdictions elect the appraisal district's directors and fund the agency, and the CAD's board of directors appoints the chief appraiser (Texas Property Tax System, n.d.). Appraisal review boards that hear taxpayer protests to CAD valuations are made up of "citizens from the community" (Texas Property Tax System, n.d.) appointed by the CAD board of directors. Pressure on the chief appraiser for a particular level of appraisal could in theory be exercised through local governments' board appointment and budget approval powers, through CAD board members' decisions on initiating appeals, or through ARB decisions in specific cases.

Due to having a fixed budget to accomplish its mission, the appraisal district may have motivations that could result in below-market valuations. For example, by appraising valuable properties so as not to provoke a taxpayer protest, the CAD achieves a budget savings while it is local governments that suffer the loss from foregone tax revenues. This outcome is contrary to expectations of the revenue-maximizing behavior of local government that might be predicted by public choice or neoclassical economic theory. McGuire for example, in a discussion of the effects of tax limitations, finds evidence of a revenue-maximizing "Leviathan" government (McGuire, 1999 cited in Dye, 2010, pp. 221-222).

Undervaluing certain classes of property might be revealed through the comptroller's property value study, which randomly samples and analyzes appraisal levels (Combs, 2011b, p. 1). However, the sampling is done in large categories of property, such as commercial real property, so patterns of undervaluation could go undetected if limited to a subset of the larger category and if overall progressivity or regressivity is avoided—that is, if there is no statistical pattern of differing levels of appraisal between higher value and lower value properties within the category. This assertion follows from the limited statistical tests performed in the property value study (Combs, 2011b, pp. 5-20) and the fact that no testing is done that compares subsets within a property category, other than through stratification by value (p. 10).

The reason that apparently inefficient institutions persist is because "institutional change and restructuring towards a more efficient system is costly" (Tang, et al., 2011, p. 860), and is often "thwarted by cumulative past experiences, opposing organizations and prevailing beliefs" (Tang, et al., 2011, p. 861, citing North, 1997).

The NIE provides a useful standard for proposed institutional change: Williamson's (2000) remediableness criterion, which "holds that an extant mode of organization for which no superior *feasible* alternative can be described and *implemented* with expected net gains is presumed to be efficient" (p. 601—emphasis original). The critique of Texas property tax

valuation should point toward feasible and implementable alternatives in order to realize any benefit.

According to Tang, et al. (2011), "the legitimacy of a market-value-based property tax system cannot be established unless the public is allowed a fair opportunity to challenge and alter government decisions" (p. 870). Valuation transparency and an efficient and fair protest system are institutional requirements for public acceptance of the property tax system.

2.3.2 Bounded Rationality

Commercial real property appraisal is a costly, painstaking, time-consuming exercise requiring a considerable level of skill and training. An appraisal done for a private sector client, such as a property buyer, seller or lender, involves a detailed examination of a single property of a single type using all relevant valuation methods (income, cost and comparable sales) to arrive at an opinion of the most probable value. The appraisal report, which may be several dozen pages, details the reasoning behind the selection and application of the most relevant appraisal method and how the opinion of value was determined.

Public sector appraisal agencies, on the other hand, are required by statute to appraise thousands or, in an urban district, possibly hundreds of thousands or more properties of varying types within a period of mere months, given a firm deadline and limited budget. While Texas CADs are not required to reappraise more frequently than every three years (Valuing Property, n.d.), the agencies must maintain cadastral records including complex geographical information systems accurately identifying every property within the boundary of the agency, provide for appraisal review board hearings, answer protests, decide on undertaking appeals, and respond to public requests for information about valuations, procedures, etc. Often, at the end of the appraisal process, the CAD's valuation is subject to dispute by a motivated property owner and potentially a tax consultant working on a percent-of-reduction fee basis.

The protest and resolution process that resolves disagreements over value between taxpayers and government is by nature adversarial. Resolutions of final valuations have

substantial economic significance for individual taxpayers and, in aggregate, for local governing bodies. In addition, CADs are subject to a further level of oversight from state government, which has an interest in equal valuation due to school-funding formulas.

In this environment of limited time and limited budgets, exacting workloads, distorted incentives, adversarial relationships, state oversight, and potential political pressure, appraisal agencies are institutionally constrained. Compounding these difficulties are policies (e.g., statutory sale price nondisclosure, protest based on unequal appraisal) and circumstances (dearth of sales, heterogeneity of properties) that present additional hurdles to the valuation of commercial property. Further complicating this environment are the limits on human beings' ability to be fully rational in situations of great complexity, a condition known as "bounded rationality."

The bounded rationality thesis asserts that "people making choices are intendedly rational,...[desiring] to make rational decisions," but not always able to do so (Jones, 1999, p. 298). At times, rationality fails and a mismatch occurs between the choices of the decision-maker and his environment (Jones, 1999, p. 298).

Herbert Simon originated and then refined the concept of bounded rationality over the last half of the 20th century as an explanation for the observed divergence of human behavior from that of the completely rational utility maximizer of neoclassical economic theory.

In the 1950s, "Simon suggested that agents would consider some threshold of satisfaction" (Munier, et al., 1999, p. 234)—what Simon called "satisficing" behavior—rather than maximize a utility function. Later he theorized that "rather than behaving as utility maximizers, economic agents follow some reasonable procedure, or sequence of thoughtful steps" in deciding issues (Munier, et al., 1999, p. 234). Finally, in the 1990s, Simon noted that this reasonable procedure is "characterized by at least two stages: *recognition* and *heuristic search*" of possibilities (Munier, et al., 1999, p. 234—emphasis original). These departures from the behavior of the rational utility maximizer of orthodox economics constitute bounded

rationality, a construct that has explanatory power for the outcomes of the property tax appraisal process.

So-called “satisficing” behavior might be seen in CAD appraisers reaching a level of valuation that is close to fair market value, but not high enough to incite a protest. Following a reasonable procedure (rather than maximizing utility) might be revealed in ways the valuation process diverges from the strict appraisal model laid out in USPAP, e.g. starting from last year’s value, negotiating with the property owner, etc. Identifying separate stages of recognition and heuristic search would be difficult to uncover and would likely require the cognitive testing of subjects that is beyond the scope of this research project.

Simon contrasts the approach of neoclassical economics with the other social sciences, psychology in particular, regarding basic assumptions of rationality. Neoclassical economics is silent on “the content of goals and values” of the agent and assumes behavioral consistency that is “objectively rational in relation to its total environment” (Simon, 1986, p. S210). In contrast, the other social sciences seek empirically to understand: “the nature and origins of values” and how they change with experience; the individual and social processes that select certain aspects of reality as the basis of decisions; the “computational strategies…used in reasoning, so that very limited information-processing capabilities can cope with complex realities;” and how “non-rational processes (e.g., motivations, emotions, and sensory stimuli) influence the focus of attention and the definition of the situation that set the factual givens for the rational processes” (Simon, 1986, p. S210).

Thus, neoclassical economics views rationality “in terms of the choices it produces” (substantive rationality), while the other social sciences are concerned with “the process it employs” (procedural rationality) (Simon, 1986, p. S210).

Jones (1999) distinguishes between “environmental demands (seen by the individual as incentives, positive or negative) and bounds on adaptability in the given decision-making situation” (p. 298). Knowing the environmental demands should allow for prediction of behavior

based on rational choices; departures from those predicted behaviors reveal bounds on rationality.

Simon's original insight into the bounds of human rationality in policy making has parallels to property tax valuation. As recounted in Jones (1999, p. 300), Simon returned home to Milwaukee from undergraduate study at the University of Chicago and observed the horse-trading that constituted the budget process for the city's recreation department.

A rational budget process would "simply compare the marginal utility of a proposed expenditure with its marginal cost, and approve it only if the utility exceeded the cost…[Instead], I saw a lot of bargaining, of reference back to last year's budget, and incremental changes in it" (Simon, quoted in Jones, 1999, p. 300).

A parallel is found in the perception of some property owners of their property tax burden, i.e., in terms of an incremental change from their prior year burden. This notion is enshrined, in residential property taxation, in percentage limits on year-over-year increases in the taxable value of a homestead (Moak, Casey & Associates, 2004, p. 6). It may also be how CAD appraisers sometimes approach setting commercial property valuations: using the prior year value as a starting point and positing some "fair" or plausible increase to account for inflation, changes in the market capitalization rate, etc. Clearly not a by-the-book method of conducting property appraisal, this type of behavior would fall into the category of a "satisficing" rule of thumb that achieves the limited set of goals (getting the job done, perhaps avoiding a protest) of a boundedly rational appraiser.

Jones (1999) asserts that three "facets of human cognitive architecture [account] for a very large proportion of the deviations from adaptation" to the external environment: attention, emotion, and the tendency of humans to "'overcooperate,' that is, to cooperate more than strict adherence to rationality would dictate" (p. 298). For Simon, overcooperation derives from human docility, which contributes to evolutionary fitness. Simon (1993) defines docility as "*the tendency to depend on suggestions, recommendations, persuasion, and information obtained*

through social channels as a major basis for choice" (p. 156, italics original). The implication for property tax valuation is the possibility that appraisers may tend to lean toward property owner perspectives or assertions without adequate skepticism.

The observance of overcooperation—that is, cooperating with other actors more than is necessary to accomplish one's goals—may be a rational reaction to the task (or game) environment. In extended play, or in work environments where repeated interaction takes place over a long period of time, people use cooperative strategies "in the rational hope that such offers will be reciprocated, making both parties better off" (Jones, 1999, p. 317). In tax appraisal, appraisers may interact with taxpayers year after year. In this situation, cooperative behaviors, such as below-market appraisals that avoid protests, have a mutual payoff. This recalls Ostrom's (2005) observation that positive outcomes reinforce commitment to evolved rules and norms (p. 828).

The "fundamental premise underlying organizational studies in political science" is that these human tendencies cause "the behavior of organizations [to mimic] the bounded rationality of the actors that inhabit them" (Jones, 1999, p. 302). For government organizations, the most salient theoretical components are "limited attention spans, habituation and routine, and organizational identification" (Jones, 1999, p. 302), giving rise to such notions as Cohen et al.'s (1972) garbage can model of organizational choice, Lindblom's (1959) incremental decision making model, and the routinization of organizational decision making (all cited in Jones, 1999, pp. 303-304).

Such characteristics, if exhibited by appraisal agencies, might adversely affect appraisal accuracy. For example, organizational rules might be followed even when appraisals clearly depart from fair market value. Contradictory demands, such as between appraisal accuracy and avoiding protests or meeting performance targets, might be handled in different ways depending on "which set of rules was activated" (Jones, 1999, p. 304). As described above, appraisals might be set by reference to last year's value plus or minus some factor for economic

change, analogous to incremental budgeting. Appraisers may tend to be credulous with taxpayer submissions on income and expenses.

Boundedly rational decision makers depart in many ways from the fully rational utility maximizer of orthodox economic theory. Each of these departures could have an analog applicable to property tax appraisal. For example, people "do not undertake complete searches for information, and they ignore available information—especially if it is not relevant to the factors they have determined to characterize the structure of the problem" (Jones, 1999, p. 306). Thus, information available in public filings of corporations might never be consulted. Even seemingly obvious information sources, such as submarket leasing data and past sale prices, might be ignored.

People are subject to cognitive illusions and framing, or the tendency to shift preferences depending on how choices are stated such as in negative terms vs. positive, in terms of losses vs. gains, etc. (Jones, 1999, p. 306). One such frame is using the prior year's valuation as the starting point for an appraisal, versus starting from the current income and expense data of the property.

People are also "incomplete Bayesians." That is, they "do not update their choices in light of incoming information about the probability of outcomes" (Jones, 1999, p. 307) as quickly as probability theory would predict. This could lead to persistent tax undervaluation in a rising real property market, and the opposite condition in a falling market, though the latter outcome would likely be contended by protesting taxpayers (see, e.g., Allen, 2009, p. 40).

Finally, in repetitive situations, people "often come to identify both cognitively and emotionally with the means, or subgoals of a decision-making process" (Jones, 1999, p. 307). If so, they are slow to shift to a more effective problem solving mechanism (March, 1994, cited in Jones, 1999, p. 307). If an appraisal method is outdated, but perceived as "reliable," appraisal agencies may produce inaccurate appraisals which, if they survive in a Darwinian fashion, would tend to be below-market due to protests of above-market appraisals. Mass appraisal

techniques of the type to be tested in this research project may be one such alternative means of problem solving for many appraisers.

The ambiguity of the property tax appraisal process may play a role in accuracy. Ambiguity involves situations where the relative importance of a problem's attributes are unclear or, more fundamentally, where "alternative states are hazily defined or [where] they have multiple meanings, simultaneously opposing interpretations" (March, 1994, quoted in Jones, 1999, p. 308).

Given the expected consequences of a high, middle, or low valuation, as these may be perceived by a CAD appraiser, it is possible that the perceived larger unfavorable consequences of a high appraisal (as compared to a low appraisal) might tip the scales to the low side. In situations of identical probable payoffs, people tend to favor less risky alternatives even in violation of L.J. Savage's second postulate, which states that given a preference of A to B if C obtains or if not-C obtains, a rational person prefers A to B despite the uncertainty of C (explained in Ellsberg, 1961, p. 649).

Ellsberg (1961) formulates a decision rule that explains this unexpected behavior through a trick of discounting the "riskier" scenario (pp. 664-665). The implication is that "the rule will favor—other things (such as the estimated expectation [or payoff]) being roughly equal—actions whose expected value is less sensitive to variation of the probability distribution within the range of ambiguity" (Ellsberg, 1961, p. 666). That is, an alternative with more unknowns and a chance of very bad results is disfavored by discounting its payoff beyond its expected probable result.

This tendency explains risk-averseness to new situations and new ways of doing things, since estimating probable outcomes is harder to accomplish with the untried or unfamiliar. The agent is acting "*'as though' the worst* [case scenario] *were somewhat more likely than his best estimates of likelihood would indicate*" (Ellsberg, 1961, p. 667—emphasis original).

In property tax appraisal, it would be helpful to discover whether the agent (appraiser) believes he often understands what level of valuation will tend to trigger a protest. Self-reported lack of insight into this matter would indicate greater ambiguity, with probable follow-on consequences of risk-averse, below-market appraising behavior.

Jones's (1999) application of bounded rationality to Eugene Fama's efficient market hypothesis illustrates how non-Bayesian updating behavior, contagion and emotion can explain stock market and other financial market bubbles (pp. 312-313). This evidence is revealed by contrasting the postulated normal distribution of price variations with the observed leptokurtic distribution having thinner peaks and fatter tails. These are not "bizarre deviations….Intendedly rational actors may deviate from fully rational actors, but the deviation will be attenuated in well-functioning institutions" (Jones, 1999, p. 313). Can a similar distribution of appraised values over time, if such exists, be explained by bounded rationality? The evidence would be found in a test (not attempted here) of leptokurtic distributions of appraised values versus normal distributions of market values.

The property tax valuation environment appears to have enough conflicting external incentives to render unreliable any firm predictions of rationality. For example, state law requires valuation at the standard of fair market value. However, agencies must operate within the constraints of their budget, staffing levels and deadlines on the calendar. It may be that a (boundedly) rational response to an appraiser's external environment could result in below-market valuations, despite law and policy. In this case, one may expect that an appraiser's response to an anonymous survey would indicate whether his appraisals are at times below his perception of fair market value.

Resolving whether bounded rationality is at play requires separating the behavior that responds to external incentives from behavior internal to the agent (appraiser) (Jones, 1999, p. 311). This is likely impossible in the case of property tax appraisal, absent the cognitive testing referenced earlier. Because such testing is beyond the scope here, bounded rationality will be

inferred from answers to Likert-scale questions that provide respondents with situational choices that reveal “satisficing” behavior or procedural rationality.

Future research might, as Jones (1999) suggests, “use the rational model to estimate what fully rational actors would do given the external situation. This is a possibility only when one understands the structure of the situation and the frame that would be used by rational actors” (p. 311).

The present study may contribute to understanding the structure of the property tax appraisal situation—and the frames used by appraisers—so that boundedly rational behavior in appraisal could be better defined and distinguished from rational responses to environmental demands. The first step is devising a quantitative model for valuing commercial real property that could be implemented in mass appraisal fashion, establishing a basis on which to compare outcomes of the current process to the standard and constitutional requirement of fair market value appraisal. Jones (1999) then suggests looking at “the internal workings of such institutions—in effect, to trace the processes that lead to the outcomes of interest” (p. 319) to distinguish responses to environmental demands from bounded rationality. The survey of commercial real property tax appraisers may clarify these processes.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Approach

The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities is to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies. This research project uses a case study comparison approach to highlight similarities and contrasts of class A office building appraisal methods and valuations from the five most populous cities in Texas.

The comparative case study has two parts: (1) a valuation model based on accepted mass appraisal principles to generate values to compare to historical appraisals; and (2) a survey of licensed tax appraisers employed in the commercial real property departments of the five CADs. The valuation model demonstrates variation between counties, and the survey of tax appraisers suggests the causes of and possible solutions to that variation.

Texas law does not require the disclosure of property sale price in a transaction between private parties, presenting a potentially significant hurdle to the accuracy of commercial property appraisals since all three valuation approaches (income, cost and comparable sales) require sale price data. Additionally, taxpayers in Texas may protest property valuations either on the basis of appraisal that exceeds market value or on the basis of unequal appraisal (Combs, 2011a, p. 24). In theory, successful protests based on unequal appraisal could lower the appraisal level of a group of similar properties to a level below that of dissimilar properties. Given the uniform statewide legal regime, differing valuation levels between county appraisal districts are likely due to local methods and circumstances. These

statewide similarities and local differences inform the discussion of technical, legal, procedural and political causes of misappraisal.

The investigation began with Tarrant County because, based on Comptroller Property Value Studies of the five largest counties, it has the largest degree of misappraisal between commercial real property and other property types. In Chapter 1, a simplified calculation of the average value of downtown Fort Worth class A office buildings in 2010 indicated a variance from market value of approximately 35%. This outcome, in a county where the Comptroller had detected a 10% undervaluation of commercial property in general, warranted further investigation. Given the significant value of class A office buildings, any consistent or widespread departure from market value by more than 10% would likely be a concern to taxing jurisdictions due to the possibility of foregone tax revenues.

The valuation model developed below looks at the population of approximately 95 class A office buildings in the downtowns of the five largest Texas cities over the period from 2005 to 2011. Investigating five different county appraisal districts kept the research project manageable while offering opportunities to discover contrasting approaches to tax appraisal.

The study concentrated solely on downtown class A office buildings for two reasons: (1) there is a relatively large amount of taxable value represented by these properties in a small number of accounts, making the investigation both significant and practical; and (2) using a well-defined relatively homogeneous subset of competing commercial properties in a well-defined submarket (the Central Business District) in each city makes it possible to construct a simple valuation model with a reasonable expectation of accuracy. Class A office buildings as a group have an impact on the local tax jurisdictions' total tax base that is disproportionate to their small numbers. These are equivalent to Getzendanner's (2004) "trophy" properties and as such, their assessment impact "usually extends beyond the individual property" (p. 87).

Downtown class A office buildings constitute a single property type in a single submarket of competing property owners. The relative similarity of these properties, versus the heterogeneity of commercial real property generally, creates the opportunity to apply mass appraisal techniques to value the group. Stratification by use (office), quality (class A) and location (downtown CBD) properly "define[s] the scope of a mass appraisal model" (Gloudemans and Almy, 2011, p. 140). The valuation model thus created may serve as a template to construct models for other commercial property types (e.g., class B office, suburban office, retail strip center, retail mall, etc.).

Selected for study were the five counties of Harris, Bexar, Dallas, Travis and Tarrant because they are home to the five largest cities in Texas: Houston, San Antonio, Dallas, Austin and Fort Worth, respectively. Each of these cities has an established downtown with a competitive market of multi-tenant class A office buildings, although the sizes of these markets vary considerably. While the five counties have similar central business districts and real estate markets, the corresponding appraisal districts may have different procedures, strengths and appraisal outcomes that informed this study.

Understanding the causes of any pattern of inaccurate valuations in each downtown required looking at the practices and procedures of the particular CAD. Are there CAD-specific reasons that values vary from market value in a recognizable pattern? The survey of appraisers was intended to shed light on that question.

This project used a mixed method approach, combining quantitative and qualitative methods. Quantitative methods are used to measure any variation from market value of the selected properties within each downtown. For the qualitative portion of the study, tax appraisers involved in the commercial property valuation process were surveyed to understand their perceptions of policies, customs and practices of their agency. The survey's purpose was

to understand how CAD practices and policies affect appraisal accuracy. The findings suggest ways to improve CAD appraisal accuracy.

The design of this research project followed from the research questions. If tax valuations diverge significantly from market value, the causes of such discrepancies required investigation. Any variations in accuracy between CADs have no obvious cause, since the legal regime and constitutional requirement of equal valuation is the same statewide. Limitations on accuracy may derive from technical, legal, procedural or political causes, as detailed above in the review of literature.

Technical issues may arise if appraisers lack specific market knowledge, appraisal skill or appropriate tools such as computer software, and those factors may vary between CADs.

Legal causes of mis-valuation could be a result of state laws that favor protesters or put constraints on CADs in the appraisal process; court decisions that favor taxpayers' arguments on market value over CADs' arguments; or CAD Boards of Directors that interpret state law in varying ways, affecting final valuations stemming from appeals or protest resolutions.

Procedural issues may obtain when the protest-appeal-resolution process advantages those taxpayers able to navigate it successfully, presumably including wealthy commercial property owners; when limited CAD resources are diverted to resolving thousands of smaller protests rather than being devoted to larger cases; or when appraisal review boards lack adequate data or understanding of the forces driving market values.

Political aspects of tax valuation may include powerful taxpayers exerting influence to limit their property's appraisal or the valuations of a class of similar properties; or local governments limiting CAD budgets so that inadequate resources are available to engage with protesting taxpayers.

Because the study may be perceived as critical of the job performance of CAD appraisers, it was important to allay concerns about the use or possible misuse of the data gathered. There could be repercussions for appraisers or other CAD employees, municipal or state officials, or the author in exposing any pattern of mis-valuation and speculating on its causes. Strict anonymity and confidentiality of individual survey responses must be maintained to avoid these potential consequences.

While a purely quantitative study of property tax assessment variation would be informative, it would not help explain the causes of such variation. Therefore, a qualitative approach, a multiple case study involving a survey of licensed property tax appraisers, was chosen as a companion to the valuation model. The survey population selected were the employees of the five CADs responsible for the valuation of commercial properties like those used in the quantitative study.

According to Merriam (1998), quoted in Bloomberg and Volpe (2008, p. 80), the case study design elicits "an in-depth understanding of the situation…The interest is in process rather than outcomes, in context rather than a specific variable…" This process-oriented methodology is useful for investigating the obstacles to accurate appraisal and applying the theoretical explanations from the literature review.

3.2 Valuation Model Design

3.2.1 Introduction and Overview

The valuation model developed for this study measuring variation in the accuracy of commercial property tax appraisal centers on these two research questions: Can a model for valuing a particular type of commercial property be constructed that would be more accurate than historical tax appraisals at predicting market sale prices, and can this model be applied by

appraisal districts to this and other property types to increase the accuracy of tax appraisals? Does appraisal accuracy vary from county to county?

The specific hypotheses being tested by this comparative study address first the question of variation of tax appraisals from fair market value generally, and then whether there is variation in appraisal levels between CADs. First, taxable values of the selected properties were tested to determine if they vary from market value in each county on average by more than 10%, the approximate level of variance measured by the state Comptroller for Tarrant County commercial property appraisals in Tarrant County in 2007, 2008 and 2009 (Combs, 2010). Next, the overall average level of variation between counties was calculated. The two hypotheses being tested are:

H1: On average, the final tax appraisals of CBD class A office properties in a county vary measurably—by more than 10%—from fair market value.

H2: On average, there is a difference in the average variation from fair market value of the final tax appraisals of CBD class A office properties between counties that exceeds 25%. Since the average percentage variations from fair market value are expected to be small, a noteworthy difference between two such averages would need to equal or exceed 25%. For example, a 10% variation in one county is 25% greater than an 8% variation in another county: (.10 - .08) / .08 = .25.

The null hypotheses are:

$H_0$1: $\mu(\,|FMV - TAX| \div TAX) < .1$, i.e., for all properties within a county the mean of the absolute value of the difference between FMV and TAX divided by TAX is less than 10%, where FMV is the fair market value of a property calculated by the valuation model and TAX is the final taxable appraised value from the CAD record.

$H_0 2$: $(\mu 1 - \mu 2) \div \mu 2 < .25$, where $\mu 1$ and $\mu 2$ are the mean percentage variances from fair market value, as calculated in $H_0 1$ above, for every pair of counties.

The project used quantitative analysis to compare tax appraisals of downtown class A office buildings over a period of six years (2007-2012) to a calculated estimate of market value. A mass valuation model was built by using asking rents, market vacancy and CBD-average expense data to generate a net operating income amount which was then capitalized to arrive at the estimate of market value. The individual property values thus derived were compared to CAD valuations, and measures of individual property accuracy and overall CAD accuracy were computed (for H1). Averages in variation for the individual CADs were then compared to one another (for H2).

The counties and properties were selected for comparability so that CAD valuation levels could be compared and contrasted on relatively equal footing, which requires similar property markets and property uses. The five most populous Texas counties (Harris, Dallas, Bexar, Travis and Tarrant) each contain a city (Houston, Dallas, San Antonio, Austin and Fort Worth) at the heart of a major metropolitan area. While the downtowns of these five cities are diverse, particularly in their relative sizes, they all contain a historical central business district that is home to a major office submarket. These five office markets, particularly their class A office buildings, provide the required similarity of use (office), class (A) and submarket (CBD) for comparability across counties and sufficient homogeneity to construct an automated valuation model. The five different county appraisal districts' operations provide contrasting management examples.

The valuation model relies on market data from a variety of private companies, and its results are compared to appraisal district valuations from the websites of the CADs (Bexar Appraisal District, 2012; Dallas Central Appraisal District, 2012; Harris County Appraisal District,

2012; Travis Central Appraisal District, 2012; and Tarrant Appraisal District, 2012). Market data, including asking rental rates, building sizes, downtown average expenses, and market-specific capitalization rates, was drawn from CoStar Group, the Building Owners and Managers Association International (BOMA), and Integra Realty Resources (IRR). This data provides the basis for the valuation model's comparison to appraisal district values.

CoStar Group touts itself as "the number one provider of commercial real estate research and information services for property investors and sales professionals in the United States and United Kingdom" (CoStar Group, 2012). According to Tidwell (2011), CoStar data has been used in "several recent scholarly studies published in respected journals" and is expected to be free from bias "as CoStar does not have a direct stake in the outcome of commercial property transactions or derive any commissions from the leasing or sale of property" (p. 47). CoStar provides data on building rentable area, historical asking rental rates and sales information, and current expense and lease terms. CoStar office building quality ratings (A, B or C), use categories (office, retail, industrial) and submarket classifications (e.g. central business district) were used to define the population of class A central business district office properties that are the subject of this analysis.

BOMA's Experience Exchange Report is "the most comprehensive resource for financial performance information on private and public office buildings in the U.S. and Canada" (BOMA, 2012). BOMA collects building income and expense data from an online survey and "aggregates the data and presents the information in terms of averages, medians, upper and lower quartiles for aggregate markets" (BOMA, 2012). BOMA's CDB-average expense data was used for the valuation model.

The IRR-Viewpoint (2011) contains market data gathered from appraisal professionals who "provide quality real estate valuation and counseling services to investors, lenders, developers, governments and property users throughout North America" (p. 1).

The valuation model used criteria important to investors to derive market value, which was then compared to the final values recorded by the CADs. The resulting comparisons illustrate variation between counties. Property sale prices from a variety of sources was compared to both the derived market value estimates and final appraisal district valuations. These comparisons provide a measure of accuracy of the two sets of values.

This section 3.2 contains a literature review on automated valuation models, specific property categorization criteria, and detailed information on data collection methods. This section also describes the construction of the valuation model and how data was analyzed and synthesized. Limitations and a summary of the model complete the section.

A simple calculation was used in Chapter 1 to estimate the potential variance from market value of approximately 35% for class A office buildings in downtown Fort Worth (Tarrant County). The model developed below uses local average building expense data, specific-property asking rents and appropriate local capitalization rates.

3.2.2 Automated Valuation Models

Automated valuation models are used in mass appraisal situations where "many properties must be appraised for the same purpose" in a cost-efficient manner (Gloudemans and Almy, 2011, p. 1). Mass appraisal, according to the USPAP definition, is "*the process of valuing a universe of properties as of a given date using standard methodology, employing common data, and allowing for statistical testing*" (cited in Riley and Joyner, 2012, p. 4—italics original). The intended output of an automated valuation model is the market value of a property, that is, "its most probable sale price" (Gloudemans and Almy, 2011, p. 2).

According to USPAP Standard 6 for mass appraisal, a mass appraisal includes these typical steps:

(1) identifying properties to be appraised;

(2) defining [a] *market area of consistent behavior that applies to properties;*

(3) identifying characteristics (supply and demand) that affect the creation of value in that market area;

(4) developing a model structure that reflects the relationship among the characteristics affecting value;

(5) calibrating the model structure to determine the contribution of the individual characteristics affecting value;

(6) applying the conclusions reflected in the model to the characteristics of the property(ies) being appraised; and

(7) reviewing the mass appraisal results. (USPAP, 2012-2013 edition cited in Riley and Joyner, 2012, p. 5—italics original).

The valuation model developed in this project follows these steps. First, the universe of properties to be valued comprises class A office buildings in the CBDs of the five largest cities in Texas. This both identifies the properties to be appraised and defines the market area of consistent behavior. Next, supply and demand characteristics affecting value are identified as the asking rents of the properties and the market occupancies and average expenses of the market area, which provide a projection of annual net operating income. The NOI is then divided by a market-specific capitalization rate, which provides an estimate of market value. The simple model developed here correctly reflects the relationship among those characteristics (rents, expenses, occupancies, capitalization rates). The results of the model were reviewed and tested for accuracy by comparing computed values to actual sale prices where available. It

was determined, given the available data, that no calibration of the model was needed. The computed values were then compared to tax appraised values to measure CAD assessment accuracy.

Because Texas is a property sale price nondisclosure state, sales data is neither always available nor completely reliable. This limitation makes it difficult to test for appraisal accuracy. Further, the use of sale price as a proxy for market value is a matter of dispute in the literature. So-called "sales chasing" involves the reappraisal to the sale price of properties that have recently sold, or using recent sales to reappraise all similar properties. Sold properties may have different characteristics from properties that have not sold, so the use of sale prices in ratio studies in any manner other than through random selection from a population of all properties is suspect. This requirement was relaxed in the calibration phase of model construction in order to take into account the effect of excess vacancy on building values.

The purpose of developing the automated valuation model is different from calculating assessment inequity (for the latter discussion, see, for example, Decesare and Ruddock, 1998). Here we are only trying to, as it were, build a better mousetrap in regard to tax assessments. Whether deviations of tax assessments from market value at this high end of the property ladder result in inequities with lower-priced commercial or residential properties is an important but separate matter.

The accuracy of the model is illustrated by comparisons to actual sale prices, which are perhaps the best indicators of fair market value. According to Gloudemans and Almy (2011), "[p]rices reached in actual market transactions can provide sound evidence of the market value of similar properties" (p. 2).

3.2.3 Categorization of Properties

The overall basis for selection of CBD class A office properties in the five largest Texas counties was described in the introduction to this section 3.2. The valuation model requires precise identification of properties to ensure that comparable entities are being tested between the valuation model and appraisal district records.

Typically, CAD delineation of a parcel follows property platting, which may or may not represent the way investors conceptualize individual properties. For example, an office building with a nearby but separate parking garage may be platted as two separate properties, but could sell to a new owner as a single unit. CoStar provides the basis of how properties are defined for this study, and generally speaking, CAD records are combined or otherwise resolved to conform to this definition of individuality. However, CoStar sometimes contains data showing that multiple proximately located properties have sold as a single portfolio. In this instance, adjacent properties that are represented separately in CoStar are combined in order to create as-sold comparisons to CAD records. A complicating factor is that CoStar and the CAD may not have the same address or addresses associated with a specific property.

In the database that was constructed from CAD records of the five counties, a search was performed in the following order to confirm which CAD record(s) correspond to the property as identified by CoStar:

1. Records with the same owner name and legal description;
2. Records with the same physical address;
3. Records of nearby properties included in the most recent sale recorded in CoStar.

The goal was to ascertain the CAD record or records that constitute the CoStar-identified stand-alone property. Generally speaking, parking structures are grouped and sold with the office building they serve, as is integrated retail space.

A complicated but instructive example is the group of buildings in downtown Fort Worth formerly known as the RadioShack campus and now called Tarrant County College Trinity River Campus. The property consists of several office buildings, a parking garage and a former RadioShack retail store. Presumably because the various office buildings were at one time available for lease, they now appear as individual properties in CoStar even though served by a common garage, built as a unitary campus and twice sold as a single unit. The Tarrant Appraisal District splits the property between the tax-exempt portion used by the college and the taxable portion currently leased by RadioShack. CoStar splits the property into six distinct property records.

The guiding principle is to reconstitute the property in the manner an investor would view and value it. Therefore the six CoStar records are combined into one property record, and then compared to the two Tarrant Appraisal District records combined. In reality, the lack of reliable rental data prevented the model from valuing the TCC/RadioShack property.

Similarly, the Pennzoil Place North and South Towers (711 Louisiana St. and 700 Milam St.) in Houston are listed separately in CoStar but combined by the Harris County Appraisal District into a single parcel record. Because there is no ready way to divide the appraisal district value between the two towers, comparison is made possible only by combining the two CoStar listings into one.

Buildings that are wholly government-owned and -occupied are removed from the analysis since there is little basis for a market-based valuation analysis, and, in the case of the Harris County Criminal Justice Center, no appraisal district valuation to use for comparison.

In theory, both single- and multi-tenant buildings could be included in the analysis, though these two building populations are usually best valued by different methods: comparable sales and income approach, respectively. All such buildings of similar use, quality and submarket location tend to have similar features and function, and should be comparable in value, subject to capital expenses that may be required to switch between a single user and multiple users and vice versa. By including both types, the analysis of multi-tenant buildings would benefit from using comparable sales of single-tenant buildings, and the valuation of single-tenant buildings would be informed by the net operating income data from comparable multi-tenant buildings. However, single-tenant buildings have no indicator of asking rent, making it impossible for the model to value them. Therefore, the use of single-tenant buildings in this analysis is limited to comparisons that measure CAD accuracy. The same limitation applies to multi-tenant buildings that don't reveal their asking rents. These situations explain the reason for the blanks in the valuation table in Appendix A.

3.2.4 Data-Collection Methods

The literature on income property valuation in section 3.2.2 provides the theoretical foundation for the types of data needed and subsequently collected for the valuation model. Attempts were made to use authoritative or widely used data sources within the limits of availability and affordability.

CoStar property classifications (class A, CBD, office) were used, within the parameters described above. Combinations or splits of records were effected as appropriate to arrive at a unitary property a prospective buyer might bid on, which is sometimes evident from prior sales recorded in CoStar. If parking is associated with the building in the CoStar record, and a parking facility is nearby under the same ownership, an assumption was made that the parking

facility goes with the office building, absent evidence otherwise, such a property sale without the parking facility.

Data collected from the five CAD web sites included historical valuations, legal description, building size, and uses. Searches were conducted for associated property records, such as parking facilities.

Reports of annual building operating expenses per square foot in each downtown for 2001-2011 were purchased from the Building Owners and Managers Association (BOMA). This data is compiled from surveys of office building owners. Data from BOMA includes detailed income and operating and fixed expenses by category. Some of the data is missing for San Antonio for 2002, 2003, 2008, 2010 and 2011 due to low response rates to the BOMA survey. The expense data is an average for the entire year and was used in all calculations and comparisons as representative of building expenses at any time during that year.

Data from CoStar includes asking rent and occupancy data for most buildings in the survey for most of the years from 2001 to 2011. The rental rate data came from CoStar's Building Historical Vacancy Report for the CBD submarket. This data includes the face amount of the rent and the rent structure, such as full service (landlord pays all expenses), triple net (tenant pays all expenses), etc. These rents vary from the rents in CoStar's Analytics section for individual properties, which appear to be grossed up to include all expenses to create a full service rental amount. In order not to mix BOMA CoStar expense data, the valuation model uses CoStar's face amount and rent structure, along with BOMA's figures for electricity, utilities and total operating and fixed expenses, to compute property values.

Data from Integra Realty Resources' *Viewpoint* publications from 2001 to 2011 provides capitalization rates, discount rates, reversion rates, market rent change rates, expense growth rates and tenant finish allowances as of the prior year's end. This research project used only

the capitalization rates, which are cited by location, including all five cities in our valuation model, and by property type, including CBD office. An alternative valuation model using discounted cash flow methodology could make use of the remainder of this data.

The data used here has several limitations. For example, it would be preferable to have audited income and expense data for specific buildings from their owners. This type of data is considered proprietary, and it would be imprudent of an owner interested in a low property tax expense to share that type of information with a researcher. In light of responses to the survey question on obstacles to appraisal, even owner-supplied information to CADs, which is protected from public disclosure, is potentially unreliable and may contribute to appraisal inaccuracy. The next best thing to accurate, building-specific data is the type of data used in this study: CBD-average building expenses compiled from building manager surveys; building-specific asking rents from a commercial property marketplace; and local, property-type-specific capitalization rates from an authoritative commercial property data source.

In addition, sale prices for downtown class A office properties during the study period from a variety of sources—news publications, SEC filings, CADs, industry journals, etc.—are used for testing the model's accuracy.

3.2.5 Model Specification

The first phase of valuation model construction is model specification, which "involves deciding which valuation approach to use, which property characteristics likely have a significant effect on property values, and how those characteristics (or variables based on them) are assumed to affect value" (Gloudemans and Almy, 2011, p. 5).

Two types of models were considered: a model based on net operating income divided by an appropriate capitalization rate (direct capitalization), similar to the calculation used for downtown Fort Worth properties in Chapter 1 but with more precise data inputs; or a more

complex model based on discounted cash flows (DCF), which depend on the stream of net operating income received during an assumed holding period, plus net sales proceeds received at the end of the holding period minus all outlays for property acquisition and ownership. Both model types require estimates of income and expense data to compute net operating income: the direct capitalization model requires the use of a capitalization rate, and the DCF model requires assumptions or data regarding investor expectations, including an appropriate discount rate to apply to future income, future capitalization rates for the reversionary period, etc.

According to the International Association of Assessing Officers' (2003) Standard on Automated Valuation Models, DCF methodology has more challenging data requirements and relies on many more investor assumptions than does direct capitalization (p. 21). However, both models should produce similar estimates of value (Sevelka, 2004, p. 143). The direct capitalization model was selected for this project for its relative simplicity and availability of data for its computation.

Following Conner and Liang (2005), net operating income used in the calculation of the capitalization rate excludes extraordinary items such as capital expenditures (p. 71). Expense items included in the calculation of net operating income are operating expenses and fixed expenses such as property taxes and insurance. The valuation model developed here can be represented by the following formulas, considered on a per-square-foot basis:

Potential Income = (Total Rental Rate – Average Expenses)

Net Operating Income = Potential Income * Market Occupancy Rate

Value = Net Operating Income ÷ Capitalization Rate

The value per square foot from the formula above is multiplied times the rentable building area in square feet to arrive at total building value.

A more detailed description of the model construction process, along with identification of the specific data sources used at each point in the process, follows.

All measures were on a per-square-foot basis until the multiplication times the rentable building area. The Total Rental Rate was built up from the CoStar asking rent amount plus the amount of any tenant-paid expenses identified by CoStar in the rent structure, using the downtown average expense amount from BOMA. These CoStar rent structures include an annual face amount of rent paid by the tenant to the landlord, plus any extras: "+elec," plus electricity expense; "+util" or "mg" (modified gross rent), plus utilities expense; "nnn" or "n" (triple net rent), plus all operating and fixed expenses; and "fs" (full service), "negot" (negotiable), or "est gross rent" (estimated gross rent), no expenses added.

All operating and fixed expenses from the BOMA survey downtown average were then subtracted from the Total Rental Rate to arrive at a figure for Potential Income. Note that for a triple net rent, the effect of first adding all operating and fixed expenses and then subtracting all such expenses is to revert to the asking rent amount. The reason for doing this is that for the second model described below, a grossed up amount was needed for each quarter in order to obtain an accurate average of the four quarters of rental data.

Potential Income was multiplied by the market vacancy rate from CoStar to arrive at Net Operating Income. It is typical to use market vacancy rates rather than the particular building's vacancy in automated valuation models of the type developed here. The IAAO Standard on Mass Appraisal of Real Property suggests that mass appraisers "compute normal or 'typical' gross incomes, vacancy rates, net incomes, and expense ratios." (International Association of Assessing Officers, 2012, p. 10).

Net Operating Income was divided by the submarket-, use- and class-specific capitalization rate from Integra Realty Resources to calculate value per square foot. This was then multiplied by the building's rentable area to produce the estimate of building value.

All calculations of value were done after year end (December 31) and then compared to the CAD valuations for the following January 1. Because properties may be sold at any time during the year, the comparisons of actual sale prices to both CAD valuations and the output of the valuation model required an adjustment for the time between the beginning of the year and the date of sale. To keep the comparisons on an equal footing, the adjustments for both model values and CAD values assume a straight line change between the January 1 value preceding the date of sale and the January 1 value following the date of sale. The "predicted" comparison values from the model and the CAD were based on this formula, where BeginValue is the value on January 1 prior to the sale date; EndValue is the value on January 1 after the sale date; Days is the number of days between January 1 and the sale date:

PredictedValue = BeginValue + (EndValue – BeginValue) * (Days / 365)

For example, a property that was valued (by either the CAD or the model) for $10,000,000 on the prior January 1, and for $12,000,000 on the following January 1, sold on March 14, 73 days after the year began, would have the following predicted value:

PredictedValue = $10,000,000 + (12,000,000 - $10,000,000) * (73/365)

PredictedValue = $10,000,000 + $400,000 = $10,400,000

This predicted value (for the CAD or the model) would then be compared to the actual sale price as a measure of accuracy. While it is not likely that real estate prices change in a linear fashion over the course of a year, the assumption that they do introduces little in the way of "noise" for the resulting calculations. Also, note that the same assumption is made for both

the CAD valuations and the values produced by the model, keeping the comparisons on a level field.

There were in succession two models produced using this direct capitalization method: Model 1 used the immediately preceding quarter (fourth quarter) of asking rent and market vacancy data from CoStar. All other inputs into the model are on an annual basis. According to Conner and Liang (2005), the "appraisal process itself is inherently backward-looking" (p. 72). It's difficult to say whether investors base their expectations of value on the past, but even in forming predictions of the future, they have only the past to guide them. The most recent historical data would seem to be the best predictor of investor expectations of value.

However, this most recent quarterly data from CoStar has issues. At times, there are dramatic swings, dips or jumps, in quarterly rental rates that do not follow the longer term trend. This was particularly true at the end of 2009, as the commercial real estate environment encountered constrained lending conditions on top of what appeared at the time to be a deepening recession. These swings have a dramatic impact on values produced by the model; this exaggerated high or low value becomes the beginning point for the model's predicted values for the following year and the ending point for the model's predicted values for the preceding year.

In an attempt to smooth out these anomalies, a second valuation model, Model 2, was created that substituted the preceding four quarters of rental rates and market vacancy rates for the preceding single quarter used in Model 1. This had a smoothing effect on the values produced by the valuation model, and this is the basis of the model discussed in the findings in Chapter 4, subject to the model calibration changes discussed below.

3.2.6 Model Calibration

After comparisons were made to historical selling prices, it initially seemed that calibrating the model was unnecessary. The model as specified was already at the limits of available data and few choices remained for fine-tuning.

Information from sale prices had not been used in the model's specification, which was based solely on an estimate of value derived from rents, average building expenses, occupancy rates and capitalization rates. At this point in testing, the model appeared to show values that were generally closer than were CAD valuations to the limited universe of sale prices available. The model's values appeared to be on average between 5% and 15% above market value, while the CAD's valuations appeared to be around 25% below market value, assuming that actual sale prices on average represent market value.

While there was substantial individual variation in comparisons between the model's predicted prices and actual sale prices, the largest divergences from sale prices seemed to be in cases of buildings with excess vacancy, which the model appeared to overvalue. In an effort to achieve greater accuracy, the requirement of not using sale prices in model construction were relaxed to test algorithms that could account for the diminution in value resulting from above market vacancy rates.

The reason buildings with excess vacancy would be less valuable than buildings at or above the market average vacancy rate is not solely due to the lower income received by the landlord for the period of excess vacancy. In theory, an investor would assume that in purchasing such a property, the building could be readily brought up to the market average occupancy rate, absent any serious functional obsolescence or other defects in the property. The costs involved in such "retenanting," however, could be substantial in terms of leasing commissions and tenant improvements. These are typically borne by the landlord. Therefore, a

model that does not take into account these outlays would tend to overestimate value in such cases.

Because CoStar had defined all of these buildings as class A properties, none of them were likely to suffer from acute obsolescence, in which case they likely would be reclassified to a lower quality class. Therefore, it can be assumed that buildings with excess vacancy, at least in class A, are diminished in value simply by the costs of retenanting.

To account for this reduction in value, a series of calculations was performed to reduce net income commensurate with the building's excess space in order to push the model's predicted values closer to actual sale prices. In practice, a better methodology would be to derive a formula for this reduction in value based on investor expectations of the costs involved, amortized over some holding period. For the purposes here, the calculation was simplified to reduce net income by some factor, which was then capitalized into a lower value. The factor was based on the margin, or excess vacancy, of the building's vacancy rate minus the market vacancy rate. This implies a linear relationship between excess vacancy and retenanting costs, which is a reasonable though untested assumption.

This calibration of the model was carried out by adjusting the formula for net operating income, specifically the market occupancy rate. Recall the steps outlined in section 3.2.5 for calculating the value of property:

Potential Income = (Total Rental Rate – Average Expenses)

Net Operating Income = Potential Income * Market Occupancy Rate

Value = Net Operating Income ÷ Capitalization Rate

The market occupancy rate is calculated as 1 minus the market vacancy rate, averaged over four quarters of data. In cases of excess vacancy (i.e. a vacancy rate greater than the market), the vacancy rate was increased by half of the difference between the building's actual

vacancy rate, averaged over four quarters, and the market vacancy rate. The resulting Effective Occupancy Rate, substituted for the Market Occupancy Rate above, is:

1 – (Market Vacancy Rate + 0.5 × (Building Vacancy Rate – Market Vacancy Rate))

This calculation was applied only in cases of above-market vacancy. In all other cases, the market vacancy rate was used.

The result of this calculation on the model-to-sale price index average and median was to show convergence between these two values. Before this adjustment, the average model-to-sale price index was 115.6; after the adjustment, the average was 106.6. Before the adjustment, the median model-to-sale price index was 105.2; afterward, it was 104.5. The difference between the average and the median went from 9.0 to 0.7. The difference between the average and the median, in a mathematical sense, is essentially due to the effect of outlying values, such as, in this case, buildings with excess vacancy. The convergence of the average and the median index values indicated that the effect of the outliers on the average was nearly extinguished, and that this adjustment to the model was near its point of maximum efficacy.

By the end of this calibration process, the model's values were on average about 5% above and the CAD's valuations on average were about 25% below the limited data set of actual sale prices.

There are two important caveats about this calibration procedure. The first is that it does not follow accepted industry standards for calibration. The second is that while the calibration used here is based on an estimate of the valuation effects of the costs of retenanting, these costs are not calculated on the basis of amortized leasing commissions and tenant improvement expenses.

3.2.7 Data Analysis and Synthesis

The valuation model required data from BOMA, CoStar, Integra Realty Resources and the CADs. This data was originally put into Microsoft Excel due to the ease of screen scraping (copying and pasting) data into Excel from the CAD websites and the PDF files produced by CoStar. After the initial copy and paste, the data was then moved or re-copied into columns, and finally imported into Microsoft Access tables.

These tables were designed as part of a normalized relational database, with appropriate many-to-one relationships, such as between the multiple appraisal district accounts and the associated CoStar property. Property values were generated from the model using Access's capabilities for nested queries to create intermediate values based on the formulas in section 3.2.5. The model's values were then copied into Excel to compare to CAD values and sale prices (see Appendix A).

These comparisons provide the basis of the tests of the hypotheses from section 3.2.1. The test results are used to produce the findings on the valuation model in section 4.2 and the analysis and interpretation in section 5.2.2.

3.2.8 Limitations of the Model

The valuation model developed here has several limitations, including the assumption of linear change in price between the beginning and end of the year, a simplified calculation of the value effects of excess vacancy, the reliability and accuracy of the source data, the use of reported asking rents as a proxy for gross potential income, and the use of CBD-average building expenses. In addition, the model works only with income-producing properties that report asking rents: single-tenant properties or buildings with no reported asking rent cannot be valued. Finally, while the valuation model can be applied to any relatively homogeneous group of income properties, such as downtown class B or C office, strip-center retail, suburban office,

etc., there may not be widely available data for these other classes and types of commercial property.

It is possible that the model would have had better predictive power if it used the most recent quarterly CoStar data to the time of the sale, rather than a linear extrapolation of prices from the two predictions at the beginning of the year and end of the year. However, for the reasons explained above, it is important to keep the model's predictions and the CAD's valuations on an equal footing for fair comparisons. That entails producing valuations on January 1 that are directly comparable to the CAD's values. The point of developing the valuation model is to see if there is a more accurate method of producing annual property appraisals; by law, the appraisal district valuation process requires setting a value on January 1 each year.

The model could benefit from a more complete conceptualization of the effects on value of excess vacancy. Here, above-market vacancy is assumed to affect value in proportion to its partial effect on reducing income, which is then capitalized to a lower value than if the market vacancy rate were assumed. A better calculation would start with the value assuming the market vacancy rate, then subtract the amortized costs of retenanting the property.

Each data type used in the valuation model has one or more limitations, chiefly the reliability and accuracy of the data source. All data sources have the potential for error. However, consistency in the application of all data sources will minimize overall error.

The model used CoStar's reported asking rents as a proxy for gross potential income per square foot as of January 1 of the following year. This approximation may be inaccurate if rents for existing leases are higher or lower than the fourth quarter asking rent. Those leases may or may not contain annual escalations that keep them on par with future asking rental rates.

Using BOMA's self-reported average CBD building expenses is not as accurate as building-specific expenses would be. First, the expense data used is an average, and there is no doubt variation in expenses among buildings. Second, there is no way to tell which buildings reported, and which did not. Third, all classes of office buildings were included, which means class B and class C buildings are likely distorting the class A expense average. Nevertheless, the BOMA average is restricted to office use and downtown properties, so there relevance in using these averages.

Determining an appropriate capitalization rate is fundamental to the direct capitalization valuation method. According to Todora (2011), "[b]ecause the investor's expected return on and return of investment capital is implied in the direct capitalization rate, these items do not need to be specified during value estimation (p. 6). This simplification of investor expectations carries with it a great reliance on the accuracy of the selected capitalization rate. Integra Realty Resources' submarket and class-specific capitalization rates for office buildings are as precise a set of values as possible. However, the accurate estimation of investor expectations was particularly problematic in the upheaval in commercial property markets experienced between 2008 and 2010.

The model works only with income-producing properties. This covers most of the universe of commercial property, with the notable exception of single-tenant or owner-occupied building. In these cases, a valuation technique other than the income approach must be used to generate appraisals.

A similar limitation exists for income properties that do not report asking rents. In this case, CoStar data may be incomplete, as it is in the case of Sundance Square's office properties for several years in the late 2000s. This is problematic, but it is a deficiency that can

probably be addressed with market intelligence-gathering techniques, such as talking to tenant representative brokers, tenants or others with direct knowledge of the asking rent rate.

The model is limited in its applicability to other classes of commercial property. While in theory, the valuation model can be applied to any relatively homogeneous group of properties, such as strip-center retail, suburban office, etc., there may not be widely available data for these other classes and types of commercial property. The model will be only as accurate as the data that goes into the calculations of value.

Despite these limitations, the model produces a comparable set of values to those produced by the tax appraisal process, using widely available data.

3.2.9 Valuation Model Summary

The research questions addressed by this valuation model involve the variation of tax appraisals from fair market value generally and whether there is variation in appraisal levels between CADs. The specific hypotheses tested are: on average, the final tax appraisals of CBD class A office properties in a county vary by more than 10% from fair market value; and on average, there is a difference in the average variation from fair market value of the final tax appraisals of CBD class A office properties between counties that exceeds 25%.

The valuation model used market data from a variety of private companies and appraisal district valuations from the websites of the CADs. It was structured according to the literature on automated valuation models, a widely accepted tool used by tax appraisers, and took into account IAAO standards for mass appraisal and automated valuation models. Calibration of the model departed from industry standard procedures for the sake of simplicity of development.

The data inputs used are neither prohibitively expensive nor extraordinarily difficult to obtain, and care was taken to accurately input data from several sources into a usable database. Consistent application of data likely minimized the errors in the source data.

3.3 Survey Research Design

3.3.1. Introduction and Overview

The survey research into the reasons for variation in the accuracy of commercial property tax appraisal centers on these questions:

1. Is appraisal accuracy hampered by the diverse character and limited availability of sales data for commercial property?

2. Is appraisal accuracy limited by a lack of tools, training or personnel?

3. Is appraisal accuracy limited by budget constraints, either for performing appraisals, resolving protests or contesting legal challenges from deep-pocketed taxpayers?

4. Is appraisal accuracy limited by external pressure from potential public relations or political consequences?

5. What is the effect of the protest-appeal-resolution process on final valuation accuracy? Where in the process are values most divergent from market value? What factors or justifications, if any, explain reductions below market value?

6. What policies or laws hamper the accurate tax appraisal of commercial property?

7. Is appraisal accuracy hampered by human cognitive limits?

8. In contrast to human cognitive limits, is appraisal accuracy hampered by the environmental demands of the tax appraisal job?

9. Is appraisal accuracy hampered by the effects of the relationship between tax appraisers and taxpayers?

Section 3.3 examines the steps of the survey process including identifying and contacting the survey population, reviewing the information needed to answer the research questions, describing the research design and data-collection methods, and analyzing and synthesizing the survey data. This section proceeds to address ethical considerations, issues of trustworthiness and limitations of the study. Finally, the survey research and its results are summarized in a concluding section. The organization of section 3.3 closely follows the outline in chapter 3 of Bloomberg and Volpe (2008, pp. 65-93) on qualitative research design.

3.3.2 Identifying the Survey Population

The survey design was intended to specifically target the individuals from the five CADs, encompassing those downtowns used in the valuation model, responsible for commercial real property appraisals and involved in protest and appeal decisions. They were selected for their working knowledge of policies and procedures of the CAD and familiarity with the appraisal and protest processes. The people surveyed for this project are not a sample; instead, they are the entire population of these individuals, i.e. the entire commercial real property staffs of the five CADs, excluding those who are not licensed tax appraisers.

In urban Texas counties, commercial property appraisers are generally organized into a separate commercial property division within the CAD. Targeting the appropriate population of appraisers was made possible by obtaining a list of such employees from each CAD through open records requests, and then narrowing down that list by comparing their names with those in the state's tax appraiser registration database.

All data used to determine the survey population was gathered from public sources. Between June 14 and August 6, 2012, a list of names and mailing addresses of all persons in the commercial real property department was requested from each of the five CADs. The requests were framed as open records inquiries under the Texas Public Information Act, and

were answered promptly. These names were entered into a Microsoft Access table, along with the employees' mailing addresses. A description of the data procedures used to determine the names of the survey population is contained in Appendix B.

Table 3.1 shows the survey population size and the number of survey responses from each county.

Table 3.1 Survey Population Size and Responses by County (City)

County (City)	Survey Population Size	Survey Responses
Harris (Houston)	53	15
Bexar (San Antonio)	15	2
Dallas (Dallas)	24	1
Travis (Austin)	10	0
Tarrant (Fort Worth)	32	8
Total of all counties	134	26

Because the entire survey population was identified and surveyed, no statistical sampling techniques or tests were used.

The survey population consists of 134 licensed appraisers employed in the commercial property divisions of the CADs in the five most populous counties in Texas. The small population size has important implications for statistical significance. To draw valid inferences from non-respondents in a total population of 134, the researcher must have approximately 100 responses, a response rate of 74.6% (Krejcie and Morgan, cited in Draugalis and Plaza, 2009). Surveying the entire population is more useful than surveying a random sample, due to the large number of responses needed (100) for statistical significance. However, perhaps due of the sensitive nature of the survey questions, the response rate required for statistical significance was not achieved. Therefore, survey results cannot be generalized to the entire

population of commercial real property tax appraisers in the five counties. Instead, the survey results indicate the beliefs of those who chose to complete the survey.

For valid inferences to be drawn from specific CADs and related to the results of the valuation model for that county, a very high percentage of respondents would be required. For example, all 10 of the Travis County appraisers, and approximately 47 of the 53 Harris County appraisers, would need to respond in order for statistically significant inferences to be drawn from those groups (Krejcie and Morgan, cited in Draugalis and Plaza, 2009). The fact that these high response levels were not achieved means that conclusions linking appraisal accuracy to CAD-specific practices is unwarranted.

An additional consideration is protecting the confidentiality of respondents when there was one or only a few responses from a county. If a coworker or supervisor happened to know who had responded, the release of that data might jeopardize that person's job.

Because of these limitations, the survey results should be considered first-hand testimony on issues with the commercial real property appraisal process in Texas. The results of the valuation model stand independent of the survey results.

3.3.3 Overview of Information Needed

The survey required demographic and contact information from the CAD and TDLR on the appraisers to include in the study; contextual information about the CAD environment; perceptual information about the appraisers' work environment; and theoretical information that would allow turning broad research questions into specific survey questions so that survey responses could be aligned with theoretical constructs.

The basic demographic information needed to conduct the survey was a list of appraisal district personnel cross-checked with a list of state-licensed property tax appraisers, including a

contact address. This list became the survey population, and their mailing addresses were obtained from the CADs through open records requests.

Devising the survey required contextual information "describing the culture and environment of the…organization" (Bloomberg and Volpe, 2008, p. 70) in order to create meaningful questions about work demands and to draw appropriate conclusions from responses. As cited by Bloomberg and Volpe (2008, p. 70), "Lewin's (1935) fundamental proposition that human behavior is a function of the interaction of the person and the work environment" has significance in the realm of property tax appraisal. This includes the CADs' mission, work product, structure, appraisal plans, protest/appeal process, appraisal standards, and Comptroller monitoring and training. The broad questions are: how are appraisers evaluated, and how is their work product judged?

One goal of the survey was to understand the effects of the work environment on the appraisal process so that bounded rationality could be distinguished from rational responses to environmental demands (Jones, 1999). The survey needed perceptual data, such as how their work experiences influenced appraisers' decisions, what they felt their objectives were in regard to appraisal, and to what extent were those objectives met.

Finally, theoretical information was needed to provide a basis for questions about bounded rationality and relationships with taxpayers that are key to the ideas of the new institutional economics. A matrix aligning research questions with specific survey questions is provided in Appendix C.

3.3.4 Research Design Overview

The survey instrument is depicted in Appendix D. The first half of the survey instrument was designed to discover the presence or absence of obstacles to accurate appraisal including: (1) technical obstacles, that is, specific data, time, training or resource gaps that would hinder

performance of appraisal duties; (2) legal issues that would constrain appraisal accuracy; (3) procedural issues that interfere with appraisal accuracy; and (4) political issues, particularly funding inadequacy and pressure internal or external to the appraisal district that may deter appraisers from accuracy. These four areas were identified from the review of literature as issues in appraisal that could affect accuracy.

The second half of the survey instrument was designed primarily to test the applicability of theoretical constructs from the new institutional economics and bounded rationality to the commercial property appraisal process. Regarding the NIE, the primary research question revolves around whether the "rules of the game" in the appraisal process encourage or require other than fair market value outcomes. Simon's concept of bounded rationality requires that we first draw a distinction between bounded rationality, where human limitations impact appraisal accuracy, and environmental demands that limit accuracy, such as appraisal district performance measures, constraints or rewards that essentially limit how accurate appraisers may be. In addition, several questions relate to how specific bounded rationality concepts, such as so-called "satisficing" behavior, framing, ambiguity, credulity, overcooperation and incomplete information search, may be associated with aspects of the appraiser's work environment.

Translating these theoretical constructs into testable hypotheses and then into practical survey questions involved a measure of judgment. Consider the potential for the survey respondent to misinterpret, or rather interpret in unexpected ways, the survey questions. The final validity of the survey research results depends on how accurately the researcher understood the literature on appraisal, the NIE and bounded rationality and properly framed the survey in an unbiased way; how accurately survey respondents understood and answered the

survey questions; and how accurately the researcher interpreted survey responses in light of the selected body of research and theory.

The survey instrument, after asking for county name, asked two questions that qualify the respondent on involvement in commercial real property appraisals, protests or resolutions, and on whether he or she has any decision-making role in litigation or settling protests. These questions confirm eligibility in the population of commercial real property appraisers and identify a subgroup concerned with litigation and protest settlement. These two questions, and all the remaining ones dealing with appraisal issues, allowed a choice of "I don't know" (rendered as a "?" on the paper survey to save space) as a response.

The first half of the survey consisted of a series of yes/no questions on specific data sources used in appraisal; barriers to the effective use of data; CAD resources to handle protests and pursue litigation; and legal constraints and other factors that make it difficult to apply the fair market value standard. Each topical question set listed specific choices and asked an open-ended question inviting responses the survey did not ask about.

This portion of the survey provided information about current practices of the CAD and the individual appraiser, and solicited opinions on barriers and difficulties in accomplishing the appraiser's job. The results point towards industry best practices. This portion of the survey also explored whether the technical, legal, procedural and political difficulties mentioned in the appraisal literature are found to impact Texas CAD appraisers.

The first half of the survey ended with two self-reports of appraisal accuracy to provide a comparison to quantitative results and determine whether a CAD employee's perception of final valuation accuracy mirrors the state comptroller's analysis of initial appraisal accuracy.

The second half of the survey used a Likert frequency scale with the following choices: never, rarely, sometimes, often and always. The questions were designed to illuminate the

appraiser's perception of appraisal techniques and influences, and they asked the appraiser to consider the degree of appraised value divergences from fair market value. The questions primarily focused on the "rules of the game" from the new institutional economics and on manifestations of bounded rationality, with contrasting questions about environmental demands, to determine the extent that the theoretical model applies to commercial property tax appraisal.

These types of questions are suited to a frequency scale because of the ambiguity and variation in the appraiser's task. For example, a commercial property's prior year valuation may at times be a good starting point for the current year's appraisal, but the reported frequency of this heuristic may indicate more or less of a tendency to use cognitive shortcuts to simplify the appraisal task. On the other hand, a series of questions about appraisers' rewards and their perceptions of CAD policies was intended to reveal the operation of environmental demands on appraisers that might result in values different from fair market value. Rational responses to these environmental demands do not indicate bounds on rationality (see Jones, 1999, p. 298).

The following summary of how specific survey questions relate, in the judgment of the researcher, to the literature and theory refers to question numbers on the survey form depicted as Appendix E, Commercial Real Property Appraisal Survey Conceptual Framework.

Question 1 asked the respondent to supply locational information, i.e. county, so that comparisons by county could be drawn from the quantitative model and related to the survey results. As shown later, steps were taken to insure that county name could be derived from the physical surveys even if this was left blank, and the online survey, in the first two of three time periods, required something to be entered in this field. Question 2 determined the survey respondent's eligibility in the population of commercial real property appraisers, and question 3 further clarified whether the respondent took a role in decisions to litigate or settle protests.

Questions 4A-F and 5 establish which data sources are routinely employed in the appraiser's work. Because the listed choices are believed to represent useful resources, gaps revealed by negative answers to any part of question 4 indicate the presence of the bounded rationality condition of incomplete information search. Affirmative answers to questions 6A-D indicate environmental demands on the appraiser that prevent effective use of data. Questions 6E, 7, 8, 9, 14C, 14D, 14E, 15 and 32 relate to technical barriers to appraisal accuracy and other factors. Affirmative and possibly write-in answers indicate barriers to accuracy.

Questions 7, 8, 9, 12A-F, 13, 15 and 32 pertain to legal obstacles to appraisal accuracy, with affirmative and possibly write-in answers indicating such obstacles. Question 14E could relate to the legal obstacle of sale price nondisclosure, but since that issue is addressed directly in question 12A, 14E is interpreted as a technical barrier.

Questions 10, 14A, 14F, 14H, 15 and 32 relate to procedural obstacles to accuracy, with affirmative and possibly write-in answers indicating such obstacles. The volume of protests (question 14H) might be interpreted as a result of the lack of legal barriers to protesting, but this could be addressed by write-in answers to question 15.

Affirmative answers or write-in responses to questions 11, 14B, 14G and 15, which primarily ask about resources for litigation, reveal political obstacles to appraisal accuracy. CAD budgets are subject to approval by local governing bodies and a Board of Directors appointed by those bodies (Combs, 2012a). Answers tending toward "Always" to questions 29C, 29E, 31E, and potentially, write-in responses to questions 30 and 32 related to outside pressure and publicity concerns, also indicate political obstacles to accuracy.

Questions 16, 17 and 18 ask the respondent to evaluate the accuracy of final property valuations, estimate the variance from fair market value, and provide a self-rating of accuracy.

Questions 6F, 7, 8, 9, 27A-G, 28, 31B, 31C, 31F, 32 and 46 pertain to the role of the new institutional economics idea of the "rules of the game" that may result in non-fair market value outcomes or enter in to decisions to litigate versus settle a protest. Responses tending toward "Always" or relevant write-in responses indicate greater applicability of this theoretical construct to the appraisal environment.

The interpretation of questions related to Simon's idea of bounded rationality is more nuanced because of the potential existence of environmental demands on appraisers, a condition that does not constitute bounded rationality. Thus, answers tending toward "Never" for questions 19, 21 and 24 indicate issues with the bounded rationality conception of recognition; for question 34, the presence of ambiguity; for question 36, incomplete information search; and for question 38, issues with credulity. Answers tending toward "Always" for question 22 indicate the existence of framing effects; for questions 23, 27B, 29B, 39 and 40, a tendency toward overcooperation; for questions 25, 26, and 41, a tendency toward "satisficing" behavior; for question 33, habituation and routine; and as noted above, for gaps revealed by answers to questions 4A-F, the potential for incomplete information search.

On the other hand, answers tending toward "Never" to questions 35, 42, 43 and 44; answers tending toward "Always" to questions 20, 29A, 29D, 31A, 31B, 31D, 31F, 37, and 45; and write-in answers to questions 30 and 32 may indicate the presence of environmental demands on appraisers that work against accuracy, rather than issues of bounded rationality.

Question 20, for example, asks about the relative risk of overvaluing versus undervaluing a property. Since fair market value is the standard, a higher risk for overvaluation may indicate the presence of an environmental demand, such as avoiding the risk of provoking protests in a situation of limited budgets or time constraints. Likewise, non-appraisal factors that figure into appraisal, such as the potential costs to the CAD, how winnable the case is, or

the CAD's refusal to reward accuracy or to recognize the danger posed by lower than market value appraisals, are likely indicative of the demands of the appraisal district environment.

Questions 47 and 48 relate to the choice of nonprofit donation and provide an opportunity for overall comments on the survey.

3.3.5 Data-Collection Methods

The data gathered from the survey was used to understand variations in methodology or practice in commercial real property appraisal, and to understand tax appraisers' thinking in regard to theoretical issues proposed by the new institutional economics and Herbert Simon's concept of bounded rationality. The overall aim was to determine to what extent patterns of misappraisal revealed by the valuation model could be explained by practices of the CADs as revealed in the survey responses.

An early version of the survey was used in a pilot study of tax assessors outside of Texas. On the International Association of Assessing Officers AssessorNET general forum, a call for volunteers to take and comment on a draft of the survey instrument was posted. The stated requirements were that the person had to work outside of Texas; be a tax appraiser; and keep the contents of the instrument confidential.

The survey was e-mailed in Microsoft Word and Adobe Acrobat versions to six respondents who indicated interest in participating; only one completed survey was received back. Neither of the formats was physically easy to complete: the Word document did not have an easy way to insert text and maintain proper formatting, and the Acrobat version required the user to print, fill out with a pen, scan and return via e-mail. This process could have been made easier for the volunteers.

Two people explained why they did not complete the survey, with one person being highly critical of the perceived bias of the survey toward the assumption of appraisal inaccuracy.

The other person who chose not to complete the survey was engaged in an e-mail exchange where he offered helpful language (e.g., “difficult to achieve the fair market value standard”) to soften the implied critique of appraisal accuracy in the survey questions. This person helped with understanding the sensitive nature of the endeavor and the potential harm to the survey’s credibility from careless phrasing.

The survey was revised over time with helpful comments from my dissertation committee members and others. Dr. Yvonne Audirac suggested using a Likert scale since many of the questions about appraisal techniques and practice are more complex than a yes/no answer set allows. The first half of the survey generally follows the yes/no format, while the second half uses a frequency Likert scale. Dr. Andrew Whittemore suggested asking about specific limitations or gaps in market data and about typical faulty data submitted by taxpayers to get more detailed responses on those issues. These changes yielded valuable data and made the results easier to interpret.

The survey was offered in two nearly identical formats: a paper version mailed to each member of the survey population, and an optional online version of the survey available from a URL (internet address) provided in the cover letter and at the top of the paper survey form. Paper surveys were accompanied by self-addressed stamped envelopes to make the return process free and simple. Providing the online version of the survey was an attempt to increase the response rate by providing a more convenient method of filling out the survey form. It also reduced the work the researcher had to undertake by enabling participants to enter their own data.

Because the survey attempted to undercover variations in practice, identifying the county of the survey participant was considered important to obtaining useful results. The county name is asked as the first question, and some answer (although not a valid county

name) is required in the online version of the survey. In addition, the paper survey was issued in five different formats by county, each varying the order of the responses to the final question, the option to donate $5 to a charity of the respondent's choice. This allowed the researcher to identify the county even if the question was unanswered or answered inappropriately.

By not providing respondents an explicit choice of county names in either version of the survey, responses that are meant to mislead are less likely to be successful—an online respondent would have to correctly guess the names of one of the four other counties in the survey to succeed in such misdirection. Responses regarding county on the paper survey can be verified as accurate based on the donation choice order.

The online version of the survey was created in SurveyMethods.com. A website with the easy to spell and remember URL of www.appraisalsurvey.com was created to be the launch site for the survey and the repository for aggregated results after the survey closed. The website was functioning on August 17, 2012. Surveys were first mailed on August 22, 2012. Surveys arrived locally at the Tarrant Appraisal District the next day, as evidenced by online survey activity and the arrival of pen and paper surveys two days after the mailing. A few more surveys, totaling a response rate of less than 10%, were received over the next two business days, primarily from Tarrant and to a lesser extent from Dallas County. Over the following days, the only survey forms received were spoiled or blank. Shortly after that, the Chair of the University's Institutional Review Board was contacted by the Chief Appraiser from a CAD not part of the survey group with questions regarding my status at the university and a claim that my survey was widely believed by CADs around the state to be a "hoax."

This set in motion a concerted effort on the part of the IRB Chair, my dissertation committee and me to rectify the errors in the first mailing as described below.

The survey data-collection methodology evolved over the course of the survey period. For example, the initial round of surveys was accompanied by a cover letter and outer envelope without the University's logo on it, leading to a misunderstanding about the survey that spread to CADs not involved in the survey. This mistake was rectified by the second round of surveys, which was properly marked by the University's imprimatur, including a letter that more clearly explained my connection to the University. This mailing also included a $1 bill as an additional inducement, beyond the $5 charitable donation. Finally, due to the low response rate (at the time, less than 15%), a third round of surveys was undertaken, informed by strategies from Dillman's Total Design Method, which is "'guaranteed' to result in a 75%-80% return rate" (Dillman, 1978, referenced in Hoddinott and Bass, 1986, p. 2366).

Dillman's process involves getting the survey recipient's trust by, for example, signing letters by hand in blue ink (Hoddinott and Bass, 1986, p. 2366), and emphasizing the recipient's involvement with the issue, the benefit from participating and the help provided to the surveying organization (Olney, 2011). "Follow up must proceed according to a set pattern," according to Hoddinott and Bass (1986, p. 2366), and the surveyor should "give personal attention, be persistent and attract attention" (p. 2368).

Dillman's method involves a rigid set of procedures including a pre-notification post card or letter followed by three rounds of questionnaires delivered to the survey population over a 32-day period (Olney, 2011). The first questionnaire mailing includes $2, and the final questionnaire is sent by FedEx to show the importance of the survey. At each stage, people who have responded are sent a thank you postcard instead of a repeat survey (Olney, 2011). A similar process, named Dillman's Tailored Design Method, updates the process to the electronic age with e-mail communications and an online survey, with a mailed questionnaire sent to non-respondents at the end of a 25-day schedule (Olney, 2011). For both processes, Olney's

(2011) advice is to "get [the] endorsement from [a] trusted individual or organization; use organizational logos or letterhead; emphasize confidentiality; explain how information will be used; and provide contact information for questions."

On the third survey I implemented the signature in blue ink and appealed to the recipient's desire to help expand knowledge about the appraisal profession. Since I did not gather personal information, including who had already responded, I could not drop those people from later mailings. The three mailings bore a resemblance to the Total Design Method, with elements of the Tailored Design Method, though spread out over nearly two months.

The end result of this ad hoc methodology was a process, though messy, unplanned and time-consuming, that somewhat resembled Dillman's method—but not quite the "guaranteed" response rate. The reasons for that likely include the lack of an endorsement from a trusted individual (perhaps the Chief Appraisers of each CAD) or organization (such as a statewide appraisal membership group); the lack of the university's logo or letterhead in my original mailing; and the substance of the questions, which caused one CAD employee to suspect the survey being a stalking horse for tax protesters or litigants in an effort to portray CAD employees as incompetent or corrupt (M. Kieke, personal communication, August 31, 2012).

The final response rate was 19.4%. After the survey closed, aggregated results and amounts donated to charity were posted to the same website with password protection so that survey takers alone could see them.

3.3.6 Data Analysis and Synthesis

Each survey question was linked to specific research question based on the four general areas discovered in the literature as potential barriers to appraisal accuracy, and on the two theoretical outlooks from the new institutional economics and Simon's concept of bounded

rationality. The conceptual framework (see Appendix E) defines how responses to the survey questions were categorized to support the findings in sections 4.3 to 4.11. These findings then provided the basis of the analysis and interpretation of the survey results in section 5.3.

3.3.7 Ethical Considerations

The primary ethical consideration of the survey process was protecting the confidentiality and anonymity of responders. Several means of disseminating survey results were considered to avoid collecting e-mail addresses or other identifying data, including posting results on a password-protected web site. Gathering other personally identifying information was avoided in order to dispense with the responsibilities associated with holding, securing and destroying such data as required by University policies, but also to reinforce to survey takers that the survey itself was inherently anonymous.

Because the questions were sensitive in nature and the political environment was not favorable to CAD employees, care was taken to guard against potential consequences for survey participants in evaluating appraisal accuracy, the work environment, and their interaction with taxpayers. Although the necessary Institutional Review Board approvals were obtained, there was not a requirement to use specific informed consent language, which may have ended up reducing participation.

The original intention had been to report survey results by county, but this was not possible due to the low return rates for some counties. This decision prevented an interpretation of the valuation model results by county in the light of survey responses. However, there was a clear responsibility to protect the identities of those involved in the research project to prevent them from any harm to reputation, considering the highly visible and controversial nature of the tax appraisal process.

3.3.8 Issues of Trustworthiness

Issues of trustworthiness came sharply into focus with the misunderstandings that arose after the first round of surveys, those not sent out on UTA letterhead. Due to the questions in the survey (and despite the surveyor's professed relationship to the University), there was suspicion of an elaborate scheme to set up tax appraisers for ridicule by their opponents.

The surveyor's biases were not shared with participants in order to avoid influencing their responses to the survey. In retrospect, this might have allayed, or possibly enflamed, concerns about the intent of the survey. It is possible that the low response rate to the survey was in part due to suspicions about motives. However, it is difficult to reconcile communicating biases and research goals with the need to avoid prejudicing participants toward particular responses.

Based on correspondence received during the pilot study, it was clear that the inquiry into appraisal accuracy betrayed assumptions that hit a nerve and was felt by some to be a challenge or threat. It is possible that issues that go to the heart of a person's profession and work performance in such a public and political sphere cannot reasonably be understood through survey methods. While personal interviews might be more effective, it would difficult to guard against workplace retaliation if those took place at work or at conferences in a public way. A focus group could have provided rich detail on these questions and might have preserved anonymity, but still might have carried potential political consequences for those involved.

Clearly, the varying response rates by county demonstrate that overcoming these barriers was more successful in some areas than in others. The trust issues around the first mailing did not destroy the survey's efficacy, but they evidently diminished the readiness of tax appraisers to respond to such controversial questions.

In the end, these questions were likely perceived to have serious implications for participants, including an implicit criticism of their work and their profession. This reality limited the participation rate.

3.3.9 Limitations of the Study

By surveying the entire population of the targeted group, there are no sampling limitations. However, the small population size (134) required a nearly 75% response rate for statistical significance. The response rate of 19.4% means that the views of respondents cannot be attributed to non-respondents.

Linking appraisal issues, including theories of the new institutional economics and bounded rationality, to specific survey questions inherently involves considerable judgment by the researcher. Tying appraisal theory to specific questions was accomplished through a careful process of identifying and categorizing appraisal issues and theories, devising and refining specific questions to address them, and creating a response format (yes/no, Likert scale, fill in the blank) that was intended to allow the respondent to accurately fit his or her reality into the framework of the research project. The survey is limited to the extent that any of these goals were unmet.

The project by design was limited to the state of Texas, and further limited to its five largest urban centers. Additionally, the research focus was entirely on commercial real property, completely omitting other taxable property types such as business personal property and agricultural, industrial and residential property. Commercial real property appraisal was specifically selected because it showed the largest deviations, according to Comptroller studies, from market value. The conclusions reached here cannot necessarily be applied to other property types, tax appraisal in general, nor to other localities or states.

3.3.10 Survey Research Summary

A survey probing issues of appraisal practice and opinion was sent to a targeted group of 134 commercial property department CAD employees who are also licensed with the state of Texas as tax appraisers. The counties selected for inclusion were the same five most populous counties used in devising a valuation model. The questions were designed to reveal the presence or absence of technical, legal, procedural and political issues in the CADs, along with issues related to the new institutional economics and bounded rationality.

An earlier version of the questionnaire was intended for use in a focus group of CAD Chief Appraisers, but the opportunity to hold that meeting did not arise. A pilot study was performed on volunteers from a listserv operated by the International Association of Assessing Officers. The assistance of these volunteers was useful in rephrasing questions toward comparisons to fair market value rather than to appraisal accuracy.

The response rate was hampered by an initial cover letter that did not clearly demonstrate my connection to UTA. This aroused suspicion which was reported by a non-survey participant to the Chair of the University's Institutional Review Board. The error was rectified with second and third mailings on UTA letterhead and inside UTA envelopes, one of which included a one-dollar bill. The final tally of 26 responses out of 134 surveys was insufficient to perform county-level analysis that might link CAD practices to CAD accuracy, as measured by the valuation model. The response rate was also insufficient to establish statistical significance, which would have required 100 valid responses out of 134 surveys.

3.4 Research Methodology Summary

This comparative case study is composed of two parts: (1) a valuation model based on accepted mass appraisal principles to generate values to compare to historical appraisals; and

(2) a survey of certified tax appraisers employed in the commercial real property departments of the five CADs. This structure is designed to measure variation, identify its causes, and suggest solutions to rectify any variation discovered.

Technical, legal, procedural and political issues in tax appraisal may affect the accuracy of property tax valuations. In addition, relationships among CAD employees and taxpayers described by the new institutional economics and human limits known as bounded rationality may also have an effect. To study these effects, a survey was undertaken of certified tax appraisers employed in the CAD commercial property departments in the five largest counties in Texas (Bexar, Dallas, Harris, Tarrant and Travis). In addition, a valuation model was created to compare market value to appraised value for class A office buildings located in the CBDs of each county's largest city (San Antonio, Dallas, Houston, Fort Worth, and Austin) over a period of several years.

The valuation model used standard mass appraisal techniques and was grounded in the relative homogeneity of commercial properties with similar use (office), location (CBD) and quality (class A). It is expected that automated valuation techniques based on these principles of relative homogeneity, using sufficient relevant data, will prove to be adequate for the purposes of tax appraisal.

Survey responses by county were inadequate to draw inferences directly from CAD procedures to county-level valuation data. The overall survey results, though not statistically significant, do shed light on important issues affecting the variation of appraisal level from market value.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Introduction

The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities is to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies.

This chapter on findings of the research interprets the valuation model and survey results in light of the 11 research questions in section 1.4 that form the basis of the inquiry.

The results of the valuation model address the first two research questions, which pertain to the accuracy and feasibility of constructing the model and what it shows about variation of appraisal accuracy among the five counties. Following that is a report on measurements related to the three hypotheses in Section 3.2.1 and a description of the values produced by the model and how these compare to appraisal district values. Next, the feasibility of using such a model for tax appraisal purposes is considered.

I take up the remaining nine research questions primarily with results from the survey of tax appraisers. Findings are presented on the impact on appraisal accuracy of each of the following items: availability of sales data; internal agency limitations, including budget and personnel issues; external pressure; rules and laws; cognitive limits versus environmental demands; and the relationship between tax appraisers and taxpayers, the so-called “rules of the game.”

4.2 Findings on the Valuation Model

4.2.1 Accuracy and Feasibility of the Valuation Model

The first research question pertains to the accuracy and feasibility of a proposed valuation model for tax appraisal purposes: Can a model for valuing a particular type of commercial property be constructed that would be more accurate than historical tax appraisals at predicting market sale prices, and can this model be applied by appraisal districts to this and other property types to increase the accuracy of tax appraisals?

A type of valuation model for this purpose was specified in section 3.2.5. The model specification was based on appropriate standards of the IAAO, the international standards-setting organization for appraisers, in the areas of mass appraisal and automated valuation models. The model calibration procedure departed from industry standards for simplicity of the estimation of retenanting expenses in buildings with excess vacancy.

Finding 1: A valuation model can be built that is more accurate than some CADs' historical tax valuations at predicting sale prices, but with wider individual variation from sale prices than CAD values display.

The model was constructed to value properties at the beginning of each year, just as CADs are required by law to do. Because a property sale may occur at any time during the year, the January 1 values before and after the sale date for both the model and the CAD valuation were used to predict a sale price on the sale date. These predictions were based on a linear extrapolation from the January 1 values, as described in section 3.2.5. The two predicted prices were compared to the actual sale price as a test of accuracy.

Assuming sale prices accurately reflect fair market value, according to H1, the first hypothesis in section 3.2, CAD final values were expected to diverge from sale prices on average by more than 10%. In fact, for all properties where a sale price can be compared to CAD values, the divergence was 13.3% in Tarrant County; 37.7% in Dallas County; 20.2% in Travis County; and 47.7% in Harris County. There were no available sale prices to use for

comparison in Bexar County. The total number of sales used for these comparisons is 25, with 11 located in Dallas County, 8 in Harris County, 4 in Travis County and 2 in Tarrant County.

The smallest divergence among the group was 13.3% in Tarrant County. The null hypothesis, $H_0 1$: $\mu(\,|FMV - TAX| \div TAX) < .1$, that is, that values would vary on average by less than 10%, was rejected. However, the population of usable sales is quite small: 25.

Compared to the available sale prices from 2006 through 2011, the model's average predicted values were 6.6% higher, and the median was 4.5% higher. The combined CAD predicted prices were 23.3% lower than sale prices on average, and the median was 26.1% lower. Note that these figures use sale prices as the denominator for the calculation, while the hypothesis calculation uses the tax valuation as the denominator.

Although the model's predictions were more accurate than CAD valuations on average, the model's range of variation from actual sale prices was wider than the CADs'. The model's maximum and minimum deviations were 89.1% above sale price and 62.7% below sale price. The CADs' maximum and minimum deviations were 15.0% above sale price and 50.8% below sale price.

Appraisal districts can potentially use information about prior year sale prices when setting the following year's value, subject to taxpayer protest and adjudication by the ARB or court. This following year value becomes the end point of the predicted price calculation for the subject sale date, thus affecting one half of the input into the price prediction. The model, on the other hand, is purely based on rents, occupancies, expenses and capitalization rates, along with excess vacancies used in the model calibration procedure described in section 3.2.6. The valuation model has no opportunity to be informed by actual sale prices, in order to avoid the taint of so-called "sales chasing." This appears to increase the maximum and minimum deviations, since both the previous year and following year values are calculated independently of the intervening sale price.

Finding 2: A valuation model can feasibly be built and used by appraisal districts to value relatively homogeneous types of commercial property, such as downtown class A office buildings.

The model used data from CoStar, BOMA, and Integra Realty Resources that is available at reasonable prices. The data entry performed by the researcher was somewhat onerous, but data entry operations can be rationalized and subjected to economies of scale, or perhaps avoided entirely with downloads from the data providers.

All data appears to be available in a timely fashion, with updates available within a few months after period end. The source that likely takes the longest is the BOMA survey, which takes time to put in the field, tabulate responses and publish. This year, it was available in April, which is close to the deadline facing CADs to wrap up initial tax appraisals.

Producing appraisals with a well-tuned model should take very little time after data upload. The minimum threshold for feasibility, i.e., whether the data for the model can be input and used in time for tax season, appears to be met.

In regard to the first research question, these two findings demonstrate that an accurate model can be constructed that would be more accurate than historical tax appraisals at predicting market sale prices, though with greater deviation than CAD valuations. These extremes may be due to the fact that sale price information is not used by the model for the following year value, while such information is available to CADs. There appears to be no barrier to feasibility for the CADs in applying this or a similar model to increase the accuracy of tax appraisals.

4.2.2 Variation in Appraisal Accuracy

The second research question asks whether appraisal accuracy varies by county, and if so, what are the likely reasons?

Finding 3: Given the limited county-level sales data to use for comparison, the difference in the average variation between each pair of counties was large. The reasons for the variation are not clear, though the small population of sales in each county may play a role.

Using the assumption that sale prices accurately reflect fair market value, according to H2, the second hypothesis in section 3.2, the difference in the average variation from fair market value of the final tax appraisals of CBD class A office properties between counties was expected to exceed 25%.

As noted above, for all properties where a sale price can be compared to CAD values, the divergence (and number of sales on which this calculation was based) was 13.3% (2) in Tarrant County; 37.7% (11) in Dallas County; 20.2% (4) in Travis County; and 47.7% (8) in Harris County. There were no available sale prices to use for comparison in Bexar County.

Based on this limited data, the difference in the average variation between each pair of counties is illustrated in table 4.1.

Table 4.1 Difference in Average Variation of County Pairs

Counties	Percent Difference in Average Variation
Tarrant-Dallas	65%
Tarrant-Travis	34%
Tarrant-Harris	72%
Dallas-Travis	87%
Dallas-Harris	21%
Travis-Harris	58%

The smallest average variation between counties was 21% for Dallas and Harris Counties, and the next smallest was 34% for Tarrant and Travis Counties. Therefore the null hypothesis $H_0 2$: $(\mu 1 - \mu 2) \div \mu 2 < .25$, where $\mu 1$ and $\mu 2$ are the mean percentage variances from fair market value for every pair of counties, except the Dallas-Harris County combination, was rejected.

Harris and Dallas Counties had the largest measured deviations of tax valuations from fair market value of the four counties. Coincidentally, the average difference in variation between the two was relatively small. Overall, the five counties' divergences of valuations from market value—all of which fell below market value, on average—varied significantly.

Table 4.2 shows the average and median indexes of final valuations to sale prices (sale price used as the denominator for the calculation), along with the number of sales. In this calculation, Tarrant County has the smallest difference between final valuations and sale prices, yet it is still an 11.5% variation. Harris County's variation is 31.4% below sale price, on average.

Table 4.2 Index of CAD Final Valuation to Sale Price

County (City)	Average Index	Median Index	Sale Comparisons
Harris (Houston)	68.84	68.62	8
Bexar (San Antonio)	-	-	-
Dallas (Dallas)	77.10	73.86	11
Travis (Austin)	85.33	85.80	4
Tarrant (Fort Worth)	88.55	88.55	2

A different indicator of variation is a comparison of CAD values to values generated by the valuation model. Clearly, this is not a measure of accuracy, since it cannot be assumed that model valuations reflect fair market value. However, it illustrates the variation between counties' tax valuations as compared to a consistently calculated estimate of market value.

Table 4.3 shows the average index value of CAD valuations to values generated by the model, using the model's values as the denominator. The differences between CAD values and model values show extensive variation, with Travis County valuations over 100 on average (median 99) and the other CADs' valuations from the upper 50's to mid-70s. This would imply total variation in CAD valuations, as compared to the model's values, is around 40%: the

difference between the highest and lowest average index is 107-60 = 37, and median index: 99-56 = 41.

There are a substantially greater number of comparisons, totaling 520, versus the 25 data points available for comparison of CAD valuations to sale prices.

Table 4.3 Index of CAD Final Valuation to Model Values

County (City)	Average Index	Median Index	Comparisons
Harris (Houston)	60.85	56.50	179
Bexar (San Antonio)	67.26	75.10	28
Dallas (Dallas)	63.87	60.31	136
Travis (Austin)	107.6	99.12	145
Tarrant (Fort Worth)	76.62	76.29	32

The formula used in hypothesis H2 can be used for this comparison of CAD values to model values by using the mean percentage variances from the model value for every pair of counties. The difference in the average variation between each pair of counties is illustrated in table 4.4.

Table 4.4 Difference in Average Variation of CAD Values to Model Values of County Pairs

Counties	Percent Difference in Average Variation
Tarrant-Dallas	26%
Tarrant-Travis	133%
Tarrant-Harris	37%
Dallas-Travis	215%
Dallas-Harris	15%
Travis-Harris	73%

The pattern of mean percentage variances here is similar but not identical to that of the CAD valuation to sale price comparison: the Dallas-Harris County pair is lowest, at 15%, and the Dallas-Travis County pair is highest, at 215%. The overall variation is magnified, probably

due to the model values having a wider distribution than the sale prices. Applying the null hypothesis $H_0 2$: $(\mu 1 - \mu 2) \div \mu 2 < .25$, where $\mu 1$ and $\mu 2$ in this instance are the mean percentage variances from the model's values (not fair market values) for every pair of counties, the result is a rejection of the null hypothesis except for the Dallas-Harris County combination. This is the same result as for the comparison to fair market value, as represented by sale price.

One interesting difference with the CAD valuation to sale price mean percentage variances is that the Tarrant-Travis County combination ranked second lowest in the prior comparison with 34%, but second highest in this comparison with 133%. This is more than a reflection of magnified variation due to the wider distribution of model prices compared to sale prices. Instead, the changed ranking for the Tarrant-Travis County pairing indicates a substantial difference in how the model accounts for property value versus how value is reflected in these two counties' appraisal district valuations.

A similar but opposite effect is noted in the Tarrant-Dallas County pairing: the CAD valuation to sale price mean percentage variances ranked this pair third highest of the six pairs, while the CAD valuation to model value mean percentage variances ranked this pair fifth highest. The same effect occurred in the Tarrant-Harris County pairing: the prior comparison was second highest, and the latter comparison was fourth highest.

The county common to all three of these notable ranking shifts is Tarrant County, implying a distinct difference between the set of model values and the set of sale prices for this county. Because the comparison of CAD valuations to sale prices in Tarrant County is based on only two property sales while the comparison to model values is based on 32 data points, it is likely that the comparison to sale price understates the variation of Tarrant County's final valuations to market value to an unknown extent.

If this is so, Travis County valuations, which show the second lowest divergence from market value, would take the top spot in the ranking of accuracy. In the comparison of CAD

valuations to the model's values, Travis County is ranked highest, having average values 7.6% above the model's values and median values less than 1% below the model's values.

Part of the second research question pertains to the causes of the evident variation between counties in appraisal accuracy. If one were to take the Tarrant County appraisal district value to sale price comparison at face value, there would be no obvious clues in the data for the reason this county stood out. However, if Travis County is considered most accurate, there is a clue in the data about why it is different from most of the other counties: more than 94% of the building leases have a triple net structure. It seems logical that triple net rent structure, where all expenses are paid by the tenant, would be more transparent to the appraisal district since there would be little room to obfuscate the components of net operating income. In cases of triple net rent, the asking rent essentially equates to potential gross income.

The problem with that explanation is that while Tarrant, Dallas and Bexar Counties have zero triple net structures among the comparisons to CAD final valuations, Harris County has a similar percentage to Travis County of these rent structures: just over 95%. Recall that Harris County had by far the highest divergence of CAD valuation from sale price (47.7%), and its indexed comparison of CAD valuations to model prices was the lowest: 60.85 on average, with a median value of 56.50. If triple net rent structures allow greater accuracy in Travis County, it is difficult to see how they would result in less accuracy in Harris County.

In regard to the second research question, the finding explicated in this section 4.2.2 demonstrates that there is substantial variation in accuracy among the five counties in the study. However, based on the data from the valuation model and from the CADs, the evidence on the cause of the average variation in accuracy between CADs is inconclusive. The small population (25) of sales used for comparison to predicted prices may play a role.

4.3 Findings on the Effect of Sales Data Availability

4.3.1 Limitations or Gaps in Available Market Data

The third research question asks: Is appraisal accuracy hampered by the diverse character and limited availability of sales data for commercial property?

Finding 4: By large majorities, survey respondents believe that a lack of good sales data makes it difficult to apply the fair market value standard, and that limitations or gaps in data are a significant barrier to the effective use of data in appraisals.

In answering survey question 6E, 65% of respondents reported that "limitations and gaps in market data" are a "significant barrier to the effective use of commercial real property data in appraisals." A total of 27% did not think so. Write-in responses to survey question 7 on specific data gaps included: data more than one year old, "lack of MLS access for low-priced commercial properties," "dated rent comps or asking rents," "accuracy," and "time submitted."

Responses to survey question 14E, by a ratio of 81% to 15%, make clear that tax appraisers believe that a "lack of good data on sales" make it "difficult to apply the fair market value standard."

These data issues fall into the category of technical limitations on appraisal accuracy. All three approaches to value in appraisal depend on transaction data or "some other indicator of how markets price properties" (Kummerow, 2006, p. 362 footnote). The lack of sales data hampers not only the appraisal districts in the performance of their job, but also makes it more difficult for data firms such as CoStar, Grubb and Ellis, Integra Realty Resources and others to aggregate data and employ it accurately for determining investor expectations, capitalization rates, etc.

4.3.2 Nondisclosure of Sale Prices

Texas is one of about a dozen states without mandatory real estate sale price disclosure (Smoot and Welcome, 2003, p.5). Because sale prices are an essential source of

information for appraisals, appraisal districts in Texas face substantial obstacles in performing their constitutionally required duty to value various forms of property at market value.

Finding 5: A large majority of survey respondents believe that nondisclosure of sale prices makes it difficult to apply the fair market value standard, and several mentioned this as a limitation or gap in the effective use of commercial real property data in appraisal.

Write-in responses to survey question 7 on specific data gaps contained a mention of sale price nondisclosure by seven people; no other write-in response was mentioned more than once. In survey question 12A, 85% of respondents agreed that "nondisclosure of sales price" makes it "difficult to apply the fair market value standard."

Kummerow (2006) notes the difficulty appraisers face in valuing property, "given the data they have to work with, heterogeneous properties with infrequent trading, and changing market conditions…" (p. 358). Commercial property sales data, which is used in all three valuation methods, is difficult to obtain because of infrequent transactions and the lack of a complete database of commercial properties and their characteristics (Montero-Lorenzo, et al., 2009, p. 408). Nondisclosure of sale price simply makes the job that much harder and less precise.

4.4 Findings on Internal Appraisal District Limitations

The fourth research question asks: Is appraisal accuracy limited by a lack of tools, training or personnel?

This question covers such areas as the budgeted resources to purchase data, time to use data, training on the use of data, provision of hardware and software tools to accomplish the appraisal task, and appraiser training, knowledge and skill. These issues represent a mix of technical issues that cause difficulty in appraisal and environmental demands of the appraisal situation.

4.4.1 Barriers to the Effective Use of Data in Appraisal

Finding 6: Survey respondents believe by a narrow margin that a lack of budgeted resources to purchase data is a significant barrier to the effective use of property data in appraisals, and by a wider margin that a lack of time or training for using data is not a barrier.

Survey questions 6A, 6B, and 6C address the three potential environmental demands in Finding 6. As noted in section 2.3.2, Jones (1999) distinguishes between "environmental demands (seen by the individual as incentives, positive or negative) and bounds on adaptability in the given decision-making situation" (p. 298). Knowing the environmental demands should allow for prediction of behavior based on rational choices; departures from those predicted behaviors reveal bounds on rationality.

The survey results indicate that a majority of respondents (52% to 40%) feel the environmental demands imposed by the limited CAD budget for the purchase of data are a significant barrier to using data effectively in appraisals. Therefore, the fact that some respondents report not using certain purchased data sources may indicate this is an environmental constraint rather than a bounded rationality issue such as incomplete information search.

4.4.2 Hardware and Software Limitations

Finding 7: A lack of hardware and software is perceived by survey respondents as neither a barrier to effectively using data in appraisals nor as a difficulty in applying the fair market value standard.

Lacking adequate hardware and software tools to perform a complex job like commercial real property appraisal could imply technical limitations to appraisal accuracy if, for example, usable software was unavailable for purchase. This situation could also imply an environmental demand, if the CAD simply lacked the resources to buy adequate computer tools.

Survey questions 6D and 14D asked whether a lack of hardware and software appraisal tools is a significant barrier to the effective use of commercial real property data in appraisals, or

makes it difficult to apply the fair market value standard. By a ratio of 25% to 77%, respondents rejected the former, and by a ratio of 15% to 77%, the latter assertion.

4.4.3 Limited Appraiser Training, Knowledge and Skill

Finding 8: Survey respondents do not believe that appraiser training, knowledge and skill make it difficult to apply the fair market value standard.

By a ratio of 23% to 69%, appraisers do not agree with the proposition in survey question 14C that appraiser training, knowledge and skill make it difficult to apply the fair market value standard in commercial real property appraisal.

This technical issue in appraisal is fundamental to the core responsibilities of the tax appraisal job and to the appraisal profession generally. The question was not asked in a personal way, such as "Does your training, knowledge and skill make it difficult to apply the fair market value standard?" Instead, it was intended to get the respondent's perception of tax appraisers generally. Nevertheless, it is probably one of the questions that caused one CAD employee to write to me: "Your survey questions obviously were written by an insider, and I assumed the responses would be used to make appraisal district employees appear to be both incompetent and corrupt since that is how we are always portrayed" (M. Kieke, personal communication, August 31, 2012). This was not the intention, and the survey results show that the overwhelming majority of tax appraisers have confidence in the abilities of their professional peers.

4.5 Finding on Appraisal District Budget Constraints

4.5.1 Appraisal District Budget Constraints

The fifth research question asked: Is appraisal accuracy limited by budget constraints, either for performing appraisals, resolving protests or contesting legal challenges from deep-pocketed taxpayers? The survey asked six questions related to budget resources, any of which could have an effect on the accuracy of final tax valuations.

Finding 9: Survey respondents do not believe that appraisal district resources to handle protests, initiate appeals and pursue litigation are significant issues in appraisal, nor are budget limitations or the threat of litigation.

Finding 10: A majority of survey respondents believes the volume of protests makes it difficult to apply the fair market value standard, and they are split on whether heavy caseloads and the lack of attention to each case does as well.

Survey question 10 asked whether the appraisal district has sufficient resources to handle protests. This is construed as a procedural obstacle to accuracy, which might force a CAD to settle protests at lower than market valuations in order to stay within budget. Unanimously, survey respondents answered yes to this question, showing that it is not a barrier to accuracy.

Survey question 11 asked whether the appraisal district has sufficient resources to initiate appeals and pursue litigation. This is construed as a potential political obstacle to accuracy, since CAD budgets are subject to approval by local governing bodies and a Board of Directors appointed by those bodies (Combs, 2012a). Respondents answered affirmatively by a ratio of 58% to 19%, with 23% indicating they did not know. Most respondents do not see a problem with the CAD appeals and litigation budget.

A series of four questions, 14B, 14G, 14F, and 14H, related to whether budget limitations, the threat of litigation, heavy caseloads, or the volume of protests make it difficult to apply the fair market value standard in commercial property appraisal. The first two, 14B and 14G, are construed as potential political obstacles to appraisal accuracy. Respondents said they are not, by ratios of 32% to 60% and 15% to 73%, respectively.

Questions 14F and 14H are procedural barriers to accuracy. On these questions, the opinions of respondents are divided: by a ratio of 46% to 50%, a bare majority thought heavy caseloads were not an obstacle, and by a ratio of 54% to 46%, a majority thought the sheer volume of protests did make it difficult to apply the fair market value standard.

A majority of survey respondents do not believe that appraisal district resources to handle protests, initiate appeals and pursue litigation are significant issues in appraisal, nor are budget limitations or the threat of litigation. However, respondents believe the volume of protests makes it difficult to apply the fair market value standard, and they are split on whether heavy caseloads and the lack of attention to each case does as well.

4.6 Finding on External Pressure

4.6.1 Limitations from External Pressure or Public Relations or Political Consequences

The sixth research question asked: Is appraisal accuracy limited by external pressure from potential public relations or political consequences?

Regarding differences between classes of taxpayers, Owens (2000) notes that "owners of property in prosperous neighborhoods may be more aware of property values and more likely to challenge an over-assessment than other taxpayers. Moreover, the desire to benefit politically powerful groups has long motivated the relative over- and under-assessment of entire classes of property" (p. 341).

This political pressure has been generally understood to favor residential property owners as a class over commercial property owners, due to homeowners' greater voting strength. For example, to Youngman, "the desire to benefit politically powerful groups has long motivated the relative over- and underassessment of entire classes of property [resulting in] over-assessment of business property, and underassessment of single-family residential property nearly everywhere" (cited in Owens, 2000, 341).

Of more relevance to this discussion is the history of the property tax showing that from the beginning of the Republic, "people of influence created systems to protect their interests" (Renne, 2003, p. 103). The particular relevance is whether powerful commercial property owners have influenced the Texas property tax system so that it systematically under-assesses commercial property as a group, and higher value properties particularly.

Finding 11: According to survey respondents, any valuation inaccuracy resulting from external pressure or political or public relations consequences likely arises at the time of the litigation versus settlement decision, not at the time of appraisal.

Survey questions 29C, 29E and 31E address these issues. Large majorities of survey respondents say they do not take into account the potential public relations or political consequences (73% report “never” or “rarely”), nor pressure from outside the agency to limit valuation increases (80% report “never” or “rarely”), when creating the appraisal.

However, responses to survey question 31E on whether such matters were taken into account when deciding to litigate versus settle a protest were mixed. Potential public relations or political consequences were felt by 19% to never be taken into account; by 4% rarely taken into account; by 23% sometimes taken into account; and by 8% often taken into account. This result gives some credence to the belief that powerful commercial property owners may take advantage of the protest and resolution system by exerting political pressure in some way. Alternatively, survey respondents may instead be referring to the public relations consequences often faced by appraisal districts from aggrieved and vocal taxpayers of all types.

Because the questions were not written specifically to delve into which of these interpretations (or some other interpretation) might be at work in the responses, it is correct to say only that a plurality of survey respondents felt that at times, potential public relations or political consequences are taken into account at the litigation versus settlement decision.

4.7 Findings on Divergences from Fair Market Value

Research question 7 has three parts: What is the effect of the protest-appeal-resolution process on final valuation accuracy? Where in the process are values most divergent from market value? What factors or justifications, if any, explain reductions below market value? The first question is covered in section 4.7.1, and the latter two in section 4.7.2.

4.7.1 The Effect of the Protest-Appeal-Resolution Process on Final Valuation Accuracy

The stages of the protest-appeal-resolution process are delineated in survey questions 27A through 27G, from initial appraisal to resolution in court. These seven questions ask whether taxable values tend to diverge from fair market value at any stage. The general trend of responses is to report increasing frequency, from never to always, of divergence from fair market value from the early stages to the later stages of the process.

Finding 12: Survey respondents report divergence from fair market value at increasing frequency from the early to the later stages of the protest-appeal-resolution process.

Responses to survey question 27A indicate that 57% believe such divergence happens never or rarely at initial appraisal, while 35% believe it sometimes happens then. At informal resolution with the taxpayer, 42% believe divergence never or rarely happens; 38% believe it sometimes happens; and 19% believe it often happens.

At the third stage of the protest-appeal-resolution process, resolution at the Appraisal Review Board, 16% report divergence from fair market value happens never or rarely; 27% report that it happens sometimes; and 54% report that it happens frequently. At resolution through settlement, 23% report divergence happens never or rarely; 27% report that it happens sometimes; and 42% report it happens often or always. At resolution through arbitration, the results are: 12% never or always; 38% sometimes; and 39% often or always.

At the final stages of the process, resolution at the State Office of Administrative Hearings or in court, pluralities report divergence sometimes (42%) at the former and often/always (40%) at the latter.

These results fit with the discussion below regarding the degree of divergence from fair market value of final valuations, and the self-reported accuracy of the respondent's own appraisals.

4.7.2 Divergences from Fair Market Value

Finding 13: Survey respondents are evenly divided on whether final valuations in their district are at or below fair market value. No respondent thought final values were above market value.

According to answers to survey question 16, respondents are evenly split on their perception that final valuations in their district, after all protests are settled, are on average at (46%) or below (46%) fair market value. No respondent thought final valuations were on average above fair market value. For those respondents who thought final values were below fair market value, the average percent variance compared to market value was revealed by answers to survey question 17 to be 12.4%, with two respondents reporting they did not know.

In reporting the accuracy of their own commercial real property appraisals, on average respondents believed 83.4% of them were at the appraiser's best estimate of fair market value. The median of the response to this question was 95%.

4.8 Findings on Rules and Laws

4.8.1 Legal Constraints that Make it Difficult to Apply the Fair Market Value Standard

Research question 8 asks: What policies or laws hamper the accurate tax appraisal of commercial property?

Recent changes in Texas state law protected property owners by requiring appraisal district compensation for attorney fees in successful appeals and providing an alternate appeals process to the State Office of Administrative Hearings for owners of property over $1 million (Popp, 2009). Another protection puts a "substantial burden of evidence" on the chief appraiser for a valuation increase following an agreed or court-ordered settlement on value in the previous year (Popp, 2009). The provision benefits those, including many commercial property owners, who tend to protest more frequently.

Finding 14: Survey respondents believe that sale price non-disclosure, protests based on unequal valuation, and the standard of clear and convincing evidence for a valuation increase in the year following a settlement make it difficult to apply the fair market value standard.

Finding 15: Survey respondents did not believe that any of the following legal constraints make it difficult to apply the fair market value standard: approval of the appraisal district board of directors to appeal ARB rulings; appraisal district compensation for taxpayer attorney fees in successful appeals; alternate appeals process to SOAH; or appraisal district practices and policies.

Survey questions 12A-12F pertain to legal constraints that inhibit the application of the fair market value standard of appraisal, which is conjectured to hamper appraisal accuracy. Large majorities believe that sale price nondisclosure (85% to 15%), protests based on unequal valuation (69% to 27%) and the clear and convincing evidence standard (58% to 31%) make it difficult to apply the fair market value standard.

However, similarly large majorities do not believe this is the case with CAD board of director approval for appealing ARB rulings (27% to 58%), compensation for attorney fees for successful taxpayer appeals (23% to 38%), and the alternate SOAH appeals process (16% to 44%). Also, by a 12% to 80% ratio, respondents do not believe that appraisal district practices and policies make it difficult to apply the fair market value standard.

4.9 Finding on Human Cognitive Limits

4.9.1 Bounded Rationality at Work

Research question 9 asks: Is appraisal accuracy hampered by human cognitive limits?

Despite several survey questions related to human cognitive limits, the only results that were suggestive of the condition were four questions where responses were split and two where Simon's bounded rationality theory was supported by survey responses.

Finding 16: Survey respondents showed a split response to questions indicating the presence of the bounded rationality concepts of so-called “satisficing” behavior and framing; a split to stronger response to overcooperation; and a strong response to ambiguity. Responses to the concepts of recognition, habituation and routine, credulity and incomplete information search were weak.

So-called “satisficing” behavior refers to an agent aiming at “some threshold of satisfaction” (Munier, et al., 1999, p. 234) from a “simple decision rule (of a threshold type)” (Munier, et al., p. 245). Questions 25, 26 and 41 pertain to this construct.

Responses to survey questions 25 and 26 were split. Regarding whether the discounted cash flow methodology was too difficult to use, 24% reported never or rarely; 28% reported sometimes; and 40% reported often or always. Asked whether simple rules of thumb are substituted for complex commercial property appraisals, 44% reported never or rarely, 36% reported sometimes, and 12% reported often.

Regarding question 41 on how often the respondent uses simple shortcuts in complex commercial property appraisal cases, 62% reported never or rarely, 27% reported sometimes, and only 4% reported often.

In question 22, the survey asked whether using last year’s valuation is a good starting point for this year’s appraisal. This is an example of the bounded rationality concept of framing, or the tendency to shift preferences depending on how choices are stated such as in negative terms vs. positive, in terms of losses vs. gains, etc. (Jones, 1999, p. 306). Responses were split, with 35% of respondents saying it was never or rarely warranted, 42% saying it was sometimes warranted, and 23% saying it was often or always warranted.

Questions 27B, 29B, 39 and 40 pertain to the tendency of tax appraisers to overcooperate, or the tendency to cooperate with other actors more than is necessary to accomplish one’s goals. The divergence of taxable values from fair market value at informal resolution with the taxpayer, where only the appraiser and taxpayer are involved, was reported

by 42% to happen never or rarely, 38% to happen sometimes and 19% to happen often. Taking the taxpayer's financial resources into account when creating the appraisal was reported by 92% to happen never or rarely, and only by 4% to happen sometimes. These two results are at best a weak representation of overcooperation.

On the importance of appraisers cooperating with property owners in arriving at appraised value, 12% reported never or rarely, 20% reported sometimes, and 60% reported often or always. This is construed to be a manifestation of overcooperation, although it could also be the result of an environmental demand, where appraisers are expected to treat taxpayers with dignity and at least the appearance of cooperation in arriving at appraised value. On whether cooperative taxpayers receive the benefit of the doubt versus uncooperative ones, 43% report never or rarely, 23% report sometimes, and 31% report often or always. Responses to these two questions offer support for the overcooperation thesis.

Ambiguity involves situations where the relative importance of a problem's attributes are unclear or, more fundamentally, where "alternative states are hazily defined or [where] they have multiple meanings, simultaneously opposing interpretations" (March, 1994, quoted in Jones, 1999, p. 308). Given the expected consequences of a high, middle, or low valuation, as these may be perceived by a CAD appraiser, it is possible that the perceived larger unfavorable consequences of a high appraisal (as compared to a low appraisal) might tip the scales to the low side. Survey question 34, on whether it is fairly clear what valuation level will cause a commercial property owner to protest, had responses of 57% never or rarely, 12% sometimes and 20% often or always. These responses support the presence of ambiguity in the tax appraisal work environment.

Simon theorized that "economic agents follow some reasonable procedure, or sequence of thoughtful steps" in deciding issues (Munier, et al., 1999, p. 234). Later, Simon noted that this reasonable procedure is "characterized by at least two stages: *recognition* and *heuristic search*" of possibilities (Munier, et al., 1999, p. 234—emphasis original). Following a

reasonable procedure might be revealed by starting from last year's value, negotiating with the property owner, or otherwise departing from USPAP standards.

In an effort to identify this recognition phase, survey question 19 asked whether it is practical to apply mass appraisal techniques to commercial property appraisal. 88% of respondents said often or always, while 12% said sometimes. Clearly, respondents recognize the usefulness and practicality of this tool and thus are not exhibiting bounded rationality.

Survey questions 21 and 23 were along these same lines. Respondents reported that a recent sale price is a good indicator of fair market value (85% said this is often or always true). A steep year-over-year value increase was seen by 61% of respondents as never or rarely unfair to the property owner. Mass appraisal techniques are often or always used by 96% of respondents (survey question 24). None of the majority responses indicate a condition of bounded rationality.

Survey question 33, asking whether it is more important to follow the district's guidelines even if the result is an inaccurate appraisal, led 43% of respondents to say never or rarely, 23% sometimes and only 8% often or always. This question was based on the bounded rationality concept of habituation and routine, one of the human tendencies that cause "the behavior of organizations [to mimic] the bounded rationality of the actors that inhabit them" (Jones, 1999, p. 302). The survey responses did not indicate the presence of this quality.

The bounded rationality concept of credulity was encapsulated in survey question 38: Do property owners often emphasize unimportant property attributes to make their point? 70% of respondents reported often or always, and 23% reported sometimes. These responses do not indicate bounded rationality.

Incomplete information search is part of the "satisficing" behavior theorized by Simon whereby human beings arrive at decisions in a simplified manner by not conducting an exhaustive search. Survey questions 4A-4F looked for evidence of incomplete information search by asking questions about data sources routinely used in a tax appraiser's work,

including specific market data, local brokers or private appraisers, public filings by corporations, and data submitted by the subject taxpayer or other taxpayers. All responses were overwhelming positive (opposite of the condition of bounded rationality) except for public filings by corporations, which was still positive by a 50% to 42% ratio. Survey question 36, on whether previous valuations are reviewed for accuracy when new evidence comes to light, likewise showed no evidence of incomplete information search as 85% of respondents reported it happening often or always.

Overall, survey respondents showed a split response to questions indicating the presence of the bounded rationality concepts of framing and so-called "satisficing" behavior; a split to stronger response to overcooperation; and a strong response to ambiguity. Responses to the concepts of recognition, habituation and routine, credulity and incomplete information search were weak.

4.10 Findings on Environmental Demands

4.10.1 The Presence of Environmental Demands in Tax Appraisal

Jones (1999) distinguishes between "environmental demands (seen by the individual as incentives, positive or negative) and bounds on adaptability in the given decision-making situation" (p. 298). Knowing the environmental demands should allow for prediction of behavior based on rational choices; departures from those predicted behaviors reveal bounds on rationality. The survey seeks to understand whether environmental demands are present that would affect appraisal accuracy.

Finding 17: In the litigation versus settlement decision, taking into account how winnable the case is and the cost of litigation may indicate the presence of an environmental demand affecting final accuracy.

Finding 18: CAD efforts to grade appraisers on productivity rather than accuracy, and a lack of rewards for accuracy, may present an environmental demand affecting accuracy.

Survey question 20 asks if overvaluing a commercial property is a bigger problem than undervaluing it. Undervaluing a property in an environment of appeals based on unequal appraisal presents a risk of widespread under-appraisal. The environmental demand posited here is the interest of the appraisal district in not being overwhelmed by protests, given the limited resources and time available to resolve them, which would be revealed by answers tending toward always. Survey respondents said this was never or rarely an issue (61%) or sometimes an issue (31%). This is not therefore an environmental demand that would strongly influence appraisal accuracy.

Survey questions 29A and 29D ask whether, when creating the appraisal, the respondent takes into account the potential costs to the CAD including litigation expense, and internal agency pressure to limit the amount of a valuation increase. Responses to neither question indicated the presence of an environmental demand, with 77% and 81% respectively reporting this was never or rarely considered.

Survey questions 31A, 31B, 31D and 31F asked whether these factors were taken into account when deciding to litigate versus settle a protest: how winnable the case is, the cost of litigation, the "return" on the "investment" in litigation costs, and whether the CAD board of directors will consent to the litigation. Answers tending toward always would indicate an environmental demand that could affect final valuation accuracy. Large pluralities or a majority (31D) answered "don't know." The remaining results were split, with responses ranging from 19% never-rarely to 27% often-always (31A); 16% never-rarely to 34% often-always (31B); 15% never to 12% often (31D); and 23% never to 20% often-always (31F).

Survey question 35 asked if the respondent would assign market value to the property even if it may result in a protest. 92% responded often or always, indicating no presence of an environmental demand.

Survey question 37 asked if appraisers are generally graded on their productivity rather than accuracy. Answers tending toward always would indicate an environmental demand that

could affect final valuation accuracy. Responses were split, with 42% reporting never-rarely, 15% sometimes, and 31% often-always.

Survey question 42 directly addressed the incentives of the work environment, asking if appraisers are rewarded for accuracy. Responses support an environmental demand, with 65% reporting this occurs never or rarely, 23% reporting sometimes, and only 4% reporting always.

Survey questions 43, 44 and 45 ask about the importance of appraisal accuracy to the CAD; whether there are dangers to the CAD for lower than market appraisals; and whether a higher than expected protest rate be a serious problem for the CAD. An environmental demand would be revealed by answers tending to never for the first two questions, and tending to always for the third. None of these appears to be an environmental demand that could affect final valuation accuracy: 89% of respondents answered often-always to question 43; 62% answered often-always to question 44; and 50% answered never-rarely to question 45.

The survey attempted to discover if appraisal district performance measures, constraints or rewards would limit how accurate appraisers can be. There is some indication from the survey results that CAD efforts to grade appraisers on productivity rather than accuracy could present an environmental demand affecting accuracy. There was strong support for an environmental demand in the fact that 65% of respondents reported that appraisers are never or rarely rewarded for accuracy.

Likewise, two factors taken into account when deciding to litigate versus settle a protest, how winnable the case is and the cost of litigation, indicate the presence of an environmental demand. None of the other theorized environmental demands were supported by the survey responses.

4.11 Finding on the Relationship between Appraisers and Taxpayers

4.11.1 The Rules of the Game

Adherents of the new institutional economics assert that institutional arrangements, such as the property tax appraisal and collection system, are the rules of the game, that is, the "humanly devised constraints that shape human interaction" (North, 1990, p. 3). For Ostrom (2005), "[w]hen the outcomes are productive for those involved, they may increase their commitment to following the rules and norms that have evolved over time so as to continue to receive positive outcomes" (p. 828). This positive reinforcement can encourage behaviors by taxpayers and by CAD officials to resolve potentially contentious–and costly—tax protests by striking a final valuation different from market value, despite legal requirements to the contrary.

Finding 19: Respondents believe rules of the game involving taxpayer's faulty data submissions, litigation and protests based on unequal appraisal may result in final valuations diverging from fair market value.

Survey question 6F asked whether faulty data submitted by taxpayers was a significant barrier to the effective use of commercial property data in appraisals. By a ratio of 55% to 32%, respondents supported this view. Among the write-in responses to question 8, asking what data is faulty, were "misleading income and expense data" from eight respondents, "misleading rent roll," and "inaccurate sale price." These answers show that tax appraisers believe the rules of the tax appraisal game allow behavior that clearly could result in inaccurate tax appraisals.

The only write-in response to survey question 28, asking whether taxable values diverge from fair market value at some stage other than those enumerated in questions 27A-27G, was "litigation often causes divergence." This supports the answers to question 27F, where 40% reported that resolution in court often or always resulted in taxable values diverging from fair market value.

Survey respondents believe that the cost of litigation (survey question 31B) is often or always (34%) taken into account when deciding to litigate versus settle a protest; only 16%

reported that happens never or rarely. CADs budgets are approved by local governments, and the budget for litigation appears to be a limiting factor in the decision to litigate or settle a tax protest.

Survey questions 31C and 31F also address the litigation versus settlement decision, asking if the financial resources of the taxpayer or whether the CAD board of directors will consent to litigation is weighed in the decision. Respondents report that taxpayer resources are never or rarely considered (35%), versus 8% each for sometimes and often-always. CAD Board of director consent is never (12%) or sometimes (12%) considered, versus often-always considered (20%). These situations do not appear to be rules of the game affecting final values.

For survey question 46, respondents said that a single lower-than-market appraisal can be the cause of many "unequal appraisal" protests by the following ratios: 23% never-rarely, 23% sometimes, and 50% often-always. The unequal appraisal protest rule is perceived as one way that lower than market value outcomes may occur.

According to survey respondents, rules of the game involving taxpayer's faulty data submissions, litigation and protests based on unequal appraisal may result in final valuations diverging from fair market value.

4.12 Conclusion

4.12.1 Summary of Findings

This chapter 4 analyzed data produced by the valuation model and responses from the survey of tax appraisers in the five most populous counties in Texas. The 11 research questions that form the basis of this inquiry provided the framework for 19 findings from the research.

The findings are:

1. A valuation model can be built that is more accurate than some CADs' historical tax valuations at predicting sale prices, but with wider individual variation from sale prices than CAD values display.
2. A valuation model can feasibly be built and used by appraisal districts to value relatively homogeneous types of commercial property, such as downtown class A office buildings.
3. Given the limited county-level sales data to use for comparison, the difference in the average variation between each pair of counties was large. The reasons for the variation are not clear, though the small population of sales in each county may play a role.
4. By large majorities, survey respondents believe that a lack of good sales data makes it difficult to apply the fair market value standard, and that limitations or gaps in data is a significant barrier to the effective use of data in appraisals.
5. A large majority of survey respondents believe that nondisclosure of sale prices makes it difficult to apply the fair market value standard, and several mentioned this as a limitation or gap in the effective use of commercial real property data in appraisal.
6. Survey respondents believe by a narrow margin that a lack of budgeted resources to purchase data is a significant barrier to the effective use of property data in appraisals, and by a wider margin that a lack of time or training for using data is not a barrier.
7. A lack of hardware and software is perceived by survey respondents as neither a barrier to effectively using data in appraisals nor as a difficulty in applying the fair market value standard.
8. Survey respondents do not believe that appraiser training, knowledge and skill make it difficult to apply the fair market value standard.

9. Survey respondents do not believe that appraisal district resources to handle protests, initiate appeals and pursue litigation are significant issues in appraisal, nor are budget limitations or the threat of litigation.
10. A majority of survey respondents believes the volume of protests makes it difficult to apply the fair market value standard, and they are split on whether heavy caseloads and the lack of attention to each case does as well.
11. According to survey respondents, any valuation inaccuracy resulting from external pressure or political or public relations consequences likely arises at the time of the litigation versus settlement decision, not at the time of appraisal.
12. Survey respondents report divergence from fair market value at increasing frequency from the early to the later stages of the protest-appeal-resolution process.
13. Survey respondents are evenly divided on whether final valuations in their district are at or below fair market value. No respondent thought final values were above market value.
14. Survey respondents believe that sale price non-disclosure, protests based on unequal valuation, and the standard of clear and convincing evidence for a valuation increase in the year following a settlement make it difficult to apply the fair market value standard.
15. Survey respondents did not believe that any of the following legal constraints make it difficult to apply the fair market value standard: approval of the appraisal district board of directors to appeal ARB rulings; appraisal district compensation for taxpayer attorney fees in successful appeals; alternate appeals process to SOAH; or appraisal district practices and policies.
16. Survey respondents showed a split response to questions indicating the presence of the bounded rationality concepts of so-called “satisficing” behavior and framing; a split to stronger response to overcooperation; and a strong response to ambiguity.

Responses to the concepts of recognition, habituation and routine, credulity and incomplete information search were weak.

17. In the litigation versus settlement decision, taking into account how winnable the case is and the cost of litigation may indicate the presence of an environmental demand affecting final accuracy.
18. CAD efforts to grade appraisers on productivity rather than accuracy, and a lack of rewards for accuracy, may present an environmental demand affecting accuracy.
19. Respondents believe rules of the game involving taxpayer's faulty data submissions, litigation and protests based on unequal appraisal may result in final valuations diverging from fair market value.

The following chapter 5 interprets these findings to gain insight into the issues presented by the research questions that form the basis of this inquiry into variation in tax valuation accuracy

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CHAPTER 5

INTERPRETATION OF FINDINGS

5.1 Introduction

The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities is to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies.

This chapter interpreting findings begins with a review of the goals of the study and a description of how the study was conducted, accompanied by a summary of findings identified in chapter 4. Next, these findings are analyzed to determine what significant discoveries were made and what patterns emerge from the data analysis. The larger meaning of the findings is considered, illustrating how the research questions were answered by the findings and how the findings can be interpreted in light of the literature on tax appraisal, valuation models, and the theories of bounded rationality and the new institutional economics. Next, how the findings relate to the author's prior assumptions about the study is addressed. Finally, the disparate parts of the interpretation of findings are brought together in a concluding section.

5.2 Goals and Methods of the Study

5.2.1 Measuring Variation in Accuracy through a Mixed Methods Approach

The study's purpose is to measure variation in appraisal across five counties in Texas and explain that variation using a mixed methods approach. The study combines the development of a quantitative valuation model with a multiple case study (qualitative) approach employing a survey of tax appraisers.

The case studies were drawn from the downtowns of the five most populous cities in Texas. Those historical centers of commerce were believed likely to have comparable class A office buildings and a sufficient number of traceable sale transactions to test the accuracy of a valuation model. This property subset was selected for study because of the high concentration of property value represented by these buildings and for their comparative ease of valuation on the basis of net operating income.

A valuation model was developed to measure variation from market value of the selected properties within each downtown. For the qualitative portion of the study, tax appraisers involved in the commercial property appraisal process were surveyed to understand their perceptions of policies, customs and practices of their agency. The survey's purpose was to understand how CAD practices and policies affect appraisal accuracy. The survey findings suggest ways to improve CAD appraisal accuracy.

5.2.2 The Valuation Model and Quantitative Analysis

The measurement of variation between different CADs required benchmarks for accuracy. CAD property appraisals are required by the state constitution to be "equal and uniform" (Texas Constitution, n.d.) and state law requires nearly all real property to be assessed at 100% of market value. According to Combs (2011a), the law defines market value as:

> …the price at which a property would transfer for cash or its equivalent under prevailing market conditions if:
> (A) exposed for sale in the open market with a reasonable time for the seller to find a purchaser;
> (B) both the seller and purchaser know of all the uses and purposes to which the property is adapted and for which it is capable of being used and of the enforceable restrictions on its use; and
> (C) both the seller and purchaser seek to maximize their gains and neither is in a position to take advantage of the other (p. 49).

In reality, market value is a theoretical construct against which actual sale conditions are judged, and in comparison to which adjustments are made to the sale price. In the commercial

property environment, there are typically few comparable sales on which to base an opinion of market value.

The valuation model developed for this study assumes that sales reported as open market, i.e. not including foreclosure or related-party sales, reflect fair market value. This assumption may be problematic in theory, but in practice it appeared to hold up well enough to generate reasonably consistent estimates of deviation from market value.

The model used data from commercial data providers CoStar, BOMA, and Integra Realty Resources, to produce value estimates for all properties in the study having adequate data (published asking rents, downtown average expenses, submarket-specific capitalization rates, etc.). This data was fed into the model in an unbiased fashion, and values were generated using the direct capitalization method.

The valuation model was specified according to appraisal industry standards, following the steps in USPAP Standard 6 for mass appraisal. The model was calibrated in an unorthodox fashion to account for an obvious deviation from market value: the overestimation of the value of buildings with above-market vacancy rates.

To make fair comparisons to the appraisal district valuations, the model values were computed for the same January 1 date used by the CADs. For the comparisons to sale prices, an assumption was made of linear price change between the January 1 values prior to and following the sale date. This resulted in a predicted price on the sale date for both the model and the CAD.

The quantitative analysis employed two hypotheses that first addressed the question of variation of tax appraisals from fair market value generally, and then whether there is variation in appraisal accuracy between CADs. First, taxable values of the selected properties were tested against the available data on actual sales to determine if final valuations vary from market value in each county on average by more than 10%. This is the approximate level of

variance measured by the State Comptroller for Tarrant County commercial property appraisals in Tarrant County in 2007, 2008 and 2009 (Combs, 2010). The null hypothesis was rejected for all counties except Bexar County, which did not have any sales to use for comparison.

The model appears to be feasible, and the data inputs available in time for production of tax appraisals in late spring. This means that the first research question is answered affirmatively: a model for valuing downtown class A office buildings can be constructed that is more accurate than historical tax appraisals at predicting market sale prices, and this model can be applied by appraisal districts to this and other property types to increase the accuracy of tax appraisals.

Next, the overall average level of variation between counties was calculated and was hypothesized to exceed 25%. The null hypothesis was rejected for all pairings except Dallas-Harris County. Harris and Dallas Counties had the largest measured deviations of tax valuations from fair market value of the four counties for which there was sale data. Coincidentally, the average difference in variation between the two was relatively small. Overall, the five counties' divergences of valuations from market value—all of which fell below market value, on average—varied significantly.

The second research question is answered affirmatively, with a caveat: appraisal accuracy varies from county to county, but the reasons for this variation are not clear.

5.2.3 Survey of Registered Tax Appraisers: The Qualitative Approach

Tax appraisers employed by the CADs in commercial real property departments and registered with the state were surveyed in order to understand the reasons, the "why," behind what the valuation model revealed about tax appraisal variation.

The survey questions were devised based on the literature on tax appraisal, including technical, legal, procedural and political obstacles to accuracy, and two theories selected for their explanatory power, bounded rationality and the new institutional economics. A conceptual

framework was created (see Appendix E) that translated the direction of each obstacle to accuracy and theoretical construct on the available survey responses. For example, a response of "no" to the use of any of the data sources in survey question 4 was construed as indicative of incomplete information search, from Simon's bounded rationality thesis. Each question on the survey had at least one interpretation tied to the literature. The survey responses were then aggregated to produce the findings in chapter 4.

The overall response rate to the survey was 19.4%. Survey responses by county were uneven, with most responses coming from two counties: Tarrant and Harris. Therefore, the intention of using county-level survey results to explain the CAD specific variations on valuations was not fulfilled.

Filling out the survey was an approximately 15 minute endeavor, based on data from the online version. Survey participants are to be commended for their participation, and for contributing to increased knowledge about tax appraisal and tax appraisers.

Appraisal accuracy was perceived as hampered by the limited availability of sales data for commercial property, but not by a lack of tools, training or personnel, nor by budget constraints for performing appraisals, resolving protests or contesting legal challenges.

Survey respondents saw a possibility that valuation inaccuracy could arise from external pressure or political or public relations consequences at the time of the litigation versus settlement decision, but not at the time of appraisal.

Survey respondents reported divergence from fair market value at increasing frequency from the early to the later stages of the protest-appeal-resolution process. The survey did not ask directly about what caused such divergence, but one may surmise that what happens at the ARB, settlement, arbitration and litigation stages is the cause.

None of the legal constraints proposed by the survey seen as making difficult to apply the fair market value standard, and the only human cognitive limits identified through the conceptual framework as having an effect were overcooperation and ambiguity.

Two areas of environmental demands that may affect accuracy were identified: in the litigation versus settlement decision, taking into account how winnable the case is and the cost of litigation; and CAD efforts to grade appraisers on productivity rather than accuracy, and a lack of rewards for accuracy.

Regarding the effects of the relationship between tax appraisers and taxpayers, respondents believe rules of the game involving taxpayer's faulty data submissions, litigation and protests based on unequal appraisal may result in final valuations diverging from fair market value.

The survey results, combined with the results of the values and comparisons from the quantitative analysis, are informative on the issues of appraisal accuracy and obstacles that CAD appraisers face in the performance of their duties. The larger meaning of these findings is the subject of the following sections.

5.3 Meaning of the Findings

The 19 findings enumerated in section 4.12.1 cover both parts of this mixed method study: the valuation model and its quantitative comparisons to CAD valuations, and the results of the qualitative survey of tax appraisers. Of these findings, 12 positive findings and one negative finding stand out as significant.

5.3.1 Appraisal Accuracy

Finding 1 shows that a valuation model can be built that is more accurate than some CADs' historical tax valuations, although with wider variations from sale prices. This was the starting point of the study: was it possible to do better than the apparently large deviations from

market value observed in class A office buildings in downtown Fort Worth? Indeed, nearly half of tax appraisers agree (finding 13) that final tax valuations in their district are on average below market value (median estimate: about 5%), while the other half believe they are at market value. These two findings reinforced my intuition that there could be a departure from statutory requirements of equal valuation, at least in the case of these highly visible and highly valuable properties.

If there was something to my original intuition, what might be the cause of the anomalous valuations? The Office of the State Comptroller has oversight responsibilities of county appraisal districts in Texas: it offers training to CAD employees, provides support on technical issues, and performs property value studies, including random sampling of tax appraisals (Combs, 2011b, p. 1) for the purpose of school funding equalization. Upon investigation, I found these reports, measures and processes to be valid.

However, there appears to be a hole in the fabric of this oversight responsibility. The sampling of appraisals is done in large categories of property, such as commercial real property, so patterns of under-appraisal could go undetected if under-appraisal was limited to a subset of the larger category and if overall progressivity or regressivity is avoided—that is, if there is no statistical pattern of differing levels of appraisal between higher value and lower value properties within the category. This assertion follows from the limited statistical tests performed in the property value study (Combs, 2011b, pp. 5-20) and the fact that no testing is done that compares subsets within a property category, other than through stratification by value (p. 10).

5.3.2 The Protest-Appeal-Resolution Process

The Comptroller holds the CADs accountable only for their appraisers' valuations, and not for what happens to values in the later stages of the protest-appeal-resolution process. Indeed, findings 11 and 12 speak to what tax appraisers believe is happening in these later

stages. According to finding 11, any valuation inaccuracy resulting from external pressure or political or public relations consequences likely arises at the time of the litigation versus settlement decision, not at the time of the appraisal. Finding 12 demonstrates that survey respondents believe that divergence from fair market value occurs at increasing frequency from the early stages (beginning with initial appraisal) to the later stages (to resolution in court) of the protest-appeal-resolution process.

Of course, tax appraisers can be presumed to have a self-serving interest in making their own performance look better than that of the appraisal review boards, arbitrators and judges that rule on the protests to the appraisers' work product, i.e., the property appraisal. But if the divergences that occur are toward below-market values, there is logic in the tax appraisers' belief about what happens to the valuation after their own work on it is finished.

The survey was intended to be comprehensive, including anything that might affect the final tax valuation of commercial real property if it would fit onto one sheet, front and back. Some questions were overlapping; some were on similar topics with the direction (in regard to the theory being tested) reversed; etc. It is possible that this structure may have put off some potential respondents, but the results allow for fine-grained analysis.

For example, the survey results on finding 12, where respondents report divergence from fair market value at increasing frequency through the stages of the protest-appeal-resolution process, demonstrate the benefit of the comprehensive nature of the survey questions. Without this, the pattern would likely not have been evident.

5.3.3 Bounded Rationality

Another example of the expansiveness of the survey is the large number of questions testing various aspects of the bounded rationality thesis. This theory seemed to me compelling as a possible explanation for the divergence of taxable value from market value, given the difficulties of appraisal in the best of conditions layered on to the results of a political process

involving local and state government, powerful private actors and occasional political controversy.

The thoroughness of the bounded rationality questions paid off in distinguishing only two, overcooperation and ambiguity (finding 16), of several aspects of the theory being tested showing significance to tax appraisers. These two situational characteristics, overcooperation and ambiguity, appear particularly relevant to the tax appraisal environment: contact with taxpayers is a fraught enterprise requiring at least the appearance of cooperation, and the appraisal task is filled with ambiguity. But logically arriving at testing only these two aspects of the theory a priori was unlikely to happen; the other aspects, such as recognition, habituation and routine, credulity and incomplete information search, seemed just as relevant.

5.3.4 Sale Price Nondisclosure

A review of the appraisal literature indicated that sale price nondisclosure and a lack of sales data would be likely contributors to whatever variation in appraisal that was discovered. Findings 4, 5 and 12 bore this out. Data gaps, including a lack of good sales data is clearly an issue in applying the fair market value standard. Price disclosure is a perennial political issue in Texas, the most populous state that lacks a price disclosure law.

Ironically, it could be argued that price disclosure would be the single most leveling force in resolving what appears to be significant inequality between residential and commercial property appraisals. A cursory look at the Comptroller's property value studies should be sufficient to understand the disparity, and publicity about the widespread use of MLS data by appraisal districts ought to overcome the objections of residential taxpayers to price disclosure, since the CADs in general already have that information on residential properties.

5.3.5 Causes of Variation between Counties

The reasons for the apparent variation between counties on commercial real property valuations are not clear (finding 3). It was hoped the survey data would shed light on these

reasons, but that was impossible due to the paucity of responses from three of the five counties. The factor identified as the reason Travis County's values were closer to market value, the predominance of triple net rent structures, was contradicted by the fact that Harris County, with the most apparent deviation from market value, had an even higher predominance of these rent structures. This is an area needing further investigation.

5.3.6 Pursuit of Litigation

The single negative finding was surprising. Finding 9 indicated that survey respondents do not believe that appraisal district resources to handle protests, initiate appeals or pursue litigation are significant issues in appraisal. The particular surprise is the belief that CADs have sufficient resources to pursue litigation, especially in light of the communication to me from the Bexar County Deputy Chief Appraiser:

> Commercial values…are no longer determined by market value or any other appraisal technique. They are determined by appeals and litigation, and virtually all appeals and litigation concern equal and uniform appraisal. For the record, there is no such appraisal method definition and all the jargon and USPAP compliance are simply procedures to disqualify district appraisers when we have the audacity to take a case to court. (*Appraisal districts rarely go to court anymore for reasons of costs.* We are responsible for the litigants' attorneys' fee unless the value is sustained or raised.) (M. Kieke, personal communication, August 31, 2012—emphasis added).

The expectation was that more commercial real property tax appraisers would point this out as well, but it is possible the problem is limited to a few counties, Bexar among them. Only two responses from Bexar County were received out of 26 total responses.

5.3.7 Unequal Appraisal Protests

The effects of unequal appraisal protests (or equal and uniform appraisal) are addressed in findings 14 and 19, where protests based on unequal appraisal are believed to make it difficult to apply the standard of fair market value and may result in final valuations diverging from market value. According to Getzendanner (2004), "Owners of income-producing

property seek above all else an assessment, and resultant real estate tax, which is not anti-competitive" (p. 98). There is evidence from the valuation model that the effect of this avenue of protest may be a leveling of appraisals of high value properties significantly below fair market value.

5.3.8 Volume of Protests

Finding 10 expressed the belief of survey respondents that the volume of protests makes it difficult to apply the fair market value standard. It is possible that taxpayer protests have a particular effect on tax appraiser's work load and ability to perform other aspects of their job, if appraisers have to either attend hearings or defend their appraisals that are under protest.

5.3.9 Appraiser Accuracy versus Productivity

Finally, finding 18 makes the point that CAD efforts to grade appraisers on productivity rather than accuracy, along with a lack of rewards for accuracy, may present an environmental demand where appraisals are produced quickly with less regard to accuracy. There is a fundamental problem, however, with the idea of rewarding appraisal accuracy: how would the CAD know when it was achieved? After all, the appraisal itself is the initial measurement of value. If the ARB or court lowers the value, clearly there are circumstances (cited throughout this study) where the action takes the property value further from rather than closer to market value. The only objective measure of fair market value is a recent or near-future sale price for the property, a prospect of very low probability.

These 12 positive findings and one negative finding illustrate the larger issues in commercial real property tax appraisal: valuation accuracy and variation between counties; the nature of the protest-appeal-resolution process; bounded rationality; sale price nondisclosure; pursuit of litigation; unequal appraisal protests; volume of protests; and appraiser accuracy vs. productivity.

5.4 Conclusion

The final taxable values of class A office buildings in the five largest cities in Texas are, according to results of the valuation model developed here, below market value by 13.3% to 47.7% on average, except for the city of San Antonio where no sales were available for comparison. Valuation accuracy appears to vary significantly between counties. Almost half of the CAD appraisers who responded to the appraisal survey reported that final commercial property values in their districts were below market value, by a median value of 5%. This contradicts constitutional and statutory requirements of equal valuation.

Nondisclosure of sale prices contributes to an already poor data environment and exacerbates the inherent difficulties in mass appraisal. Overwhelming majorities of survey respondents agree that sale price nondisclosure (85%) and a lack of good data (81%) make it difficult to apply the fair market value standard in commercial real property appraisal.

CADs do not reward appraisers for accuracy, but it is difficult to imagine a remedy due to the lack of an independent measurement of accuracy. CAD appraisers appear to be subject to overcooperation and ambiguity, in the bounded rationality sense. These limits on human cognition may contribute to divergence from market value at the time of initial appraisal or informal resolution with the taxpayer, which 35% and 38%, respectively, of survey respondents reported sometimes happening.

Respondents to the appraisal survey reported divergence from fair market value at increasing frequency from the early to the later stages of the protest-appeal-resolution process. If this perception is accurate, the statutory requirement of equal valuation is eroded during the very administrative and legal processes constructed to fulfill this requirement.

Political and public relations considerations are not believed by respondents to be a concern for valuation accuracy, except perhaps at the time of the litigation versus settlement decision. The e-mail communication from the Bexar County Deputy Chief Appraiser indicates,

in contrast to the survey results, that litigation is practically no longer an option due to the CAD's responsibility to pay for the litigants' attorneys' fees if the value is lowered. The rules of the game regarding tax protest lawsuits appear to exert pressure on the CAD to settle rather than fight in court to support the appraiser's opinion of value.

Survey respondents said that unequal appraisal protests make it difficult to achieve fair market value and may result in final value diverging from market value. The sheer volume of protests, probably also including frivolous protest filings, makes it difficult to apply the fair market value standard. These represent additional rules of the game that appear to stack the deck against the CADs.

From the very beginning of the tax appraisal process, when data is being gathered to perform the January 1 valuation, all the way through the final appeal in court on a taxpayer protest based on unequal value, processes are at work that may lead to the outcome of below-market final valuations. It is a process that often accomplishes the opposite of its intended result. The concluding chapter addresses these processes and recommends solutions.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The purpose of this study of tax appraisals of downtown class A office buildings in the five largest Texas cities was to measure variation in appraisal, investigate its causes, and find possible solutions by providing feasible technical guidance and policy recommendations to cure deficiencies. The conclusions of this study are derived from the research questions in section 1.4 and the findings presented in section 4.12.1 and therefore address: appraisal accuracy; availability of sales data and price disclosure; budget and resource issues; inaccuracy arising in the various stages of the protest-appeal-resolution process; legal constraints; and bounded rationality and environmental demands.

6.2 Conclusions

Based on the analysis of CAD valuations compared to the few available sale prices, the counties in the study had undervaluation on average ranging from 13.3% to 47.7%. What appears to be a problem of tax appraisal accuracy could in fact be the result of what comes after the initial appraisal in the protest-appeal-resolution process. That process is made up of laws and rules made by the State of Texas and policies and procedures implemented by the CADs.

6.2.1 Appraisal Accuracy

The first and second findings of this study showed the feasibility of creating a valuation model that is more accurate than some CADs' historical tax valuations at predicting sale prices. Some counties (Travis and Tarrant) are doing better than others (Dallas and Harris) at keeping

final valuations close to market value. The study was unable to determine the causes of the variation between counties.

In finding 13, survey respondents were evenly divided on whether final valuations in their district are at or below fair market value. No respondent thought final values were above market value. This is what led me to the topic. The average variances from the statutory level of appraisal begs for explanation. If a class of taxpayers is benefitting from this situation, the rules will be hard to change, and it is likely the rules evolved to produce precisely this outcome.

6.2.2 Availability of Sales Data and Price Disclosure

A paucity of sales and information about sales hampers the investigation into valuation accuracy and into the variations between counties. Finding 4 showed that by large majorities, survey respondents believe that a lack of good sales data makes it difficult to apply the fair market value standard, and that limitations or gaps in data are a significant barrier to the effective use of data in appraisals. It would appear that sales data gathering is not as extensive or useful as it should be, or sales data is not being widely shared.

A related issue is the lack of mandatory real estate sale price disclosure in Texas. In finding 5, a large majority of survey respondents reported that nondisclosure of sale prices makes it difficult to apply the fair market value standard, and several mentioned this as a limitation or gap in the effective use of commercial real property data in appraisal.

This is a perennial issue in Texas politics, and a coalition has developed to stop any efforts toward price disclosure. Price disclosure could be the single most effective way to equalize residential and commercial property appraisals. Price disclosure would increase the efficiency of real estate markets and provide all participants with better information for decision making. The fear of price disclosure is grounded in the belief that appraisal districts would use price information to increase valuations, ostensibly above market value and in an unfair way. This viewpoint appears to betray the belief that current valuations are below market value.

While the arguments of the anti-disclosure lobby may not be persuasive, its concerns must be addressed if headway is to be made on the issue.

6.2.3 Budget and Resource Issues

In findings 6 and 7, survey respondents reported that a lack of budgeted resources to purchase data is a significant barrier to the effective use of property data in appraisals, but a lack of hardware and software is not. This result is a reflection of how the need for data drives the appraisal task, and it may indicate issues with how CADs allocate scarce resources.

Despite the finding that appraisal district resources to handle protests, initiate appeals and pursue litigation are not seen as significant issues, nor are budget limitations or the threat of litigation, there seems ample evidence to contradict this finding. It is at odds with packed protest schedules and with the Deputy Chief Appraiser quoted in section 5.3.6: "Appraisal districts rarely go to court anymore for reasons of costs" (M. Kieke, personal communication, August 31, 2012). In addition, there are likely to be political ramifications for Chief Appraisers who decide to aggressively pursue appeals and litigation. Perhaps the litigation budget is not perceived as a significant issue by tax appraisers because appraisal districts rarely go to court, instead choosing to settle most protests.

6.2.4 Inaccuracy in the Stages of the Protest-Appeal-Resolution Process

In finding 11, survey respondents report that any valuation inaccuracy resulting from external pressure or political or public relations consequences likely arises at the time of the litigation versus settlement decision, not at the time of appraisal. This is logical: the hardest to resolve protests are likely to be from wealthy individuals and corporations who can use the threat of litigation to force CADs to settle at a lower than market value, rather than risk paying the protester's attorneys' fees. Settling becomes the way out for CADs that do not want to take risks with scarce budget resources.

In an interesting pattern of survey responses, participants in the survey reported divergence from fair market value at increasing frequency from the early to the later stages of

the protest-appeal-resolution process. The difference between the (lower) under-appraisal evident in the Comptroller's Property Value Studies (Combs, 2010) and the (higher) under-appraisal evident in final valuations gives credence to this finding. Also, it seems likely that as the stakes get bigger and as costs grow larger the further into the appeal process the taxpayer goes, bigger reductions would be expected toward the end of the process, creating larger gaps with market value.

6.2.5 Legal Constraints

Finding 14 shows that survey respondents believe that sale price non-disclosure, protests based on unequal valuation, and the standard of clear and convincing evidence for a valuation increase in the year following a settlement make it difficult to apply the fair market value standard. These measures are probably perceived as "taxpayer protections" by their sponsors, but these laws in some cases prevent CADs from performing their duty to appraise property at market value. None of these measures seem essential to protecting taxpayers, but they may handicap the CAD and frequently appear to have the effect of lowering final values below market value.

The fact that survey respondents did not believe that any of the following legal constraints make it difficult to apply the fair market value standard probably means that these processes are too far removed from the appraisal task to have any impact on appraisers and their job performance: approval of the appraisal district board of directors to appeal ARB rulings; appraisal district compensation for taxpayer attorney fees in successful appeals; alternate appeals process to SOAH; or appraisal district practices and policies

6.2.6 Bounded Rationality and Environmental Demands

The findings on overcooperation and ambiguity, from Herbert Simon's bounded rationality theory, show that appraisers may be susceptible to misleading information supplied by taxpayers. The appraiser's job is filled with ambiguity, with hard to quantify risks and a job that is simply difficult. This situation may well lead to below-market appraisals.

Pluralities of survey respondents, in finding 17, reported taking into account in the litigation versus settlement decision how winnable the case is and the cost of litigation. This may indicate the presence of an environmental demand affecting accuracy. Some appraisers involved in these decisions are likely balancing the risks associated with losing a lawsuit to under-valuing the property.

Finally, finding 18 shows that CAD efforts to grade appraisers on productivity rather than accuracy, and a lack of rewards for accuracy, may present an environmental demand affecting accuracy. It is fair to say that getting through the caseload is part of the job of an appraiser. But reward systems should recognize the importance of accuracy at least as much as productivity.

6.3 Recommendations

The recommendations below are based on this study's findings, analysis and conclusions. The recommendations are intended for CAD officials, local governments, State Comptroller, lawmakers, professional or trade organizations, citizen groups, and academic researchers.

6.3.1 Recommendations for CAD Officials

The valuation model developed for this study needs better calibration to yield a narrower distribution of values, and excess vacancy needs to be properly handled. CADs should develop defensible (in court) valuation models that properly account for various commercial property types, rent structures, estimated expenses, etc.

CADs should spend money on data, and CAD employees should prove that it is money well spent—or simply move money from the hardware budget over to purchasing data.

CADs should add staff adequate to the purpose or otherwise manage appraisers' workload so that the volume of protests does not make it difficult for them to apply the fair market value standard.

In regard to appraiser's accuracy, CADs should perform spot checks of an appraiser's work and retrospective analyses of appraisals when a property sells. This could provide lessons for future appraisals.

Because appraisers may be susceptible to misleading information supplied by taxpayers, appraisers should be required to fact-check taxpayer submissions, perhaps against a database of real estate values (rents, expenses, etc.) to determine which should be subjected to further review.

6.3.2 Recommendations for Local Governments

Local governments should consider the costs and benefits of adequately funding CAD budgets to handle protests, initiate appeals and pursue litigation. It is conceivable that revenue benefits in this analysis would far outweigh the budget costs. Using the example in section 1.1, the loss to local governments due to the apparent under-appraisal of the class A office buildings in downtown Fort Worth was estimated at around $9 million, with nearly half of that owing to the Fort Worth Independent School District.

The political ramifications of such a move would need to be considered carefully. To achieve success, it should be framed as an equity issue, particularly as it regards the apparent differential treatment and appraisal levels of residential and commercial property taxpayers.

6.3.3 Recommendations for the State Comptroller

The State Comptroller should do further testing during the Property Value Study to look for differing levels of appraisal in subsets of commercial property; analyze the results of the ARB process; look at settlements and litigation; and publish the results of what is found. The Legislature may have to act to provide this authority.

Some CADs may not have capability to create valuation models. In these cases, the Comptroller should provide technical assistance. The Comptroller probably has the expertise to assist with evaluating model specification and calibration. This type of assistance could be of value to the great majority of CADs.

6.3.4 Recommendations for Lawmakers

The State of Texas should require price disclosure for real estate transactions in order to make the market function more efficiently and restore fairness to property tax valuation. Beyond allowing a more efficient real property market, price disclosure might also limit two potential adverse market impacts: oversupply of commercial property due to lower than normal property tax expense, and variation of tax accuracy between counties that could affect their relative competitiveness.

The latter adverse impact could distort the relocation and supply decisions of market participants. The former impact may affect supply decisions at the margin where, as in Texas, property taxes can be as high as 3% of value and therefore make up a significant portion of a building's expenses. A 33% undervaluation in property tax expense (given the assumptions in section 1.1) translates into 7% higher net operating income and a 7% increase in property value—in this case, a market valuation 7% above what would be expected with accurate property tax valuation.

To help CADs perform their statutory function, the Legislature should modify the taxpayer protest rules to remove the payment of attorneys' fees. The protester's rewards for pursuing litigation need to be curtailed to restore balance to the protest-appeal-resolution process. At a minimum, the state should study best practices on this issue in other states.

The State should repeal rules on the standard of clear and convincing evidence for a valuation increase in the year following a settlement, and on allowing protests based on unequal valuation. These are likely perceived as taxpayer protections, but in some cases these laws prevent CADs from performing their duty to appraise property at market value. None of these seem essential to protecting taxpayers, but they can handicap the CAD and frequently appear to have the effect of lowering final values below market value.

The State should enact penalties for taxpayers who submit inaccurate data or better ways of catching those who do. The litigation and protest rules need to be changed in order to alter the incentives for taxpayers to use these tools to achieve below-market value outcomes.

6.3.5 Recommendations for Professional or Trade Organizations

Real estate markets have intrinsic information issues which make those markets less efficient than securities (stock and bond) markets. Professional or trade organizations should find ways to encourage better data gathering, either in concert with commercial data providers, brokers' organizations, BOMA and other trade or membership groups, etc. One significant barrier is that real estate groups in Texas apparently believe that information monopolies by their broker organizations help the group by making their information services essential to transactions.

Professional or trade organizations should promote the argument that price disclosure would be the single most leveling force in resolving what appears to be significant inequality between residential and commercial property appraisals.

6.3.6 Recommendations for Citizen Groups

The undervaluation of commercial property requires changing the rules of the game, and this likely requires forming a coalition to oppose the interests that have made the current rules. A "good government" group—one not controlled by wealthy property owners—should adopt this cause.

6.3.7 Recommendations for Academic Researchers

Academic researchers should undertake a study of differences in CAD policies, practice, training, and ARB personnel, or differences in markets (rent structures, expenses, and brokerage practices) to find out what influences final valuations the most. This function could also be performed under the auspices of the State Comptroller.

There appears to be potential in applying the theoretical constructs of the new institutional economics to the protest-appeal-resolution process, and to the evolution of the

property tax appraisal system over time: the so-called “rules of the game.” The concepts of transaction costs and the institution of the property tax might be used to understand the effects of the property tax on competing firms (individual property owners, in this case).

Finally, the development of automated valuation models, like the relatively simple one constructed for this study, offers clear benefits to the real estate appraisal community and taxpayers. Even if different models arrive at opposite conclusions, taxpayers and local governments would benefit greatly from better knowledge of the effects of appraisal rules and practices.

APPENDIX A

VALUATION TABLE

ID	Property Name (Property Sale Date)	Property Address (Property Sale Price)	City	Year	Model Value (Predicted Value)	CAD Value (Predicted Value)	CAD/ Model Index
1	Sundance Square - The Carnegie	421 W 3rd St	Fort Worth	2012	$64,590,978	$38,750,000	59.99
2	Cantey Hanger Plaza	600 W 6th St	Fort Worth	2012	$14,269,939	$11,000,000	77.09
2	Cantey Hanger Plaza	600 W 6th St	Fort Worth	2011	$12,523,717	$10,489,000	83.75
2	Cantey Hanger Plaza	600 W 6th St	Fort Worth	2010	$11,210,717	$10,000,000	89.20
2	Cantey Hanger Plaza	600 W 6th St	Fort Worth	2009	$14,126,305	$10,664,108	75.49
2	Cantey Hanger Plaza	600 W 6th St	Fort Worth	2008	$19,387,205	$2,902,770	14.97
3	Burnett Plaza	801 Cherry St	Fort Worth	2012	$203,422,559	$130,402,602	64.10
3	Burnett Plaza	801 Cherry St	Fort Worth	2011	$191,869,462	$127,002,902	66.19
3	Burnett Plaza	801 Cherry St	Fort Worth	2010	$182,125,562	$123,900,000	68.03
3	Burnett Plaza	801 Cherry St	Fort Worth	2009	$196,056,810	$125,516,808	64.02
3	Burnett Plaza	801 Cherry St	Fort Worth	2008	$193,787,721	$159,500,000	82.31
3	Burnett Plaza	801 Cherry St	Fort Worth	2007	$139,512,425	$146,747,079	105.19
3	Property Sale - 2/10/2006	$172,000,000			$133,660,803	$144,225,857	107.90
3	Burnett Plaza	801 Cherry St	Fort Worth	2006	$132,920,320	$143,906,813	108.27
4	Sundance Square - DR Horton Tower	301 Commerce St	Fort Worth	2012	$217,580,989	$112,614,860	51.76
5	Sundance Square - Wells Fargo Tower	201 Main St	Fort Worth	2012	$190,008,834	$98,344,154	51.76
5	Sundance Square - Wells Fargo Tower	201 Main St	Fort Worth	2007	$106,148,953	$111,062,615	104.63
5	Sundance Square - Wells Fargo Tower	201 Main St	Fort Worth	2006	$119,836,191		
6	Carter Burgess Plaza	777 Main St	Fort Worth	2012	$241,725,201	$119,572,234	49.47
6	Carter Burgess Plaza	777 Main St	Fort Worth	2011	$210,117,259	$115,635,728	55.03
6	Carter Burgess Plaza	777 Main St	Fort Worth	2010	$199,213,354	$109,780,470	55.11
6	Carter Burgess Plaza	777 Main St	Fort Worth	2009	$224,288,722	$117,419,630	52.35
6	Carter Burgess Plaza	777 Main St	Fort Worth	2008	$201,367,959	$141,283,280	70.16
6	Carter Burgess Plaza	777 Main St	Fort Worth	2007	$138,664,827	$131,953,130	95.16
6	Carter Burgess Plaza	777 Main St	Fort Worth	2006	$163,154,649		
8	Two City Place	100 Throckmorton St	Fort Worth	2012	$63,526,302	$62,100,000	97.75
8	Property Sale - 2/23/2011	$59,200,000			$57,916,277	$55,198,612	95.31
8	Two City Place	100 Throckmorton St	Fort Worth	2011	$56,942,189	$54,000,300	94.83
8	Two City Place	100 Throckmorton St	Fort Worth	2010	$56,235,940	$41,952,681	74.60
8	Two City Place	100 Throckmorton St	Fort Worth	2009	$48,608,391	$39,834,221	81.95
8	Two City Place	100 Throckmorton St	Fort Worth	2008	$37,805,969	$33,429,984	88.43
8	Two City Place	100 Throckmorton St	Fort Worth	2007	$27,262,780	$16,400,000	60.16
9	Sundance Square - Chase Bank	420 Throckmorton St	Fort Worth	2012	$42,892,109	$36,000,000	83.93
9	Sundance Square - Chase Bank	420 Throckmorton St	Fort Worth	2007	$29,614,868	$36,382,320	122.85
9	Sundance Square - Chase Bank	420 Throckmorton St	Fort Worth	2006	$34,899,362		
10	Harwood Center	1999 Bryan St	Dallas	2012	$74,792,799	$39,012,380	52.16
10	Harwood Center	1999 Bryan St	Dallas	2011	$65,376,732	$38,813,380	59.37
10	Harwood Center	1999 Bryan St	Dallas	2010	$70,614,127	$41,886,220	59.32
10	Harwood Center	1999 Bryan St	Dallas	2009	$65,097,124	$50,653,650	77.81
10	Harwood Center	1999 Bryan St	Dallas	2008	$81,630,539	$55,350,730	67.81
10	Harwood Center	1999 Bryan St	Dallas	2007	$98,385,778	$55,737,720	56.65
10	Property Sale - 5/27/2006	$72,611,011			$75,888,392	$51,367,579	67.69
10	Harwood Center	1999 Bryan St	Dallas	2006	$60,718,136	$48,420,740	79.75
11	Bank of America Plaza	901 Main St	Dallas	2012	$233,509,086	$127,861,830	54.76
11	Bank of America Plaza	901 Main St	Dallas	2011	$222,421,867	$140,500,240	63.17
11	Bank of America Plaza	901 Main St	Dallas	2010	$233,270,452	$142,704,240	61.18
11	Bank of America Plaza	901 Main St	Dallas	2009	$229,146,410	$164,752,370	71.90
11	Bank of America Plaza	901 Main St	Dallas	2008	$233,023,365	$180,740,030	77.56
11	Bank of America Plaza	901 Main St	Dallas	2007	$235,106,585	$176,489,270	75.07
11	Bank of America Plaza	901 Main St	Dallas	2006	$235,787,423	$171,556,190	72.76
12	1700 Pacific	1700 Pacific Ave	Dallas	2012	$92,378,801	$44,174,070	47.82
12	1700 Pacific	1700 Pacific Ave	Dallas	2011	$85,081,209	$41,468,170	48.74

ID	Property Name (Property Sale Date)	Property Address (Property Sale Price)	City	Year	Model Value (Predicted Value)	CAD Value (Predicted Value)	CAD/ Model Index
12	1700 Pacific	1700 Pacific Ave	Dallas	2010	$93,468,039	$37,577,170	40.20
12	1700 Pacific	1700 Pacific Ave	Dallas	2009	$101,820,675	$40,479,170	39.76
12	1700 Pacific	1700 Pacific Ave	Dallas	2008	$99,942,441	$47,479,170	47.51
12	1700 Pacific	1700 Pacific Ave	Dallas	2007	$92,780,756	$53,479,170	57.64
12	1700 Pacific	1700 Pacific Ave	Dallas	2006	$41,560,916	$68,480,170	164.77
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2012	$128,439,207	$91,804,050	71.48
13	Property Sale - 12/22/2011	$79,664,946			$128,263,074	$91,641,310	71.45
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2011	$121,296,034	$85,204,050	70.24
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2010	$127,633,103	$74,704,050	58.53
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2009	$98,575,750	$76,953,050	78.06
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2008	$86,050,661	$85,256,120	99.08
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2007	$75,123,151	$81,704,050	108.76
13	Property Sale - 10/4/2006	$131,157,604			$75,409,786	$79,480,202	105.40
13	Plaza of the Americas - North Tower	700 N Pearl St	Dallas	2006	$76,272,841	$72,784,220	95.43
15	Lincoln Plaza	500 N Akard St	Dallas	2012	$159,818,057	$83,263,610	52.10
15	Lincoln Plaza	500 N Akard St	Dallas	2011	$149,932,051	$83,263,610	55.53
15	Lincoln Plaza	500 N Akard St	Dallas	2010	$158,747,649	$78,177,610	49.25
15	Lincoln Plaza	500 N Akard St	Dallas	2009	$150,607,430	$88,813,030	58.97
15	Lincoln Plaza	500 N Akard St	Dallas	2008	$127,429,141	$96,677,610	75.87
15	Lincoln Plaza	500 N Akard St	Dallas	2007	$120,441,923	$97,142,080	80.65
15	Lincoln Plaza	500 N Akard St	Dallas	2006	$122,909,634	$96,194,720	78.26
20	Bryan Tower	2001 Bryan St	Dallas	2012	$135,036,886	$68,625,850	50.82
20	Bryan Tower	2001 Bryan St	Dallas	2011	$111,046,144	$67,147,600	60.47
20	Bryan Tower	2001 Bryan St	Dallas	2010	$123,206,752	$67,147,600	54.50
20	Bryan Tower	2001 Bryan St	Dallas	2009	$116,657,011	$71,938,770	61.67
20	Bryan Tower	2001 Bryan St	Dallas	2008	$118,459,133	$71,251,700	60.15
20	Bryan Tower	2001 Bryan St	Dallas	2007	$116,108,220	$68,163,260	58.71
20	Bryan Tower	2001 Bryan St	Dallas	2006	$97,012,299	$57,738,090	59.52
21	Renaissance Tower	1201 Elm St	Dallas	2012	$151,338,775	$54,810,940	36.22
21	Renaissance Tower	1201 Elm St	Dallas	2011	$142,294,248	$76,854,940	54.01
21	Renaissance Tower	1201 Elm St	Dallas	2010	$144,361,972	$78,830,940	54.61
21	Renaissance Tower	1201 Elm St	Dallas	2009	$158,200,098	$92,800,940	58.66
21	Renaissance Tower	1201 Elm St	Dallas	2008	$168,724,838	$106,155,250	62.92
21	Renaissance Tower	1201 Elm St	Dallas	2007	$156,247,031	$118,013,390	75.53
21	Property Sale - 10/4/2006	$138,900,000			$155,646,223	$116,150,174	74.62
21	Renaissance Tower	1201 Elm St	Dallas	2006	$153,837,195	$110,540,050	71.86
22	Thanksgiving Tower	1601 Elm St	Dallas	2012	$112,324,892	$65,714,000	58.50
22	Thanksgiving Tower	1601 Elm St	Dallas	2011	$111,655,271	$62,521,000	55.99
22	Thanksgiving Tower	1601 Elm St	Dallas	2010	$119,734,255	$55,000,000	45.94
22	Thanksgiving Tower	1601 Elm St	Dallas	2009	$117,124,077	$64,500,000	55.07
22	Thanksgiving Tower	1601 Elm St	Dallas	2008	$118,746,823	$76,000,000	64.00
22	Thanksgiving Tower	1601 Elm St	Dallas	2007	$131,728,767	$82,103,160	62.33
22	Thanksgiving Tower	1601 Elm St	Dallas	2006	$150,227,265	$95,000,000	63.24
23	KPMG Centre	717 N Harwood St	Dallas	2012	$62,578,989	$44,626,000	71.31
23	KPMG Centre	717 N Harwood St	Dallas	2011	$58,973,897	$44,626,000	75.67
23	KPMG Centre	717 N Harwood St	Dallas	2010	$73,438,798	$41,000,000	55.83
23	KPMG Centre	717 N Harwood St	Dallas	2009	$91,935,059	$47,994,960	52.21
23	KPMG Centre	717 N Harwood St	Dallas	2008	$81,133,460	$55,037,280	67.84
23	KPMG Centre	717 N Harwood St	Dallas	2007	$80,878,489	$57,934,240	71.63
23	Property Sale - 6/30/2006	$71,718,946			$76,714,637	$57,204,742	74.57
23	KPMG Centre	717 N Harwood St	Dallas	2006	$72,663,321	$56,494,960	77.75
24	Comerica Bank Tower	1717 Main St	Dallas	2012	$253,180,228	$135,000,000	53.32

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24	Comerica Bank Tower	1717 Main St	Dallas	2011	$241,010,762	$141,500,000	58.71
24	Comerica Bank Tower	1717 Main St	Dallas	2010	$245,699,462	$141,500,000	57.59
24	Comerica Bank Tower	1717 Main St	Dallas	2009	$228,945,481	$155,000,000	67.70
24	Comerica Bank Tower	1717 Main St	Dallas	2008	$221,493,070	$167,500,000	75.62
24	Comerica Bank Tower	1717 Main St	Dallas	2007	$217,478,176	$165,000,000	75.87
24	Property Sale - 10/4/2006	$182,734,449			$213,296,572	$158,225,860	74.18
24	Property Sale - 10/3/2006	$216,000,000			$213,250,620	$158,151,419	74.16
24	Comerica Bank Tower	1717 Main St	Dallas	2006	$200,705,808	$137,829,000	68.67
25	The Belo Bldg	400 S Record St	Dallas	2012	$19,814,916	$10,254,000	51.75
25	The Belo Bldg	400 S Record St	Dallas	2011	$21,859,673	$10,000,000	45.75
26	Fountain Place	1445 Ross Ave	Dallas	2012	$198,923,155	$129,500,000	65.10
26	Fountain Place	1445 Ross Ave	Dallas	2011	$194,816,187	$119,515,000	61.35
26	Fountain Place	1445 Ross Ave	Dallas	2010	$195,999,908	$104,472,410	53.30
26	Fountain Place	1445 Ross Ave	Dallas	2009	$206,693,044	$107,185,200	51.86
26	Fountain Place	1445 Ross Ave	Dallas	2008	$207,012,428	$123,520,070	59.67
26	Fountain Place	1445 Ross Ave	Dallas	2007	$201,529,559	$124,299,260	61.68
26	Fountain Place	1445 Ross Ave	Dallas	2006	$202,310,732	$129,057,440	63.79
27	Trammell Crow Center	2001 Ross Ave	Dallas	2012	$237,804,973	$155,000,000	65.18
27	Trammell Crow Center	2001 Ross Ave	Dallas	2011	$224,487,517	$140,000,000	62.36
27	Trammell Crow Center	2001 Ross Ave	Dallas	2010	$257,743,240	$143,200,000	55.56
27	Trammell Crow Center	2001 Ross Ave	Dallas	2009	$290,695,583	$163,608,000	56.28
27	Trammell Crow Center	2001 Ross Ave	Dallas	2008	$245,584,345	$178,276,300	72.59
27	Trammell Crow Center	2001 Ross Ave	Dallas	2007	$220,008,053	$160,000,000	72.72
27	Trammell Crow Center	2001 Ross Ave	Dallas	2006	$213,641,974	$143,700,000	67.26
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2012	$101,865,464	$47,939,520	47.06
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2011	$110,732,164	$43,939,520	39.68
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2010	$123,061,844	$40,939,520	33.27
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2009	$108,366,590	$42,939,520	39.62
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2008	$89,681,373	$59,939,520	66.84
28	Property Sale - 4/17/2007	$73,000,000			$87,055,322	$62,257,703	71.52
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2007	$85,966,224	$63,219,120	73.54
28	2100 Ross Avenue	2100 Ross Ave	Dallas	2006	$85,886,854	$53,939,520	62.80
29	Chase Tower	2200 Ross Ave	Dallas	2012	$330,290,797	$180,977,610	54.79
29	Chase Tower	2200 Ross Ave	Dallas	2011	$330,770,022	$169,519,560	51.25
29	Chase Tower	2200 Ross Ave	Dallas	2010	$327,974,766	$169,239,740	51.60
29	Chase Tower	2200 Ross Ave	Dallas	2009	$371,835,213	$184,654,010	49.66
29	Chase Tower	2200 Ross Ave	Dallas	2008	$332,844,476	$205,920,630	61.87
29	Property Sale - 11/16/2007	$289,600,000			$325,368,758	$203,281,941	62.48
29	Chase Tower	2200 Ross Ave	Dallas	2007	$273,526,284	$184,983,210	67.63
29	Chase Tower	2200 Ross Ave	Dallas	2006	$270,401,603	$168,622,790	62.36
30	One Arts Plaza	1722 Routh St	Dallas	2012	$94,055,383	$72,508,050	77.09
30	One Arts Plaza	1722 Routh St	Dallas	2011	$95,130,502	$68,000,000	71.48
30	One Arts Plaza	1722 Routh St	Dallas	2010	$97,725,809	$65,655,000	67.18
30	One Arts Plaza	1722 Routh St	Dallas	2009	$114,310,829	$68,500,000	59.92
30	One Arts Plaza	1722 Routh St	Dallas	2008	$121,422,462	$58,451,150	48.14
30	One Arts Plaza	1722 Routh St	Dallas	2007	$128,134,985	$40,264,530	31.42
31	Patriot Tower	350 N Saint Paul St	Dallas	2012	$36,646,272	$11,000,000	30.02
31	Patriot Tower	350 N Saint Paul St	Dallas	2011	$39,408,325	$11,400,000	28.93
31	Patriot Tower	350 N Saint Paul St	Dallas	2010	$42,922,520	$12,900,000	30.05
31	Patriot Tower	350 N Saint Paul St	Dallas	2009	$40,322,564	$12,900,000	31.99
31	Patriot Tower	350 N Saint Paul St	Dallas	2008	$44,710,605	$17,510,770	39.16
31	Property Sale - 5/10/2007	$23,000,000			$43,501,923	$16,987,048	39.05

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31	Patriot Tower	350 N Saint Paul St	Dallas	2007	$42,833,291	$16,697,330	38.98
31	Patriot Tower	350 N Saint Paul St	Dallas	2006	$38,516,666	$17,479,260	45.38
32	Saint Paul Place	750 N Saint Paul St	Dallas	2012	$23,971,956	$15,000,000	62.57
32	Saint Paul Place	750 N Saint Paul St	Dallas	2011	$21,938,590	$12,500,000	56.98
32	Saint Paul Place	750 N Saint Paul St	Dallas	2010	$25,576,550	$12,500,000	48.87
32	Saint Paul Place	750 N Saint Paul St	Dallas	2009	$28,980,803	$13,500,000	46.58
32	Saint Paul Place	750 N Saint Paul St	Dallas	2008	$29,358,511	$15,500,000	52.80
32	Saint Paul Place	750 N Saint Paul St	Dallas	2007	$28,861,577	$17,000,000	58.90
32	Property Sale - 5/27/2006	$27,388,989			$23,052,948	$13,482,137	58.48
32	Saint Paul Place	750 N Saint Paul St	Dallas	2006	$19,136,120	$11,110,000	58.06
33	Univision Tower	2323 Bryan St	Dallas	2010	$32,476,505	$34,519,970	106.29
33	Univision Tower	2323 Bryan St	Dallas	2009	$28,416,672	$43,655,560	153.63
33	Univision Tower	2323 Bryan St	Dallas	2008	$29,334,894	$50,000,000	170.45
33	Univision Tower	2323 Bryan St	Dallas	2007	$30,751,217	$50,000,000	162.60
33	Univision Tower	2323 Bryan St	Dallas	2006	$98,068,930	$44,149,600	45.02
36	Bank Of America Plaza	300 Convent St	San	2012		$53,700,000	
36	Bank Of America Plaza	300 Convent St	San	2011	$62,569,428	$53,400,000	85.35
36	Bank Of America Plaza	300 Convent St	San	2010	$67,086,253	$53,400,000	79.60
36	Bank Of America Plaza	300 Convent St	San	2009		$53,400,000	
36	Bank Of America Plaza	300 Convent St	San	2008	$74,114,648	$55,600,000	75.02
36	Bank Of America Plaza	300 Convent St	San	2007	$68,627,937	$51,600,000	75.19
36	Bank Of America Plaza	300 Convent St	San	2006	$71,695,766		
37	Rosa Verde Towers	343 W Houston St	San	2012		$7,100,000	
37	Rosa Verde Towers	343 W Houston St	San	2011	$11,269,606	$6,300,000	55.90
37	Rosa Verde Towers	343 W Houston St	San	2010	$11,820,411	$6,344,096	53.67
37	Rosa Verde Towers	343 W Houston St	San	2007	$20,122,690	$6,857,000	34.08
37	Rosa Verde Towers	343 W Houston St	San	2006	$19,993,543		
38	Weston Centre	112 E Pecan St	San	2012		$50,500,000	
38	Weston Centre	112 E Pecan St	San	2011	$56,451,635	$50,500,000	89.46
38	Weston Centre	112 E Pecan St	San	2010	$59,830,484	$51,553,000	86.17
38	Weston Centre	112 E Pecan St	San	2009		$52,665,000	
38	Weston Centre	112 E Pecan St	San	2008	$71,531,836	$53,991,000	75.48
38	Weston Centre	112 E Pecan St	San	2007	$66,541,921	$52,000,000	78.15
38	Weston Centre	112 E Pecan St	San	2006	$70,232,619		
39	One Riverwalk Place	700 N Saint Marys St	San	2012		$18,950,000	
39	One Riverwalk Place	700 N Saint Marys St	San	2011	$25,550,864	$18,400,000	72.01
39	One Riverwalk Place	700 N Saint Marys St	San	2010	$24,681,150	$20,000,000	81.03
39	One Riverwalk Place	700 N Saint Marys St	San	2009		$21,000,000	
39	One Riverwalk Place	700 N Saint Marys St	San	2008	$28,300,527	$23,500,000	83.04
39	One Riverwalk Place	700 N Saint Marys St	San	2007	$27,326,157	$26,150,000	95.70
39	One Riverwalk Place	700 N Saint Marys St	San	2006	$35,039,443		
40	Tower Life Building	310 S Saint Marys St	San	2012		$6,388,400	
40	Tower Life Building	310 S Saint Marys St	San	2011	$14,826,896	$6,388,400	43.09
40	Tower Life Building	310 S Saint Marys St	San	2010	$19,076,560	$7,913,370	41.48
40	Tower Life Building	310 S Saint Marys St	San	2009		$6,838,400	
40	Tower Life Building	310 S Saint Marys St	San	2008	$20,673,639	$6,483,400	31.36
40	Tower Life Building	310 S Saint Marys St	San	2007	$14,735,178	$6,228,900	42.27
40	Tower Life Building	310 S Saint Marys St	San	2006	$14,890,395		
42	Littlefield Building	106 E 6th St	Austin	2012	$25,215,060	$15,797,590	62.65
42	Littlefield Building	106 E 6th St	Austin	2011	$23,206,068	$14,475,715	62.38
42	Littlefield Building	106 E 6th St	Austin	2010	$18,215,803	$14,975,000	82.21
42	Littlefield Building	106 E 6th St	Austin	2009	$19,930,427	$14,975,000	75.14

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42	Littlefield Building	106 E 6th St	Austin	2008	$17,507,781	$14,448,022	82.52
42	Littlefield Building	106 E 6th St	Austin	2007	$14,955,859	$14,676,681	98.13
42	Littlefield Building	106 E 6th St	Austin	2006	$12,471,217	$12,238,262	98.13
43	Scarbrough Building	101 W 6th St	Austin	2012	$29,999,680	$20,245,597	67.49
43	Scarbrough Building	101 W 6th St	Austin	2011	$29,776,706	$17,401,263	58.44
43	Scarbrough Building	101 W 6th St	Austin	2010	$23,346,082	$17,401,263	74.54
43	Scarbrough Building	101 W 6th St	Austin	2009	$28,793,431	$17,444,097	60.58
43	Scarbrough Building	101 W 6th St	Austin	2008	$19,855,309	$16,709,787	84.16
43	Scarbrough Building	101 W 6th St	Austin	2007	$15,504,844	$17,441,711	112.49
43	Scarbrough Building	101 W 6th St	Austin	2006	$14,263,694	$11,677,000	81.87
44	Chase Tower	221 W 6th St	Austin	2012	$113,975,533	$86,169,575	75.60
44	Chase Tower	221 W 6th St	Austin	2011	$96,712,514	$74,500,000	77.03
44	Property Sale - 1/25/2010	$73,850,000			$74,518,626	$72,518,685	97.32
44	Chase Tower	221 W 6th St	Austin	2010	$72,886,723	$72,373,000	99.30
44	Chase Tower	221 W 6th St	Austin	2009	$95,760,172	$76,799,255	80.20
44	Chase Tower	221 W 6th St	Austin	2008	$75,761,471	$71,195,600	93.97
44	Chase Tower	221 W 6th St	Austin	2007	$48,847,428	$71,000,000	145.35
44	Chase Tower	221 W 6th St	Austin	2006	$39,503,386	$66,123,578	167.39
45	300 West Sixth	300 W 6th St	Austin	2012	$150,623,124	$135,087,158	89.69
45	300 West Sixth	300 W 6th St	Austin	2011	$140,886,522	$127,439,369	90.46
45	300 West Sixth	300 W 6th St	Austin	2010	$113,051,614	$122,640,750	108.48
45	300 West Sixth	300 W 6th St	Austin	2009	$122,315,313	$130,106,292	106.37
45	300 West Sixth	300 W 6th St	Austin	2008	$105,324,091	$130,106,292	123.53
45	300 West Sixth	300 W 6th St	Austin	2007	$84,058,126	$125,735,948	149.58
45	300 West Sixth	300 W 6th St	Austin	2006	$77,490,172	$126,685,780	163.49
46	Norwood Tower	114 W 7th St	Austin	2012	$27,016,652	$17,911,966	66.30
46	Norwood Tower	114 W 7th St	Austin	2011	$23,452,642	$16,258,105	69.32
46	Norwood Tower	114 W 7th St	Austin	2010	$19,194,293	$17,929,589	93.41
46	Norwood Tower	114 W 7th St	Austin	2009	$26,544,889	$19,018,187	71.65
46	Norwood Tower	114 W 7th St	Austin	2008	$20,650,816	$17,677,600	85.60
46	Norwood Tower	114 W 7th St	Austin	2007	$12,337,196	$15,762,600	127.76
46	Norwood Tower	114 W 7th St	Austin	2006	$7,746,617	$12,595,283	162.59
47	Capitol Tower	206 E 9th St	Austin	2011	$33,673,432	$31,621,703	93.91
47	Capitol Tower	206 E 9th St	Austin	2010	$27,874,875	$29,846,594	107.07
47	Capitol Tower	206 E 9th St	Austin	2009	$27,919,381	$31,020,885	111.11
47	Capitol Tower	206 E 9th St	Austin	2008	$17,397,265	$24,746,481	142.24
47	Capitol Tower	206 E 9th St	Austin	2007	$10,883,962	$18,900,000	173.65
47	Capitol Tower	206 E 9th St	Austin	2006	$9,697,230	$18,000,000	185.62
48	Wells Fargo Tower	400 W 15th St	Austin	2012	$67,241,998	$64,307,384	95.64
48	Wells Fargo Tower	400 W 15th St	Austin	2011	$65,227,911	$58,211,370	89.24
48	Wells Fargo Tower	400 W 15th St	Austin	2010	$52,678,028	$57,699,000	109.53
48	Wells Fargo Tower	400 W 15th St	Austin	2009	$58,270,990	$62,870,306	107.89
48	Wells Fargo Tower	400 W 15th St	Austin	2008	$52,444,708	$56,205,456	107.17
48	Wells Fargo Tower	400 W 15th St	Austin	2007	$37,361,417	$51,368,885	137.49
48	Wells Fargo Tower	400 W 15th St	Austin	2006	$32,213,028	$52,795,000	163.89
49	Austin Centre	701 Brazos St	Austin	2012	$79,093,150	$58,740,300	74.27
49	Austin Centre	701 Brazos St	Austin	2011	$76,040,570	$60,860,700	80.04
49	Austin Centre	701 Brazos St	Austin	2010	$67,526,054	$67,080,169	99.34
49	Austin Centre	701 Brazos St	Austin	2009	$78,121,036	$70,272,491	89.95
49	Austin Centre	701 Brazos St	Austin	2008	$64,145,559	$70,272,491	109.55
49	Austin Centre	701 Brazos St	Austin	2007	$45,566,024		0.00
49	Austin Centre	701 Brazos St	Austin	2006	$33,224,478	$50,300,000	151.39

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50	200 W Cesar Chavez St	200 W Cesar Chavez	Austin	2011	$49,128,012	$50,300,000	102.39
50	200 W Cesar Chavez St	200 W Cesar Chavez	Austin	2010	$40,668,180	$50,100,000	123.19
50	200 W Cesar Chavez St	200 W Cesar Chavez	Austin	2009	$55,215,249	$50,100,000	90.74
51	400 W Cesar Chavez St - CSC	400 W Cesar Chavez	Austin	2007	$33,213,098	$47,626,887	143.40
51	400 W Cesar Chavez St - CSC	400 W Cesar Chavez	Austin	2006	$36,235,885	$40,979,389	113.09
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2012	$15,070,638	$9,803,933	65.05
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2011	$13,298,374	$8,542,201	64.23
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2009	$7,312,132	$8,341,868	114.08
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2008	$7,480,546	$8,183,597	109.40
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2007	$7,713,115	$7,526,309	97.58
52	Texas Trial Lawyers Association Bldg	1220 Colorado St	Austin	2006	$8,931,191	$7,668,550	85.86
53	100 Congress Ave	100 Congress Ave	Austin	2012	$130,587,501	$109,057,851	83.51
53	100 Congress Ave	100 Congress Ave	Austin	2011	$112,405,084	$93,303,729	83.01
53	100 Congress Ave	100 Congress Ave	Austin	2010	$91,360,992	$90,600,000	99.17
53	100 Congress Ave	100 Congress Ave	Austin	2009	$98,047,847	$93,660,960	95.53
53	100 Congress Ave	100 Congress Ave	Austin	2008	$85,925,912	$100,467,072	116.92
53	100 Congress Ave	100 Congress Ave	Austin	2007	$55,911,402	$89,180,844	159.50
53	100 Congress Ave	100 Congress Ave	Austin	2006	$48,445,622	$78,828,340	162.72
54	One Congress Plaza	111 Congress Ave	Austin	2012	$159,452,560	$137,372,025	86.15
54	One Congress Plaza	111 Congress Ave	Austin	2011	$144,052,703	$115,406,004	80.11
54	One Congress Plaza	111 Congress Ave	Austin	2010	$118,725,717	$113,007,930	95.18
54	One Congress Plaza	111 Congress Ave	Austin	2009	$125,459,343	$124,283,760	99.06
54	One Congress Plaza	111 Congress Ave	Austin	2008	$106,248,799	$124,283,760	116.97
54	Property Sale - 5/6/2007	$119,800,000			$85,944,744	$118,817,719	138.25
54	One Congress Plaza	111 Congress Ave	Austin	2007	$75,240,514	$115,936,041	154.09
54	One Congress Plaza	111 Congress Ave	Austin	2006	$64,154,832	$101,833,276	158.73
55	301 Congress Ave	301 Congress Ave	Austin	2012	$113,853,570	$106,618,050	93.64
55	301 Congress Ave	301 Congress Ave	Austin	2011	$100,361,447	$86,819,601	86.51
55	301 Congress Ave	301 Congress Ave	Austin	2010	$79,977,332	$84,157,966	105.23
55	301 Congress Ave	301 Congress Ave	Austin	2009	$96,838,943	$101,986,125	105.32
55	301 Congress Ave	301 Congress Ave	Austin	2008	$87,315,753	$101,986,125	116.80
55	301 Congress Ave	301 Congress Ave	Austin	2007	$56,561,774	$93,324,949	165.00
55	301 Congress Ave	301 Congress Ave	Austin	2006	$39,962,045	$79,277,849	198.38
56	Frost Bank Tower	401 Congress Ave	Austin	2012	$217,886,547	$172,946,989	79.37
56	Frost Bank Tower	401 Congress Ave	Austin	2011	$190,388,070	$151,172,086	79.40
56	Frost Bank Tower	401 Congress Ave	Austin	2010	$154,705,375	$146,951,142	94.99
56	Frost Bank Tower	401 Congress Ave	Austin	2009	$159,235,477	$175,049,791	109.93
56	Frost Bank Tower	401 Congress Ave	Austin	2008	$130,056,823	$175,049,791	134.59
56	Frost Bank Tower	401 Congress Ave	Austin	2007	$116,210,636	$176,565,956	151.94
56	Frost Bank Tower	401 Congress Ave	Austin	2006	$103,431,161	$147,389,000	142.50
57	Bank Of America Center	515 Congress Ave	Austin	2012	$79,630,523	$43,846,727	55.06
57	Bank Of America Center	515 Congress Ave	Austin	2011	$70,487,457	$42,081,859	59.70
57	Bank Of America Center	515 Congress Ave	Austin	2010	$59,117,619	$40,748,119	68.93
57	Bank Of America Center	515 Congress Ave	Austin	2009	$70,006,203	$39,894,183	56.99
57	Bank Of America Center	515 Congress Ave	Austin	2008	$60,048,048	$38,752,019	64.54
57	Bank Of America Center	515 Congress Ave	Austin	2007	$36,698,778	$36,993,959	100.80
57	Bank Of America Center	515 Congress Ave	Austin	2006	$28,965,806	$26,991,867	93.19
58	One American Center	600 Congress Ave	Austin	2012	$143,394,546	$100,680,108	70.21
58	One American Center	600 Congress Ave	Austin	2011	$129,977,087	$99,237,598	76.35
58	One American Center	600 Congress Ave	Austin	2010	$109,426,178	$105,492,349	96.41
58	One American Center	600 Congress Ave	Austin	2009	$114,631,214	$123,921,423	108.10
58	One American Center	600 Congress Ave	Austin	2008	$93,666,986	$123,921,423	132.30

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58	One American Center	600 Congress Ave	Austin	2007	$61,354,824	$111,637,279	181.95
58	One American Center	600 Congress Ave	Austin	2006	$44,089,126	$94,943,290	215.34
59	816 Congress	816 Congress Ave	Austin	2012	$105,577,704	$72,272,608	68.45
59	816 Congress	816 Congress Ave	Austin	2011	$93,819,483	$70,682,066	75.34
59	816 Congress	816 Congress Ave	Austin	2010	$79,638,743	$70,365,705	88.36
59	816 Congress	816 Congress Ave	Austin	2009	$80,876,577	$78,085,166	96.55
59	816 Congress	816 Congress Ave	Austin	2008	$76,440,329	$71,845,600	93.99
59	816 Congress	816 Congress Ave	Austin	2007	$59,763,072	$64,901,801	108.60
59	816 Congress	816 Congress Ave	Austin	2006	$42,783,054	$54,911,949	128.35
60	Capitol Center	919 Congress Ave	Austin	2012	$37,735,926	$34,231,773	90.71
60	Capitol Center	919 Congress Ave	Austin	2011	$33,282,633	$33,199,939	99.75
60	Capitol Center	919 Congress Ave	Austin	2010	$27,745,787	$33,365,438	120.25
60	Capitol Center	919 Congress Ave	Austin	2009	$32,655,296	$37,568,289	115.05
60	Capitol Center	919 Congress Ave	Austin	2008	$26,323,040	$35,783,122	135.94
60	Capitol Center	919 Congress Ave	Austin	2007	$21,767,297	$31,567,875	145.02
60	Capitol Center	919 Congress Ave	Austin	2006	$16,895,290	$28,517,662	168.79
61	Lavaca Plaza	504 Lavaca St	Austin	2012	$25,514,443	$27,250,013	106.80
61	Lavaca Plaza	504 Lavaca St	Austin	2011	$21,917,040	$24,808,390	113.19
61	Lavaca Plaza	504 Lavaca St	Austin	2010	$17,662,024	$22,490,000	127.34
61	Lavaca Plaza	504 Lavaca St	Austin	2009	$20,567,904	$25,748,894	125.19
61	Lavaca Plaza	504 Lavaca St	Austin	2008	$18,711,812	$25,748,894	137.61
61	Lavaca Plaza	504 Lavaca St	Austin	2007	$12,151,014	$24,286,500	199.87
61	Property Sale - 8/28/2006	$28,680,000			$10,707,003	$21,050,855	196.61
61	Lavaca Plaza	504 Lavaca St	Austin	2006	$8,000,902	$14,987,205	187.32
62	700 Lavaca	700 Lavaca St	Austin	2011	$59,150,903	$47,100,592	79.63
62	Property Sale - 6/22/2010	$61,250,000			$49,780,432	$43,197,400	86.78
62	700 Lavaca	700 Lavaca St	Austin	2010	$41,429,546	$39,718,907	95.87
62	700 Lavaca	700 Lavaca St	Austin	2009	$43,819,511	$36,859,979	84.12
62	700 Lavaca	700 Lavaca St	Austin	2008	$42,563,821	$33,731,280	79.25
62	700 Lavaca	700 Lavaca St	Austin	2007	$38,104,033	$36,711,471	96.35
62	700 Lavaca	700 Lavaca St	Austin	2006	$30,710,624	$31,870,359	103.78
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2012	$123,925,600	$105,433,736	85.08
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2011	$105,081,774	$95,113,444	90.51
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2010	$92,836,198	$88,372,714	95.19
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2009	$100,372,595	$101,312,913	100.94
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2008	$88,526,224	$101,312,913	114.44
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2007	$59,100,016	$91,152,350	154.23
64	San Jacinto Center	98 San Jacinto Blvd	Austin	2006	$49,744,523	$79,416,150	159.65
65	Heritage Plaza	1111 Bagby St	Houston	2012	$305,694,251	$223,565,657	73.13
65	Heritage Plaza	1111 Bagby St	Houston	2011	$306,202,009	$211,250,000	68.99
65	Property Sale - 12/9/2010	$304,613,237			$306,976,074	$209,779,019	68.34
65	Heritage Plaza	1111 Bagby St	Houston	2010	$319,044,455	$186,845,080	58.56
65	Heritage Plaza	1111 Bagby St	Houston	2009	$385,673,990	$205,800,000	53.36
65	Heritage Plaza	1111 Bagby St	Houston	2008	$320,413,196	$186,501,250	58.21
65	Heritage Plaza	1111 Bagby St	Houston	2007	$212,071,667	$132,400,000	62.43
65	Heritage Plaza	1111 Bagby St	Houston	2006	$124,639,675	$120,694,000	96.83
66	Three Allen Center	333 Clay St	Houston	2012	$322,809,598	$188,765,602	58.48
66	Three Allen Center	333 Clay St	Houston	2011	$321,594,887	$161,884,425	50.34
66	Three Allen Center	333 Clay St	Houston	2010	$328,205,097	$157,705,474	48.05
66	Three Allen Center	333 Clay St	Houston	2009	$408,014,825	$167,121,108	40.96
66	Three Allen Center	333 Clay St	Houston	2008	$347,502,902	$188,168,243	54.15
66	Three Allen Center	333 Clay St	Houston	2007	$212,037,678	$146,950,437	69.30

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66	Three Allen Center	333 Clay St	Houston	2006	$295,024,239	$123,056,057	41.71
67	One Allen Center	500 Dallas St	Houston	2012	$248,866,161	$144,366,873	58.01
67	One Allen Center	500 Dallas St	Houston	2011	$266,715,853	$134,970,112	50.60
67	One Allen Center	500 Dallas St	Houston	2010	$282,401,432	$147,739,253	52.32
67	One Allen Center	500 Dallas St	Houston	2009	$352,715,483	$158,562,842	44.95
67	One Allen Center	500 Dallas St	Houston	2008	$295,197,935	$172,528,065	58.44
67	One Allen Center	500 Dallas St	Houston	2007	$171,778,249	$143,409,080	83.49
67	One Allen Center	500 Dallas St	Houston	2006	$244,065,815	$122,195,733	50.07
68	2 Houston Center	909 Fannin St	Houston	2012	$274,835,740	$129,803,083	47.23
68	2 Houston Center	909 Fannin St	Houston	2011	$264,051,361	$112,745,160	42.70
68	2 Houston Center	909 Fannin St	Houston	2010	$295,869,740	$111,048,621	37.53
68	2 Houston Center	909 Fannin St	Houston	2009	$364,291,364	$123,954,070	34.03
68	2 Houston Center	909 Fannin St	Houston	2008	$273,573,184	$133,881,275	48.94
68	2 Houston Center	909 Fannin St	Houston	2007	$147,237,501	$112,745,160	76.57
68	2 Houston Center	909 Fannin St	Houston	2006	$144,679,255	$92,246,040	63.76
69	First City Tower	1001 Fannin St	Houston	2012	$357,633,793	$223,435,128	62.48
69	First City Tower	1001 Fannin St	Houston	2011	$351,851,513	$194,063,595	55.15
69	First City Tower	1001 Fannin St	Houston	2010	$376,041,602	$183,144,312	48.70
69	First City Tower	1001 Fannin St	Houston	2009	$476,802,026	$201,934,413	42.35
69	First City Tower	1001 Fannin St	Houston	2008	$353,115,683	$200,253,178	56.71
69	First City Tower	1001 Fannin St	Houston	2007	$218,128,786	$163,643,912	75.02
69	First City Tower	1001 Fannin St	Houston	2006	$171,357,258	$133,384,130	77.84
70	NRG Tower	1201 Fannin St	Houston	2011	$31,805,679	$60,390,094	189.87
70	NRG Tower	1201 Fannin St	Houston	2010	$31,984,554	$8,270,850	25.86
70	NRG Tower	1201 Fannin St	Houston	2009	$38,848,772	$16,541,700	42.58
70	NRG Tower	1201 Fannin St	Houston	2008	$79,670,357	$8,270,850	10.38
71	Houston DataCenter	1301 Fannin St	Houston	2012	$150,101,841	$96,000,000	63.96
71	Houston DataCenter	1301 Fannin St	Houston	2011	$156,261,928	$88,291,000	56.50
71	Houston DataCenter	1301 Fannin St	Houston	2010	$161,264,609	$80,000,000	49.61
71	Houston DataCenter	1301 Fannin St	Houston	2009	$195,291,679	$89,500,000	45.83
71	Houston DataCenter	1301 Fannin St	Houston	2008	$165,345,618	$92,300,000	55.82
71	Property Sale - 3/7/2007	$114,500,000			$164,229,086	$84,927,397	51.71
71	Houston DataCenter	1301 Fannin St	Houston	2007	$163,982,627	$83,300,000	50.80
71	Houston DataCenter	1301 Fannin St	Houston	2006	$149,471,094	$60,213,050	40.28
73	Younan Square	1010 Lamar St	Houston	2012	$31,386,533	$19,995,900	63.71
73	Younan Square	1010 Lamar St	Houston	2011	$32,492,558	$16,000,000	49.24
73	Younan Square	1010 Lamar St	Houston	2010	$47,197,046	$20,300,000	43.01
73	Younan Square	1010 Lamar St	Houston	2009	$46,375,066	$25,000,000	53.91
73	Younan Square	1010 Lamar St	Houston	2008	$38,733,559	$30,750,000	79.39
73	Property Sale - 11/30/2007	$40,000,000			$37,410,403	$29,858,219	79.81
73	Younan Square	1010 Lamar St	Houston	2007	$23,154,460	$20,250,000	87.46
73	Younan Square	1010 Lamar St	Houston	2006	$22,090,012	$15,957,853	72.24
74	Bank of America Center	700 Louisiana St	Houston	2012	$365,578,992	$218,241,975	59.70
74	Bank of America Center	700 Louisiana St	Houston	2011	$362,158,288	$172,308,139	47.58
74	Bank of America Center	700 Louisiana St	Houston	2010	$433,785,277	$163,410,579	37.67
74	Bank of America Center	700 Louisiana St	Houston	2009	$539,558,903	$185,200,000	34.32
74	Bank of America Center	700 Louisiana St	Houston	2008	$408,672,544	$211,234,630	51.69
74	Property Sale - 8/24/2007	$370,000,000			$341,213,603	$198,579,136	58.20
74	Bank of America Center	700 Louisiana St	Houston	2007	$220,714,426	$175,973,140	79.73
74	Bank of America Center	700 Louisiana St	Houston	2006	$205,770,857	$139,517,050	67.80
76	One Shell Plaza	910 Louisiana St	Houston	2012	$349,245,021	$157,300,000	45.04
76	One Shell Plaza	910 Louisiana St	Houston	2010	$303,218,609	$145,772,000	48.07

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76	One Shell Plaza	910 Louisiana St	Houston	2009	$368,325,174	$171,091,840	46.45
76	One Shell Plaza	910 Louisiana St	Houston	2008	$339,488,289	$194,190,080	57.20
76	One Shell Plaza	910 Louisiana St	Houston	2007	$184,837,435	$158,981,200	86.01
76	One Shell Plaza	910 Louisiana St	Houston	2006	$164,557,027	$134,821,060	81.93
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2012	$570,426,007	$314,940,031	55.21
77	Property Sale - 9/27/2011	$456,440,160			$564,215,757	$296,954,375	52.63
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2011	$547,295,996	$247,952,638	45.31
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2010	$555,727,010	$231,760,639	41.70
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2009	$664,019,026	$259,424,872	39.07
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2008	$582,707,880	$283,097,441	48.58
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2007	$348,834,432	$239,299,549	68.60
77	Wells Fargo Plaza	1000 Louisiana St	Houston	2006	$276,089,155	$185,894,136	67.33
79	1100 Louisiana	1100 Louisiana St	Houston	2012	$376,880,095	$236,105,108	62.65
79	1100 Louisiana	1100 Louisiana St	Houston	2011	$376,765,256	$206,197,204	54.73
79	1100 Louisiana	1100 Louisiana St	Houston	2010	$396,328,102	$198,779,398	50.16
79	1100 Louisiana	1100 Louisiana St	Houston	2009	$453,436,085	$215,690,648	47.57
79	1100 Louisiana	1100 Louisiana St	Houston	2008	$380,619,774	$239,061,900	62.81
79	1100 Louisiana	1100 Louisiana St	Houston	2007	$219,868,146	$192,000,000	87.33
79	1100 Louisiana	1100 Louisiana St	Houston	2006	$165,106,824	$163,962,058	99.31
81	Total Plaza	1201 Louisiana St	Houston	2012	$169,764,077	$102,067,493	60.12
81	Total Plaza	1201 Louisiana St	Houston	2011	$158,473,340	$95,319,229	60.15
81	Total Plaza	1201 Louisiana St	Houston	2010	$167,423,225	$93,451,737	55.82
81	Total Plaza	1201 Louisiana St	Houston	2009	$221,581,575	$99,536,894	44.92
81	Total Plaza	1201 Louisiana St	Houston	2008	$219,561,152	$99,536,894	45.33
81	Property Sale - 5/30/2007	$151,500,000			$212,543,766	$93,077,511	43.79
81	Total Plaza	1201 Louisiana St	Houston	2007	$207,647,916	$88,570,965	42.65
81	Total Plaza	1201 Louisiana St	Houston	2006	$190,723,538	$53,367,450	27.98
82	Wedge International Tower	1415 Louisiana St	Houston	2012	$85,396,936	$60,497,125	70.84
82	Wedge International Tower	1415 Louisiana St	Houston	2011	$80,026,377	$51,514,632	64.37
82	Wedge International Tower	1415 Louisiana St	Houston	2010	$89,667,433	$49,028,815	54.68
82	Wedge International Tower	1415 Louisiana St	Houston	2009	$117,198,458	$53,407,094	45.57
82	Wedge International Tower	1415 Louisiana St	Houston	2008	$90,694,095	$60,189,088	66.36
82	Wedge International Tower	1415 Louisiana St	Houston	2007	$54,385,976	$50,000,175	91.94
82	Wedge International Tower	1415 Louisiana St	Houston	2006	$51,722,472	$42,225,946	81.64
84	BG Group Place	811 Main St	Houston	2012	$201,337,481	$235,713,910	117.07
85	1000 Main	1000 Main St	Houston	2012	$216,575,453	$189,600,223	87.54
85	1000 Main	1000 Main St	Houston	2011	$238,925,749	$156,967,687	65.70
85	1000 Main	1000 Main St	Houston	2010	$269,446,248	$138,131,565	51.26
85	1000 Main	1000 Main St	Houston	2009	$370,908,511	$151,200,000	40.76
85	1000 Main	1000 Main St	Houston	2008	$297,234,013	$181,500,000	61.06
85	1000 Main	1000 Main St	Houston	2007	$178,057,303	$156,100,500	87.67
85	1000 Main	1000 Main St	Houston	2006	$245,216,004	$129,759,955	52.92
86	One City Center	1021 Main St	Houston	2012	$114,466,748	$97,487,357	85.17
86	One City Center	1021 Main St	Houston	2011	$111,062,788	$85,454,234	76.94
86	One City Center	1021 Main St	Houston	2010	$123,275,877	$85,692,588	69.51
86	One City Center	1021 Main St	Houston	2009	$167,187,358	$95,000,000	56.82
86	Property Sale - 6/20/2008	$130,500,000			$143,789,686	$89,231,769	62.06
86	One City Center	1021 Main St	Houston	2008	$143,789,686	$84,203,055	58.56
86	One City Center	1021 Main St	Houston	2007	$141,447,757	$68,047,369	48.11
86	One City Center	1021 Main St	Houston	2006	$123,629,340	$48,522,000	39.25
88	LyondellBasell Tower	1221 McKinney St	Houston	2012	$290,022,201	$156,165,858	53.85
88	LyondellBasell Tower	1221 McKinney St	Houston	2011	$282,153,219	$135,282,305	47.95

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88	LyondellBasell Tower	1221 McKinney St	Houston	2010	$308,752,540	$130,869,224	42.39
88	LyondellBasell Tower	1221 McKinney St	Houston	2009	$380,546,248	$143,954,464	37.83
88	LyondellBasell Tower	1221 McKinney St	Houston	2008	$288,730,589	$154,263,550	53.43
88	LyondellBasell Tower	1221 McKinney St	Houston	2007	$154,093,370	$127,825,800	82.95
88	LyondellBasell Tower	1221 McKinney St	Houston	2006	$149,816,647	$106,521,500	71.10
89	Fulbright Tower	1301 McKinney St	Houston	2012	$341,475,770	$182,875,567	53.55
89	Fulbright Tower	1301 McKinney St	Houston	2011	$332,111,496	$158,376,747	47.69
89	Fulbright Tower	1301 McKinney St	Houston	2010	$361,584,179	$152,748,678	42.24
89	Fulbright Tower	1301 McKinney St	Houston	2009	$448,504,070	$170,102,158	37.93
89	Fulbright Tower	1301 McKinney St	Houston	2008	$341,654,519	$168,353,235	49.28
89	Fulbright Tower	1301 McKinney St	Houston	2007	$159,272,803	$137,176,710	86.13
89	Fulbright Tower	1301 McKinney St	Houston	2006	$151,307,094	$104,332,322	68.95
90	5 Houston Center	1401 McKinney St	Houston	2012	$186,908,182	$131,557,702	70.39
90	5 Houston Center	1401 McKinney St	Houston	2011	$178,512,000	$108,923,393	61.02
90	5 Houston Center	1401 McKinney St	Houston	2010	$196,332,857	$98,000,000	49.92
90	5 Houston Center	1401 McKinney St	Houston	2009	$246,286,552	$108,000,000	43.85
90	5 Houston Center	1401 McKinney St	Houston	2008	$218,434,650	$122,966,850	56.29
90	5 Houston Center	1401 McKinney St	Houston	2007	$157,413,186	$115,000,000	73.06
90	5 Houston Center	1401 McKinney St	Houston	2006	$143,276,690	$90,035,625	62.84
91	Hess Tower	1501 McKinney St	Houston	2012		$276,353,768	
91	Property Sale - 12/21/2011	$442,500,000				$273,841,808	
91	Hess Tower	1501 McKinney St	Houston	2011		$184,667,231	
91	Hess Tower	1501 McKinney St	Houston	2010	$299,082,306	$113,856,523	38.07
91	Hess Tower	1501 McKinney St	Houston	2009	$363,236,438	$53,973,628	14.86
93	Two Allen Center	1200 Smith St	Houston	2012	$269,340,912	$184,820,401	68.62
93	Two Allen Center	1200 Smith St	Houston	2011	$267,684,523	$161,319,368	60.26
93	Two Allen Center	1200 Smith St	Houston	2010	$277,721,924	$159,187,926	57.32
93	Two Allen Center	1200 Smith St	Houston	2009	$363,823,329	$170,514,608	46.87
93	Two Allen Center	1200 Smith St	Houston	2008	$295,921,930	$183,776,218	62.10
93	Two Allen Center	1200 Smith St	Houston	2007	$177,084,004	$150,110,160	84.77
93	Two Allen Center	1200 Smith St	Houston	2006	$243,859,658	$131,691,135	54.00
94	1400 Smith St	1400 Smith St	Houston	2012		$191,538,963	
94	Property Sale - 6/23/2011	$340,000,000				$181,071,430	
94	1400 Smith St	1400 Smith St	Houston	2011		$171,639,747	
94	1400 Smith St	1400 Smith St	Houston	2008	$258,789,670	$163,766,200	63.28
94	1400 Smith St	1400 Smith St	Houston	2007	$159,503,589	$115,480,000	72.40
94	Property Sale - 9/22/2006	$120,000,000			$158,961,781	$101,350,530	63.76
94	1400 Smith St	1400 Smith St	Houston	2006	$157,583,590	$65,409,548	41.51
95	Continental Center I	1600 Smith St	Houston	2012	$285,138,556	$184,531,032	64.72
95	Continental Center I	1600 Smith St	Houston	2011	$281,475,398	$164,759,850	58.53
95	Continental Center I	1600 Smith St	Houston	2010	$306,390,555	$155,408,477	50.72
95	Continental Center I	1600 Smith St	Houston	2009	$390,036,750	$169,221,632	43.39
95	Continental Center I	1600 Smith St	Houston	2008	$322,822,212	$181,235,835	56.14
95	Continental Center I	1600 Smith St	Houston	2007	$194,780,922	$146,087,067	75.00
95	Continental Center I	1600 Smith St	Houston	2006	$158,306,888	$125,217,486	79.10
96	Hines 717 Texas	717 Texas Ave	Houston	2010	$239,003,800	$118,833,709	49.72
96	Hines 717 Texas	717 Texas Ave	Houston	2009	$264,896,394	$128,837,885	48.64
96	Hines 717 Texas	717 Texas Ave	Houston	2007	$103,493,092	$121,805,950	117.69
96	Hines 717 Texas	717 Texas Ave	Houston	2006	$100,996,274	$104,945,100	103.91
97	Chase Tower	600 Travis St	Houston	2012	$436,704,561	$298,156,975	68.27
97	Chase Tower	600 Travis St	Houston	2011	$410,540,859	$243,019,029	59.19
97	Chase Tower	600 Travis St	Houston	2010	$443,648,553	$229,659,812	51.77

ID	Property Name (Property Sale Date)	Property Address (Property Sale Price)	City	Year	Model Value (Predicted Value)	CAD Value (Predicted Value)	CAD/ Model Index
97	Chase Tower	600 Travis St	Houston	2009	$566,698,352	$255,341,966	45.06
97	Chase Tower	600 Travis St	Houston	2008	$474,001,416	$277,764,400	58.60
97	Chase Tower	600 Travis St	Houston	2007	$274,472,628	$234,101,955	85.29
97	Chase Tower	600 Travis St	Houston	2006	$224,116,810	$193,522,410	86.35
98	Two Shell Plaza	777 Walker St	Houston	2012	$137,915,228	$85,497,670	61.99
98	Two Shell Plaza	777 Walker St	Houston	2011	$138,671,936	$73,000,000	52.64
98	Two Shell Plaza	777 Walker St	Houston	2010	$146,744,434	$67,300,807	45.86
98	Two Shell Plaza	777 Walker St	Houston	2009	$181,007,845	$81,386,881	44.96
98	Two Shell Plaza	777 Walker St	Houston	2008	$155,410,398	$89,583,156	57.64
98	Two Shell Plaza	777 Walker St	Houston	2007	$95,687,208	$72,287,400	75.55
99	AKA 711 Louisiana St/Pennzoil Place	700 Milam St	Houston	2012	$340,912,117	$190,000,000	55.73
99	AKA 711 Louisiana St/Pennzoil Place	700 Milam St	Houston	2008	$307,438,681	$183,166,590	59.58
99	AKA 711 Louisiana St/Pennzoil Place	700 Milam St	Houston	2007	$168,921,803	$154,250,000	91.31
99	AKA 711 Louisiana St/Pennzoil Place	700 Milam St	Houston	2006	$129,437,619	$140,538,000	108.58

Average CAD/Model Index	75.81
Median CAD/Model Index	67.80

CAD/Model Index Level By County		
Tarrant	Average	76.62
Tarrant	Median	76.29
Dallas	Average	63.87
Dallas	Median	60.31
Bexar	Average	67.26
Bexar	Median	75.10
Travis	Average	107.61
Travis	Median	99.12
Harris	Average	59.88
Harris	Median	56.61

APPENDIX B

STATE LICENSE DATABASE AND CAD EMPLOYEE NAME MATCHING

Names on each CAD list were checked against a database of licensed tax appraisers on the website of the Texas Department of Licensing and Registration (2012) (TDLR) in order to eliminate from the survey those employees who are not licensed tax appraisers. The TDLR license data search was performed on August 7, 2012 using the filtering criteria of license type ("Property Tax Professionals"), property tax professional type ("Tax Appraiser") and county.

For Tarrant County, this TDLR search produced a list of 112 names, including those with expired licenses; for Travis County, 153 names; for Harris County, 326 names; for Dallas County, 137 names; and for Bexar County, 88 names, making a total of 816 licensed tax appraisers in the five counties. These lists contained the names of CAD employees in departments other than commercial property and of tax appraisers employed in private practice.

This data was "scraped" or copied, screen by screen, and pasted into a Microsoft Excel workbook. The data was cleaned and transformed so that the names of licensed appraisers could be compared to the names of CAD employees in commercial property departments as provided by the appraisal districts.

After the cleaned up list of licensees was imported into a Microsoft Access table, an un-matched records query was run between the list and a table containing names of persons in commercial property departments at the CADs, linking the two tables on CAD and last name. The resulting 36 names were then checked again on the state licensee web site to make sure there were no minor differences in spelling that resulted in unmatched names.

Next, a more sensitive un-matched records query was run on the same two tables, this time linked on CAD, last name and first name. This resulted in 63 records, inclusive of the 36 found above. When a third un-matched records query was run on the two earlier queries, linked only on last name, the resulting 26 records were those where the first name caused a potential mismatch that might be a true match. While it is expected that last names would typically be spelled consistently between one's workplace and one's state registration, first names may not

be consistent due to minor variations in spelling or the use of nicknames (e.g., Jim for James) or middle names (e.g., Howard for James) at the workplace.

Below is the resulting list of close matching first names from the two data sources where the last name and county were perfect matches, a separate list of non-matching first names from the two data sources where last name and county name matched.

The original 177 names provided by CADs was reduced to 134 names of licensed tax appraisers employed in the commercial property departments of the five CADs, precisely the population under study. As a quality check, the names and job titles of commercial property department employees at Bexar Appraisal District and Travis Central Appraisal District appearing on the Texas Tribune (2012) web site were examined against the appraisal survey participant list. Based on their job titles, persons included in the survey appeared to have appraisal responsibilities, and persons excluded appeared not to have such responsibilities. The winnowing process described above appears to have accurately identified commercial property appraisers in the two cases for which the Texas Tribune (2012) web site has data.

Variations in First Names that are Matches

State Licensee Name	CAD-Provided Name
Jeffery	Jeff
Jerald	Jerry
Jeffery	Jeffrey
Middle name Wesley	Wesley
Doug	Douglas
Antonio	Tony
Charles	Charlie
Debra	Debbie
Benjamin	Ben
Middle initial C	Cade
Middle name Dwayne	Dwayne
Brently	Brent
Middle name Roy	Roy
Michael	Mike
Middle name Elizabeth	Liz
Middle initial M	Matt
Cynthia	Cindy
Middle initial G	Glen
Middle initial K	Kay
Beverley	Beverly

Variations in First Names that are Not Matches

State Licensee Name(s)	CAD-Provided Name
Paul	Michelle
Deidre or Linton	Renee
Linda, Tyrone, Christopher, Madlyn, Jacob or John	Anacristina
Silvia or Patricia	Brenda
Michael, Larry, Josh or Ronald	Carla
Monica, Danielle, Jeffery, Louis, Karen-kai, Stephen, or Lataliayon	Taneisha

APPENDIX C

RESEARCH QUESTIONS AND SURVEY QUESTIONS KEY

Research questions with related survey question numbers.

1. Can a model for valuing a particular type of commercial property be constructed that would be more accurate than historical tax appraisals at predicting market sale prices? Can this model be applied by appraisal districts to this and other property types to increase the accuracy of tax appraisals? Output of the valuation model; Survey questions: 19, 24

2. Does appraisal accuracy vary from county to county? If so, what are the likely reasons? Output of the valuation model

3. Is appraisal accuracy hampered by the diverse character and limited availability of sales data for commercial property? Survey questions: 6E, 7, 12A, 14E

4. Is appraisal accuracy limited by a lack of tools, training or personnel? Survey questions: 6A, 6B, 6C, 6D, 14C, 14D

5. Is appraisal accuracy limited by budget constraints for performing appraisals, resolving protests or contesting legal challenges from deep-pocketed taxpayers? Survey questions: 10, 11, 14B, 14F, 14G, 14H

6. Is appraisal accuracy limited by external pressure from potential public relations or political consequences? Survey questions: 29C, 29E, 30, 31E

7. What is the effect of the protest-appeal-resolution process on final valuation accuracy? Where in the process are values most divergent from market value? What factors or justifications, if any, explain reductions below market value? Survey questions: 27A, 27B, 27C, 27D, 27E, 27F, 27G; 16, 17, 18

8. What policies or laws hamper the accurate tax appraisal of commercial property? Survey questions: 12A, 12B, 12C, 12D, 12E, 12F, 13, 14A

9. Is appraisal accuracy hampered by human cognitive limits? Survey questions: 4A, 4B, 4C, 4D, 4E, 4F, 19, 21, 22, 23, 24, 25, 26, 27B, 29B, 33, 34, 36, 38, 39, 40, 41

10. In contrast to human cognitive limits, is appraisal accuracy hampered by the environmental demands of the tax appraisal job? Survey questions: 20, 29A, 29D, 30, 31A, 31B, 31D, 31F, 35, 37, 42, 43, 44, 45

11. Is appraisal accuracy hampered by the effects of the relationship between tax appraisers and taxpayers? Survey questions: 6F, 7, 8, 9, 28, 31B, 31C, 31F, 46

APPENDIX D

COMMERCIAL REAL PROPERTY
APPRAISAL SURVEY

Commercial Real Property Appraisal Survey

This survey asks several questions about commercial real property appraisal in your jurisdiction. Please fill in the blank or select "Yes" or "No," or "?" if you don't know the answer. Include an additional sheet if you have more comments.
You may complete this survey online at www.appraisalsurvey.com. Results will be posted there in September.

County: _____

Are you involved in commercial real property appraisals, protests or resolutions? Yes ◯ No ◯ ? ◯
Do you have any role in decisions to litigate or settle commercial real property protests? Yes ◯ No ◯ ? ◯

Do you routinely use any of the following data sources in your commercial real property appraisals?

- CoStar data Yes ◯ No ◯ ? ◯
- CB Richard Ellis, Cushman & Wakefield or other market data Yes ◯ No ◯ ? ◯
- Local brokers or private appraisers Yes ◯ No ◯ ? ◯
- Public filings by corporations (forms 10-K) Yes ◯ No ◯ ? ◯
- Data voluntarily submitted by the owner of the subject property Yes ◯ No ◯ ? ◯
- Data submitted by other taxpayers Yes ◯ No ◯ ? ◯

Do you use other data sources? (specify)_____

Are any of the following a significant barrier to the effective use of commercial real property data in appraisals?

- Lack of budgeted resources to purchase data Yes ◯ No ◯ ? ◯
- Lack of time to use the data Yes ◯ No ◯ ? ◯
- Lack of training on using the data Yes ◯ No ◯ ? ◯
- Lack of software or adequate hardware tools (computers, etc.) Yes ◯ No ◯ ? ◯
- Limitations or gaps in market data Yes ◯ No ◯ ? ◯
  - If yes, what gaps? _____
- Faulty data submitted by taxpayers Yes ◯ No ◯ ? ◯
  - If yes, what faulty data is typical? _____

Are there other barriers to using data? (specify) _____

Does the appraisal district have sufficient resources to handle protests? Yes ◯ No ◯ ? ◯
Does the appraisal district have sufficient resources to initiate appeals and pursue litigation? Yes ◯ No ◯ ? ◯

Do any of these legal constraints make it difficult to apply the fair market value standard?

- Non-disclosure of sales price Yes ◯ No ◯ ? ◯
- Protests based on unequal valuation Yes ◯ No ◯ ? ◯
- Standard of clear and convincing evidence for valuation increases following a settlement Yes ◯ No ◯ ? ◯
- Approval of the appraisal district board of directors in order to appeal ARB rulings Yes ◯ No ◯ ? ◯
- Appraisal district compensation for attorney fees in successful taxpayer appeals Yes ◯ No ◯ ? ◯
- Alternate appeals process to the State Office of Administrative Hearings (SOAH) Yes ◯ No ◯ ? ◯

What other legal constraints cause difficulty? _____

Do any of the following factors make it difficult to apply the fair market value standard in commercial real property appraisal?

- Appraisal district policies and practices Yes ◯ No ◯ ? ◯
- Appraisal district budget limitations Yes ◯ No ◯ ? ◯
- Appraiser training, knowledge and skill Yes ◯ No ◯ ? ◯
- Hardware and software tools available for appraisals, protests and appeals Yes ◯ No ◯ ? ◯
- Lack of good data on sales Yes ◯ No ◯ ? ◯
- Heavy caseloads, not enough attention to each case Yes ◯ No ◯ ? ◯
- Threat of litigation by protesting taxpayers Yes ◯ No ◯ ? ◯
- Sheer volume of protests Yes ◯ No ◯ ? ◯

What other factors cause difficulty? _____

On average, are final valuations of commercial real property in your district at fair market value?
At fair market value ◯ Below fair market value ◯ Above fair market value ◯ ? ◯
If you answered above or below fair market value, enter the % variance compared to fair market value: _____% ? ◯

Of your own commercial property appraisals, what percent are at your best estimate of fair market value? _____% ? ◯

Commercial Real Property Appraisal Survey **Page 2**

Please answer the following questions on a scale from 1 to 5: 1- Never; 2- Rarely; 3- Sometimes; 4- Often; 5- Always

	Never----------Always
Is it practical to apply mass appraisal techniques to commercial real property appraisal?	1○ 2○ 3○ 4○ 5○ ?○
Is overvaluing a commercial real property a bigger problem than undervaluing it?	1○ 2○ 3○ 4○ 5○ ?○
How often is a recent sales price a good indicator of the current fair market value of a property?	1○ 2○ 3○ 4○ 5○ ?○
For a commercial property, is last year's valuation a good starting point for this year's appraisal?	1○ 2○ 3○ 4○ 5○ ?○
Is a steep year-over-year valuation increase simply unfair to the commercial property owner?	1○ 2○ 3○ 4○ 5○ ?○

	Never----------Always
How often do you use mass appraisal techniques for valuing commercial properties?	1○ 2○ 3○ 4○ 5○ ?○
Is the discounted cash flow (DCF) method too difficult to use in commercial property appraisals?	1○ 2○ 3○ 4○ 5○ ?○
Are commercial appraisals sometimes so complex that simple "rules of thumb" are used?	1○ 2○ 3○ 4○ 5○ ?○

Do taxable values tend to diverge from fair market value at any stage of the valuation process?	Never----------Always
Initial appraisal	1○ 2○ 3○ 4○ 5○ ?○
Informal resolution with taxpayer	1○ 2○ 3○ 4○ 5○ ?○
Resolution at the Appraisal Review Board	1○ 2○ 3○ 4○ 5○ ?○
Resolution through settlement	1○ 2○ 3○ 4○ 5○ ?○
Resolution through arbitration	1○ 2○ 3○ 4○ 5○ ?○
Resolution at State Office of Administrative Hearings (SOAH)	1○ 2○ 3○ 4○ 5○ ?○
Resolution in court	1○ 2○ 3○ 4○ 5○ ?○

Do taxable values diverge from FMV at some other stage? (specify) _____

Do you take into account any of these outside factors when creating the appraisal?	Never----------Always
Potential costs to the appraisal district, including litigation expense	1○ 2○ 3○ 4○ 5○ ?○
The taxpayer's financial resources	1○ 2○ 3○ 4○ 5○ ?○
Potential public relations or political consequences	1○ 2○ 3○ 4○ 5○ ?○
Internal agency pressure to limit the amount of a valuation increase	1○ 2○ 3○ 4○ 5○ ?○
Pressure from outside the agency to limit a valuation increase	1○ 2○ 3○ 4○ 5○ ?○

Are there other outside factors considered in appraisal? (specify) _____

Are these factors taken into account when deciding to litigate versus settle a protest?	Never----------Always
How winnable the case is	1○ 2○ 3○ 4○ 5○ ?○
The cost of litigation	1○ 2○ 3○ 4○ 5○ ?○
The financial resources of the taxpayer	1○ 2○ 3○ 4○ 5○ ?○
The "return" on the "investment" in litigation costs	1○ 2○ 3○ 4○ 5○ ?○
Potential public relations or political consequences	1○ 2○ 3○ 4○ 5○ ?○
Whether the appraisal district Board of Directors will consent to litigation	1○ 2○ 3○ 4○ 5○ ?○

Are there other factors in the litigation decision? (specify) _____

	Never----------Always
Is it more important to follow the district's guidelines, even if the result is an inaccurate appraisal?	1○ 2○ 3○ 4○ 5○ ?○
Is it fairly clear what valuation level will cause a commercial property owner to protest?	1○ 2○ 3○ 4○ 5○ ?○
Do you assign fair market value to a commercial property, even if it may result in a protest?	1○ 2○ 3○ 4○ 5○ ?○
Are previous valuations reviewed for accuracy when new evidence comes to light?	1○ 2○ 3○ 4○ 5○ ?○

	Never----------Always
Are appraisers generally graded on their productivity rather than on their accuracy?	1○ 2○ 3○ 4○ 5○ ?○
Do property owners often emphasize unimportant property attributes to make their point?	1○ 2○ 3○ 4○ 5○ ?○
Is it important for appraisers to cooperate with property owners in arriving at appraised value?	1○ 2○ 3○ 4○ 5○ ?○
Do cooperative taxpayers generally receive the "benefit of the doubt" vs. uncooperative ones?	1○ 2○ 3○ 4○ 5○ ?○

	Never----------Always
How often do you use simple shortcuts in complex commercial property appraisal cases?	1○ 2○ 3○ 4○ 5○ ?○
Are appraisers rewarded for appraisal accuracy?	1○ 2○ 3○ 4○ 5○ ?○
Is overall appraisal accuracy of commercial real property important to the appraisal district?	1○ 2○ 3○ 4○ 5○ ?○
Are there dangers to the appraisal district for lower than market value appraisals?	1○ 2○ 3○ 4○ 5○ ?○
Would a higher than expected number of protests be a serious problem for the appraisal district?	1○ 2○ 3○ 4○ 5○ ?○
Can a single lower-than-market appraisal be the cause of many "unequal appraisal" protests?	1○ 2○ 3○ 4○ 5○ ?○

Thank you for completing this survey. Please select a charity for a $5 donation:
American Red Cross ○ Salvation Army ○ Wounded Warrior Project ○ Nature Conservancy ○

APPENDIX E

COMMERCIAL REAL PROPERTY APPRAISAL SURVEY CONCEPTUAL FRAMEWORK

Commercial Real Property Appraisal Survey – Conceptual Framework

Abbreviations
Obstacles to Accuracy: **T**–Technical (practical), **L**–Legal, **Pr**–Procedural, **Po**–Political
New Institutional Economics: **RG** – Rules of the game
Bounded Rationality: **A**–Ambiguity, **C**–Credulity, **F**–Framing, **HR**–Habituation and routine, **IIS**–Incomplete information search, **OC**–Over-cooperation, **R**–Recognition, **S**–Satisficing
Other: **ED**–Environmental demands

The following questions were answered Yes or No

1. County
2. Are you involved in commercial real property appraisals, protests or resolutions?
3. Do you have any role in decisions to litigate or settle commercial real property protests?

4. Do you routinely use any of the following data sources in your commercial real property appraisals?

A. CoStar data	No **IIS**
B. CB Richard Ellis, Cushman & Wakefield or other market data	No **IIS**
C. Local brokers or private appraisers	No **IIS**
D. Public filings by corporations (forms 10-K)	No **IIS**
E. Data voluntarily submitted by the owner of the subject property	No **IIS**
F. Data submitted by other taxpayers	No **IIS**

5. Do you use other data sources?

6. Are any of the following a significant barrier to the effective use of commercial real property data in appraisals?

A. Lack of budgeted resources to purchase data	Yes **ED**
B. Lack of time to use the data	Yes **ED**
C. Lack of training on using the data	Yes **ED**
D. Lack of software or adequate hardware tools (computers, etc.)	Yes **ED**
E. Limitations or gaps in market data	Yes **T**
7. If yes, what gaps?	Write-in **T, L, RG**
F. Faulty data submitted by taxpayers	Yes **RG**
8. If yes, what faulty data is typical?	Write-in **T, L, RG**
9. Are there other barriers to using data?	Write-in **T, L, RG**

10. Does the appraisal district have sufficient resources to handle protests?	No **Pr**
11. Does the appraisal district have sufficient resources to initiate appeals and pursue litigation?	No **Po**

12. Do any of these legal constraints make it difficult to apply the fair market value standard?

A. Non-disclosure of sales price	Yes **L**
B. Protests based on unequal valuation	Yes **L**
C. Standard of clear and convincing evidence for valuation increases following a settlement	Yes **L**
D. Approval of the appraisal district board of directors in order to appeal ARB rulings	Yes **L**
E. Appraisal district compensation for attorney fees in successful taxpayer appeals	Yes **L**
F. Alternate appeals process to the State Office of Administrative Hearings (SOAH)	Yes **L**
13. What other legal constraints cause difficulty?	Write-in **L**

14. Do any of the following factors make it difficult to apply the fair market value standard in commercial real property appraisal?

A. Appraisal district policies and practices	Yes **Pr**
B. Appraisal district budget limitations	Yes **Po**
C. Appraiser training, knowledge and skill	Yes **T**
D. Hardware and software tools available for appraisals, protests and appeals	Yes **T**
E. Lack of good data on sales	Yes **T**
F. Heavy caseloads, not enough attention to each case	Yes **Pr**
G. Threat of litigation by protesting taxpayers	Yes **Po**
H. Sheer volume of protests	Yes **Pr**
15. What other factors cause difficulty?	Write-in **T, L, Pr, Po**

16. On average, are final valuations of commercial real property in your district at fair market value?
17. If you answered above or below fair market value, enter the % variance compared to fair market value.
18. Of your own commercial property appraisals, what percent are at your best estimate of fair market value?

Abbreviations
Obstacles to Accuracy: **T**–Technical (practical), **L**–Legal, **Pr**–Procedural, **Po**–Political
New Institutional Economics: **RG** – Rules of the game
Bounded Rationality: **A**–Ambiguity, **C**–Credulity, **F**–Framing, **HR**–Habituation and routine, **IIS**–Incomplete information search, **OC**–Over-cooperation, **R**–Recognition, **S**–Satisficing
Other: **ED**–Environmental demands

The following questions were answered on a Likert scale: 1- Never; 2- Rarely; 3- Sometimes; 4- Often; 5- Always

19. Is it practical to apply mass appraisal techniques to commercial real property appraisal?	←Never **R**
20. Is overvaluing a commercial real property a bigger problem than undervaluing it?	→Always **ED**
21. How often is a recent sales price a good indicator of the current fair market value of a property?	←Never **R**
22. For a commercial property, is last year's valuation a good starting point for this year's appraisal?	→Always **F**
23. Is a steep year-over-year valuation increase simply unfair to the commercial property owner?	→Always **OC**
24. How often do you use mass appraisal techniques for valuing commercial properties?	←Never **R**
25. Is the discounted cash flow (DCF) method too difficult to use in commercial property appraisals?	→Always **S**
26. Are commercial appraisals sometimes so complex that simple "rules of thumb" are used?	→Always **S**
27. Do taxable values tend to diverge from fair market value at any stage of the valuation process?	
A. Initial appraisal	→Always **RG**
B. Informal resolution with taxpayer	→Always **OC**, **RG**
C. Resolution at the Appraisal Review Board	→Always **RG**
D. Resolution through settlement	→Always **RG**
E. Resolution through arbitration	→Always **RG**
F. Resolution at State Office of Administrative Hearings (SOAH)	→Always **RG**
G. Resolution in court	→Always **RG**
28. Do taxable values diverge from FMV at some other stage?	Write-in **RG**
29. Do you take into account any of these outside factors when creating the appraisal?	
A. Potential costs to the appraisal district, including litigation expense	→Always **ED**
B. The taxpayer's financial resources	→Always **OC**
C. Potential public relations or political consequences	→Always **Po**
D. Internal agency pressure to limit the amount of a valuation increase	→Always **ED**
E. Pressure from outside the agency to limit a valuation increase	→Always **Po**
30. *Are there other outside factors considered in appraisal?	Write-in **ED**, **Po**
31. Are these factors taken into account when deciding to litigate versus settle a protest?	
A. How winnable the case is	→Always **ED**
B. The cost of litigation	→Always **ED, RG**
C. The financial resources of the taxpayer	→Always **RG**
D. The "return" on the "investment" in litigation costs	→Always **ED**
E. Potential public relations or political consequences	→Always **Po**
F. Whether the appraisal district Board of Directors will consent to litigation	→Always **ED, RG**
32. *Are there other factors in the litigation decision?	Write-in **ED**, **L, Po, Pr, RG, T**
33. Is it more important to follow the district's guidelines, even if the result is an inaccurate appraisal?	→Always **HR**
34. Is it fairly clear what valuation level will cause a commercial property owner to protest?	←Never **A**
35. Do you assign fair market value to a commercial property, even if it may result in a protest?	←Never **ED**
36. Are previous valuations reviewed for accuracy when new evidence comes to light?	←Never **IIS**
37. Are appraisers generally graded on their productivity rather than on their accuracy?	→Always **ED**
38. Do property owners often emphasize unimportant property attributes to make their point?	←Never **C**
39. Is it important for appraisers to cooperate with property owners in arriving at appraised value?	→Always **OC**
40. Do cooperative taxpayers generally receive the "benefit of the doubt" vs. uncooperative ones?	→Always **OC**
41. How often do you use simple shortcuts in complex commercial property appraisal cases?	→Always **S**
42. Are appraisers rewarded for appraisal accuracy?	←Never **ED**
43. Is overall appraisal accuracy of commercial real property important to the appraisal district?	←Never **ED**
44. Are there dangers to the appraisal district for lower than market value appraisals?	←Never **ED**
45. Would a higher than expected number of protests be a serious problem for the appraisal district?	→Always **ED**
46. Can a single lower-than-market appraisal be the cause of many "unequal appraisal" protests?	→Always **RG**
47. Charitable donation	

APPENDIX F

COMMERCIAL REAL PROPERTY APPRAISAL SURVEY RESULTS

Commercial Real Property Appraisal Survey Results **November 1, 2012**

This survey asked questions about commercial real property appraisal to a population of 134 state-certified tax appraisers in the five most populous Texas counties. **Results below** indicate the percentage of answers divided by total responses.

2. Are you involved in commercial real property appraisals, protests or resolutions? Yes **100** No **0** ? **0**
3. Do you have any role in decisions to litigate or settle commercial real property protests? Yes **79** No **21** ? **0**

4. Do you routinely use any of the following data sources in your commercial real property appraisals?
   - A. CoStar data — Yes **100** No **0** ? **0**
   - B. CB Richard Ellis, Cushman & Wakefield or other market data — Yes **92** No **4** ? **4**
   - C. Local brokers or private appraisers — Yes **92** No **8** ? **0**
   - D. Public filings by corporations (forms 10-K) — Yes **50** No **42** ? **8**
   - E. Data voluntarily submitted by the owner of the subject property — Yes **100** No **0** ? **0**
   - F. Data submitted by other taxpayers — Yes **100** No **0** ? **0**

5. Do you use other data sources? **Loopnet (3), MLS (2), internet, news, local govts., PWC REIS, MPF, Apt. listings**

6. Are any of the following a significant barrier to the effective use of commercial real property data in appraisals?
   - A. Lack of budgeted resources to purchase data — Yes **52** No **40** ? **8**
   - B. Lack of time to use the data — Yes **40** No **56** ? **4**
   - C. Lack of training on using the data — Yes **29** No **67** ? **4**
   - D. Lack of software or adequate hardware tools (computers, etc.) — Yes **25** No **77** ? **4**
   - E. Limitations or gaps in market data — Yes **65** No **27** ? **8**

7. If yes, what gaps? **Sales price non-disclosure (7), data is a year or more old, lack of MLS access for low-priced commercial, dated rent comps or asking rents, accuracy, time submitted**

   - F. Faulty data submitted by taxpayers — Yes **55** No **32** ? **14**

8. If yes, what faulty data is typical? **Misleading income & expense data (8) or rent roll, inaccurate sale price**

9. Are there other barriers to using data? **Lack of sales & income disclosure, confidentiality an issue, deep pockets of corporations that litigate to get an unfair advantage over the average tax payer, market transactions (sales), cost info**

10. Does the appraisal district have sufficient resources to handle protests? Yes **100** No **0** ? **0**
11. Does the appraisal district have sufficient resources to initiate appeals and pursue litigation? Yes **58** No **19** ? **23**

12. Do any of these legal constraints make it difficult to apply the fair market value standard?
   - A. Non-disclosure of sales price — Yes **85** No **15** ? **0**
   - B. Protests based on unequal valuation — Yes **69** No **27** ? **4**
   - C. Standard of clear & convincing evidence for valuation increase following a settlement — Yes **58** No **31** ? **12**
   - D. Approval of the appraisal district board of directors in order to appeal ARB rulings — Yes **27** No **58** ? **15**
   - E. Appraisal district compensation for attorney fees in successful taxpayer appeals — Yes **23** No **38** ? **38**
   - F. Alternate appeals process to the State Office of Administrative Hearings (SOAH) — Yes **16** No **44** ? **40**

13. What other legal constraints cause difficulty? **Unqualified ARB employees, small litigation budget, proforma income & expense allowed on rented property during ARB, map requirements during ARB hearings reduce efficiency**

14. Do any of the following…make it difficult to apply the fair market value standard in commercial real property appraisal?
   - A. Appraisal district policies and practices — Yes **12** No **80** ? **8**
   - B. Appraisal district budget limitations — Yes **32** No **60** ? **8**
   - C. Appraiser training, knowledge and skill — Yes **23** No **69** ? **8**
   - D. Hardware and software tools available for appraisals, protests and appeals — Yes **15** No **77** ? **8**
   - E. Lack of good data on sales — Yes **81** No **15** ? **4**
   - F. Heavy caseloads, not enough attention to each case — Yes **46** No **50** ? **4**
   - G. Threat of litigation by protesting taxpayers — Yes **15** No **73** ? **12**
   - H. Sheer volume of protests — Yes **54** No **46** ? **0**

15. What other factors cause difficulty? **Value increase caps. "Substantial evidence" AFTER begins prior yr. hearing ARB Decision. Applying market value while at the same time being uniform and equal. The biggest constraint to ultimately ending up with a fair market value on a property is the craziness of the equal and uniform appeals.**

16. On average, are final valuations of commercial real property in your district at fair market value?
    At fair market value **46** Below fair market value **46** Above fair market value **0** ? **8**
17. If you answered above or below fair market value, enter the % variance compared to fair market value: **-12.4%** ? **17**
    [Note: No response had "above" FMV; the average of the 7 responses "below" FMV was 12.4%; 2 responses were "?"]
18. Of your own commercial property appraisals, what percent are at your best estimate of fair market value? **83.4%** ? **24**
    [Note: The median response was **95%**; a few very low responses (5, 20 and 25) lowered the average.]

The following questions were answered on a scale from 1 to 5: 1- Never; 2- Rarely; 3- Sometimes; 4- Often; 5- Always

	Never	2	3	4	Always	?
19. Is it practical to apply mass appraisal techniques to commercial real property appraisal?	0	0	12	65	23	0
20. Is overvaluing a commercial real property a bigger problem than undervaluing it?	23	38	31	0	4	4
21. How often is a recent sales price a good indicator of the current fair market value of a property?	0	4	8	73	12	4
22. For a commercial property is last year's valuation a good starting point for this year's appraisal?	27	8	42	19	4	0
23. Is a steep year-over-year valuation increase simply unfair to the commercial property owner?	19	42	23	4	0	12

	Never	2	3	4	Always	?
24. How often do you use mass appraisal techniques for valuing commercial properties?	0	0	0	27	69	4
25. Is the discounted cash flow (DCF) method too difficult to use in commercial property appraisals?	8	16	28	16	24	8
26. Are commercial appraisals sometimes so complex that simple "rules of thumb" are used?	8	36	36	12	0	8

27. Do taxable values tend to diverge from fair market value at any stage of the valuation process?	Never	2	3	4	Always	?
A. Initial appraisal	19	38	35	4	0	4
B. Informal resolution with taxpayer	19	23	38	19	0	0
C. Resolution at the Appraisal Review Board	12	4	27	54	0	0
D. Resolution through settlement	8	15	27	38	4	8
E. Resolution through arbitration	8	4	38	35	4	12
F. Resolution at State Office of Administrative Hearings (SOAH)	8	4	42	15	4	27
G. Resolution in court	8	4	28	28	12	20

28. Do taxable values diverge from FMV at some other stage? **Litigation often causes divergence**

29. Do you take into account any of these outside factors when creating the appraisal?	Never	2	3	4	Always	?
A. Potential costs to the appraisal district, including litigation expense	54	23	0	12	4	8
B. The taxpayer's financial resources	69	23	4	0	0	4
C. Potential public relations or political consequences	42	31	15	4	0	8
D. Internal agency pressure to limit the amount of a valuation increase	54	27	4	8	0	8
E. Pressure from outside the agency to limit a valuation increase	56	24	8	4	0	8
30. *Are there other outside factors considered in appraisal? **[No written comments]**	44	22	11	0	0	22

31. Are these factors taken into account when deciding to litigate versus settle a protest?	Never	2	3	4	Always	?
A. How winnable the case is	15	4	12	15	12	42
B. The cost of litigation	12	4	12	15	19	38
C. The financial resources of the taxpayer	23	12	8	4	4	50
D. The "return" on the "investment" in litigation costs	15	0	15	12	0	58
E. Potential public relations or political consequences	19	4	23	8	0	46
F. Whether the appraisal district Board of Directors will consent to litigation	23	0	12	12	8	46
32. *Are there other factors in the litigation decision? **[No written comments]**	13	13	13	0	0	63

	Never	2	3	4	Always	?
33. Is it more important to follow the district's guidelines even if it means an inaccurate appraisal?	12	31	23	4	4	27
34. Is it fairly clear what valuation level will cause a commercial property owner to protest?	15	42	12	12	8	12
35. Do you assign fair market value to a commercial property, even if it may result in a protest?	0	0	4	15	77	4
36. Are previous valuations reviewed for accuracy when new evidence comes to light?	0	8	4	54	31	4

	Never	2	3	4	Always	?
37. Are appraisers generally graded on their productivity rather than on their accuracy?	23	19	15	23	8	12
38. Do property owners often emphasize unimportant property attributes to make their point?	0	0	23	62	8	8
39. Is it important for appraisers to cooperate with property owners in arriving at appraised value?	8	4	20	32	28	8
40. Do cooperative taxpayers generally receive the "benefit of the doubt" vs. uncooperative ones?	8	35	23	23	8	4

	Never	2	3	4	Always	?
41. How often do you use simple shortcuts in complex commercial property appraisal cases?	35	27	27	4	0	8
42. Are appraisers rewarded for appraisal accuracy?	38	27	23	0	4	8
43. Is overall appraisal accuracy of commercial real property important to the appraisal district?	0	0	8	27	62	4
44. Are there dangers to the appraisal district for lower than market value appraisals?	8	0	15	35	27	15
45. Would a higher than expected rate of protests be a serious problem for the appraisal district?	15	35	19	27	0	4
46. Can a single lower-than-market appraisal be the cause of many "unequal appraisal" protests?	4	19	23	38	12	4

47. Raw numbers for selected charity for a $5 donation:
American Red Cross **8** Nature Conservancy **3** Salvation Army **3** Wounded Warrior Project **7**

* Note: These two questions were provided in Never—to—Always format in the online version of the survey only. No comments were received in either format.

Survey Results Detail

Total population of persons surveyed: 134
Sample size: 100% (all persons in the population were surveyed)
Completed surveys returned: 26
Response rate: 19.4%
Composition of completed surveys: 9 web access; 17 mail return
Composition of mail return surveys: 4 in round 1 mailing; 13 in round 2 mailing ($1 incentive & proper use of UTA letterhead); 0 in round 3 mailing
Counties included (number of responses) in the survey: Bexar (2), Dallas (1), Harris (15), Tarrant (8), Travis (0)

Notes: Some questions are edited due to space constraints.
A partially completed survey received online from Collin County was not included in the survey results.

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