AN ANALYSIS OF INDIANA PROPERTY TAX REFORM: EQUITY AND COST CONSIDERATIONS

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INTRODUCTION

Influenced by economic and institutional cycles, property tax is a primary source of funds for the local governments throughout the country. In the United States 45.28 percent of local revenue and 1.2 percent of state revenue comes from the property tax. In Indiana, local governments generated 46.85 percent of their revenue from the property tax in 2008[1], slightly above the U.S. average. While the administration of the property tax has often been criticized and has moved through many different phases, it is likely that the property tax will remain in its current form for many years to come. There is a continuous need to improve the administration of the tax, which should include an accurate, fair, and modern assessment process.

This study assesses the vertical and horizontal equity of assessments for the purposes of property taxation in the state of Indiana from 1998 to 2010. In the early 2000s the state of Indiana shifted from a true tax value-based assessment system to a market value-based assessment system aiming to improve the uniformity of assessments as well as to achieve vertical and horizontal property tax equity. In this paper, assessment indicators are compared to the generally accepted benchmarks defined by the International Association of Assessing Officers (IAAO), including the accuracy of assessments and assessment uniformity and are measured over time and across assessing jurisdictions.

THE PROPERTY TAX ASSESSMENT SYSTEM IN INDIANA

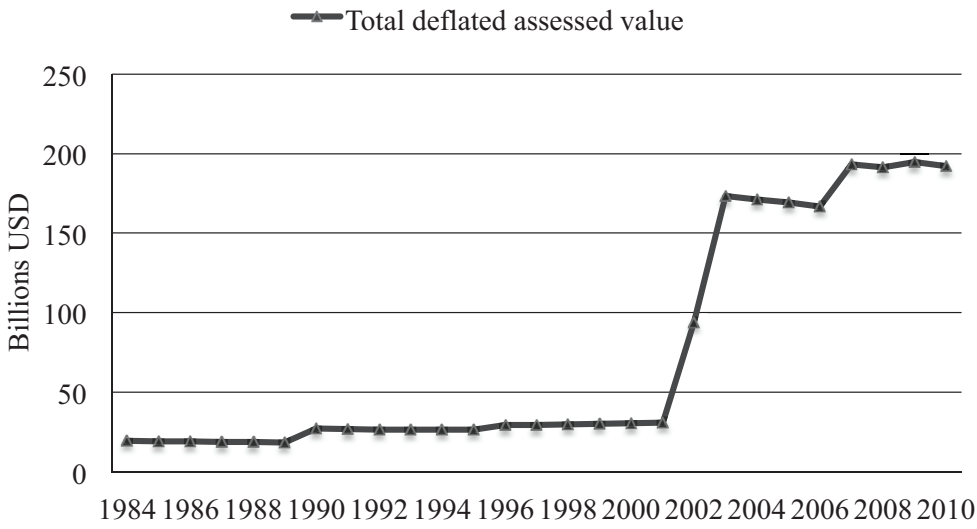
In Indiana, a decade of reforms aimed to streamline property tax administration and to improve the equity and efficiency of the assessment process. These reforms were as follows.

In 1998-2002 the state of Indiana introduced a market value-based system for assessing real property. Previously, property assessments for the purposes of property taxation were done on a cost basis, known as a true tax value basis, and were based upon detailed cost manuals held by the assessors. The Indiana Constitutional Court ruled that the state's existing cost schedules lacked "any meaningful reference to property wealth and resulted in significant deviations from substantial uniformity and equality." Thus, the cost-based system was abandoned in 1998. The true tax value approach was deemed not transparent since it relied on agency cost manuals, and property owners could not easily compare their property's assessed value with the values of other houses. The State Board of Tax Commissioners was required to consider "real world evidence" in future property assessments, or the "just" value of the property. As a result, the state has decided to shift to the market value as the basis for the assessed value.

In 2006, the state mandated local assessors to trend the property tax base in their respective jurisdictions each year in line with the previous market price movements of comparable properties. Guidelines developed by the State Department of Local Government Finance suggested that the assessed value of real property ought to be adjusted annually "to account for changes in value in those years since a general reassessment of property last took effect." Assessors were mandated to research the local property sales over the past two to three years and to adjust all of the assessed values in their jurisdictions with the historic trend. With the introduction of trending, the property tax base in the state was to change incrementally each year in line with the historic selling price movements. Figure 1 illustrates such annual trending adjustments to the gross tax base in Indiana in 2006-2010. The goal of trending was to promote uniform and equal assessment of real property within and across classifications under the market value-based system. Note that prior to 2006, the statewide tax base readjustments took place only during the mass reassessment years: 1989, 1995, and 2001.

Organizational changes to the property tax administration system in the state were the third important step in realigning the Indiana property tax. Previously, county assessors provided oversight of the township assessors' performance and

Figure 1: **Total assessed value of properties in the state of Indiana.**



Source: Department of Local Government Finance

the Department of Local Government Finance (DLGF)[2] provided state-level support and oversight. In July 2008, the House Enrolled Act 1001-2008 by the General Assembly eliminated 995 out of 1008 Indiana township assessors from the property tax administration function. This consolidation was thought to be cost efficient, considering that by 2008 many township assessors already delegated their assessment duties to counties or private contractors. A smaller number of better-trained assessors were expected to produce more uniform and higher quality assessments in their counties.

These three reforms were aimed at modernizing and streamlining the property tax assessment system in the state of Indiana. Many of the new statutory requirements conformed with the IAAO's recommendations to the states: An obsolete system of township assessors was removed; A closer connection between the assessed values and the market values was established due to trending; The market value-based system had been implemented.

VERTICAL AND HORIZONTAL PROPERTY TAX EQUITY IN RATIO STUDIES

Ratio studies examine the level and composition of assessment ratios in a jurisdiction to determine whether the property tax is being administered in compliance with the statutory requirements of that jurisdiction. They are often drawn across property classes or geographic localities and can provide evidence of any horizontal or vertical inequity in the administration of the property tax. Vertical inequity can, for example, occur due to infrequent assessments, assessor subjectivity, and information asymmetries at the time of assessment. The political environment of the assessment process and the tendency of the assessors to center-value their estimates on median properties while over-assessing low-valued properties and under-assessing high-valued properties can contribute to inequitable assessments. Thin markets and spatial spillover effects may also amplify vertical inequity (Smith, 2000; McMillen and Weber, 2008).

Most ratio studies with a focus on property tax equity agree upon the regressivity of the property tax. Significant evidence has been found that the most expensive properties are paying the lowest effective tax rate (Black, 1972; Cox and Studer, 1997; Paglin and Fogarty, 1972; McMillen, 2011). Some researchers have discovered a U-shaped distribution of assessment ratios over the sales price: some of the most expensive properties may occasionally be over-assessed, because they are unique, rarely sold, and difficult to assess with accuracy (Johnson,

1958; Oldman and Aaron, 1965). Ratio studies document a systematic bias in assessments in inner cities and metropolitan areas as compared to suburbs (Johnson, 1958; Black, 1972; Oldman and Aaron, 1965; Walzer and Fisher, 1981; Zimmer, 1958; McMillen, 2011).

Indiana ratio studies of the recent decade described the true tax value-based assessment system. DeBoer et al. (1996) estimated median assessment ratio of 0.62 based on a sample of 20 counties. Mikesell (2004) documented systematic under-assessment of properties, non-uniform assessments, and a widespread property tax inequity that failed to meet the IAAO requirements for a reasonably good assessment system. He noted a nonincremental growth in assessed values during the mass reassessment years at the discretion of the State Board of Tax Commissioners (see figure 1). Brown (2005) concluded upon systematic non-uniformity of assessments in the state both within and across jurisdictions. The IAAO standards of property assessment were not met during the 2002-2003 mass reassessment cycle. Brown criticized state authorities for a lack of oversight and for the absence of independent county equalization studies. The report found no evidence of a new market value-based assessment system being implemented in the state.

THE DATA

Sales and parcel records for this study were provided by the Department of Local Government Finance in October 2010. The data contained records of all reported real property parcels and of all reported real property sales transactions in the state between 1998 and 2010. Notably, prior to 2003 any sales data disclosure by counties to the state had been voluntary and, therefore, some of the counties were missing from the picture.

Parcel data was merged with sales data resulting in a 1.5 million sample of matched properties. The matched data file was cleansed from observations in which vital information was missing such that the assessment ratio could not be calculated – either the assessed value or the sales price was missing from the sample. Only residential properties were selected (class 500 to 599) to ensure uniformity within one property class. Residential properties are the largest property class in Indiana and made up 86 percent of the initial sample.

The initial data set included assessment ratios between -2 and +28. The ratios were then judgmentally restricted to positive numbers. Any negative values should have been entered erroneously by the county clerks during the data reporting process. Sales valued below $1,000 were eliminated as non-arms'-length transactions: according to the president of Indiana Association of County Assessors, it is unrealistic to purchase a residential property, including land, in Indiana at a price of $1,000 or below. Additionally, the sales prices were cut off at $3 million dollars: according to records held by the Indiana Board of Realtors, the most expensive residential property sold over the past decade in Indiana was $3 million dollars. Records above the $3 million were erroneous entries made by the counties and were also removed from the sample. After this cleansing, the sample was trimmed 2.5 percent from each of the two extremes, as per IAAO guidelines (IAAO, 1978).

Assessment ratios ranged from 0.00692308 to 6.52 in the final sample. The final data set included 996,930 observations, of which 382,706 were marked as "valid for trending" sales by the property assessors. "Valid for trending" were those sales judged by the local assessors as the arms'-length, or market, transactions. These are the only sales considered for trending and sales ratio reporting purposes by the assessing jurisdictions. This data set is unique as it encompasses over a decade of sales transactions for the entire state of Indiana. All prior studies have focused on smaller sample sizes and shorter time spans.

Descriptive Statistics

Descriptive statistics provides a summary of key assessment indicators in the state of Indiana from 1998 to 2010. The mean assessment ratio is 0.9698 and 0.8254 is the median. Properties are generally under-assessed but within the IAAO-recommended range of 0.85 to 1.15. The standard deviation of the assessment ratio is 0.8972. Descriptive statistics of the assessment ratios are presented in table 1.

The key measures of variability in ratio studies are the mean and median assessment ratios, the standard deviation of the assessment ratio, coefficient of dispersion (COD), and price-related differential (PRD). The assessment ratio denotes assessor's compliance with the legislative requirements; the coefficient of dispersion is a horizontal equity measure; the price-related differential

Table 1
Descriptive Statistics

	Mean	*Median*	*Std. Dev.*	*Max.*	*Min.*
Sales Price	113,602	90,000	126,176	3,000,000	1,000
Assessed Value	85,220	68,900	88,679	3,000,000	1,000
Assessment ratio	0.9698	0.8254	0.8972	6.52	0.0069
N=996,930					

indicates any vertical equity in the property tax assessments. The methodology of calculating and interpreting these measures is provided by IAAO in their Standard on Ratio Studies, as well as in many other publications (IAAO, 1999).

The mean ratio is a statistical mean of all ratios. The median is the statistical median of all ratios. The standard deviation shows how much deviation from the mean there is in the population. A low standard deviation usually implies observations are tightly clustered around the mean. The coefficient of dispersion for ratio studies is calculated as follows:

$$\text{COD} = \frac{\textit{Absolute average deviation}}{\textit{Median ratio}} * 100\%$$

COD does not rely on the assumption that all ratios are normally distributed and represents percentage deviation from the median assessment ratio, which makes it a useful and versatile measurement tool. Usually about half of the ratios will fall within one COD of the median. A smaller COD indicates that the ratios are more tightly distributed around the median; a larger COD indicates a greater distribution of ratios around the median. IAAO recommends the COD of assessment ratios to be below 20 percent and below 10 percent for new uniform properties.

The price related differential (PRD) is used to assess regressivity in the distribution of ratios over the range of the sales prices, or vertical equity of the property tax assessments. The PRD is calculated as follows:

$$\text{Sales-Based Average Ratio} = \frac{\Sigma\, \textit{Assessed values}}{\Sigma\, \textit{Sales prices}} * 100\%$$

$$\text{Mean Assessment Ratio} = \frac{\Sigma\, \textit{Sales ratios}}{\textit{number of ratios}}$$

$$\text{PRD} = \frac{\textit{Mean Assessment Ratio}}{\textit{Sales} - \textit{Based Average Ratio}}$$

The PRD statistic has a slight upward bias. According to the IAAO, a PRD above 1.03 will indicate the presence of assessment regressivity. A PRD below 0.98 will indicate that the property assessment system is progressive.

Descriptive statistics for the sample of assessment ratios by year for the state of Indiana between 1998 and 2010 are presented in tables 2 and 3 (below). Table 2 presents the full sample and table 3 presents a subsample of "valid for trending" sales. On average, properties were under-assessed until 2007, which is in line with the literature. Property under-assessment was in the range of 22-30 percent from 2000 to 2002. As counties shifted to the market value based assessment system, average assessment ratios increased to the statutory requirement of 100 percent. In 2007, a 100 percent average assessment ratio was reached statewide. As the housing market began to crumble in 2008, however, average assessment ratios increased by 30 percent. A similar pattern holds for the median assessment ratios: under-assessment was more profound in the years 1998-2006 than in 2008-2010. Over the time period 2009-2010, median ratios were well within the range recommended by IAAO. Traditionally, median assessment ratios are seen as a more reliable measure than mean ratios, as they better represent the majority of properties in the sample and are less skewed to the right. As expected, over time, median assessment ratios have increased from 0.53-0.77 in 1998-2002 to 0.83-0.86 in 2003-2004. Further, as ratios increased to 0.82-0.93 in 2005-2007, their standard deviations declined markedly to 0.55-0.59, so the quality of assessments has improved. Over 2008-2010, median assessment ratios remained at about the same level (0.8-0.93), whereas their standard deviations rapidly increased to 1.2-1.42. This increase is an indication of either

Table 2
Assessment ratios. Descriptive statistics. Full sample.

Year	*N*	*Mean*	*Median*	*Std. Dev.*	*COD*	*PRD*
1998	46,983	0.90	0.78	0.93	0.27	1.17
1999	53,423	0.85	0.74	0.94	0.37	1.18
2000	70,698	0.74	0.56	0.84	0.24	1.19
2001	73,907	0.67	0.53	0.73	0.14	1.19
2002	82,042	0.75	0.64	0.65	0.12	1.21
2003	93,881	0.88	0.84	0.68	0.10	1.24
2004	125,736	0.96	0.86	0.71	0.11	1.25
2005	86,939	0.86	0.82	0.54	0.05	1.14
2006	79,474	0.90	0.88	0.51	0.06	1.12
2007	54,920	1.00	0.93	0.58	0.08	1.13
2008	119,550	1.24	0.92	1.21	0.36	1.62
2009	98,937	1.28	0.80	1.37	0.56	1.74
2010	10,440	1.41	0.93	1.43	0.50	1.79

N=996,930

Table 3
Assessment ratios. Descriptive statistics. "Valid for trending" sales.

Year	*N*	*Mean*	*Median*	*Std. Dev.*	*COD*	*PRD*
1998	1	1.58	1.58		0.00	1.00
1999	6	0.87	0.88	0.32	2.55	1.12
2000	109	0.84	0.81	0.43	0.77	1.07
2001	12	0.93	0.57	1.30	0.88	1.76
2002	1,498	0.92	0.91	0.30	0.02	1.03
2003	4,806	1.07	0.92	0.80	0.18	1.16
2004	39,767	0.98	0.87	0.69	0.11	1.19
2005	70,964	0.87	0.83	0.49	0.04	1.11
2006	76,344	0.89	0.87	0.50	0.06	1.11
2007	54,596	1.00	0.93	0.58	0.07	1.13
2008	75,903	1.08	0.89	0.99	0.17	1.45
2009	53,813	1.03	0.67	1.12	0.26	1.56
2010	4,887	1.15	0.76	1.19	0.22	1.63

N=382,705

less accurate assessments, an increased price volatility of the housing market, or both.

The coefficient of dispersion moved similarly to the assessment ratios. In 1998-2000 the COD varied between 0.24-0.37, a violation of the IAAO prescription of 10-20 percent and an indication of horizontal inequity. In 2001-2004, the COD narrowed to 0.14-0.11 and declined to 0.05-0.08 in 2005-2007. This was a major improvement in the statewide assessment accuracy. Surprisingly, the coefficient of dispersion increased to the 0.35-0.55 range in 2008-2010 as the housing market began to crumble. The price related differential followed the trend: the assessment system demonstrated tax regressivity in the range of about 20 percent during 1998-2004. The PRD fell below 1.15 in the years 2005 to 2007. The PRD increased dramatically to 1.6 starting in 2008.

All of the equity assessment indicators increase to pre-reform levels in 2008-2010. Two out of three indicators exceed the levels of 1998-2000: the standard deviation is above 1.20 and the PRD is above 1.60, a significant increase compared to other years of data on record. Table 2 provides descriptive statistics in each year.

Similar summary statistics were computed for the subsample of "valid for trending" sales. Table 3 presents the results. Valid sales are the arms'-length transactions of the real property transfers as indicated by the assessors in the sales disclosure forms. These are the market transactions. Note that prior to 2006, the validation of sales was not mandatory and was rarely reported, causing the smaller number of observations in 1998-2005.

The intertemporal dynamics of the subsample of market sales are similar to those in the full sample. Property assessment improved noticeably in the years 2005-2007, so that the standard deviation and the COD were much lower in the years 2005-2007 compared to 1998-2004, and the PRD was at 1.11, also modest. In 2008-2010, the standard deviation of the mean assessment ratios, the COD, and the PRD increased indicating an increase in horizontal and vertical property tax inequity and evidencing tax regressivity. These increases, however, were smaller for the subsample of "valid for trending" sales, since those sales were pre-screened by the assessors. Hence, part of the variation in the full sample could be attributed to nonmarket sales, such as foreclosures, that were screened away during the validation process.

Figure 2: **Median assessment ratios and coefficients of dispersion by county.**

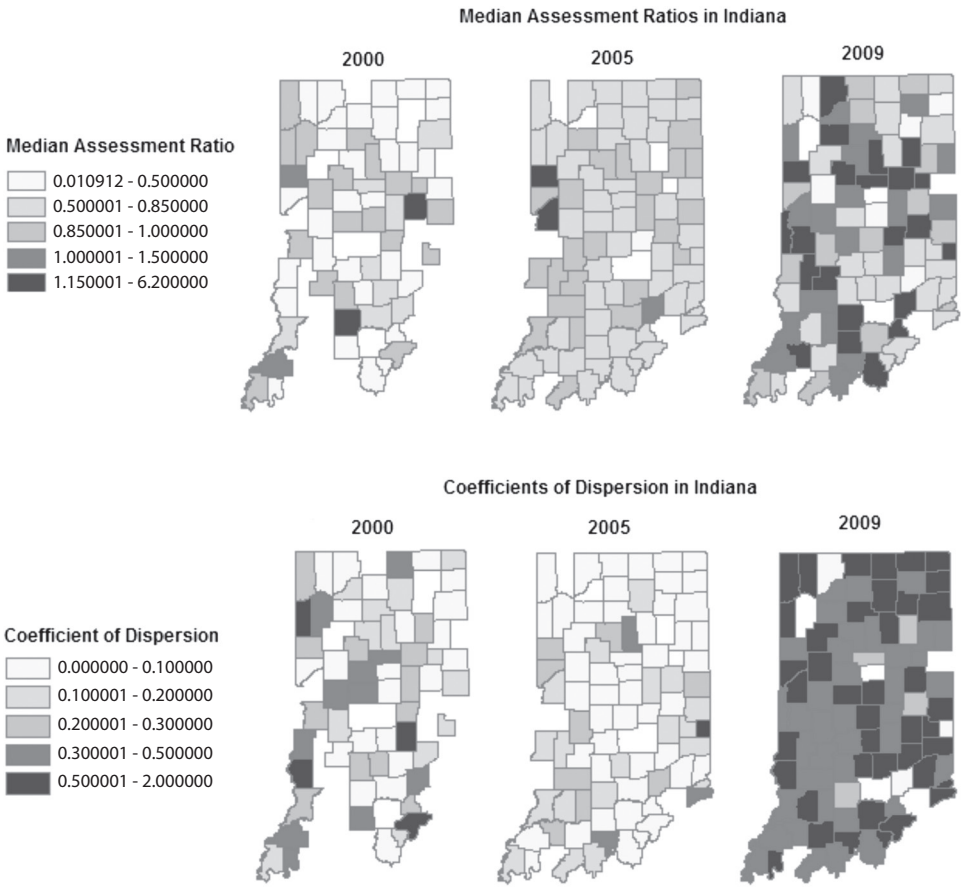


Figure 2 presents descriptive statistics by county. Summary statistics at the county level are presented on county maps for the selected three representative years, which, for the sake of this chapter's brevity, are 2000, 2006, and 2009. The descriptive statistics by county in 2000 are similar to those from 1998-2002. The descriptive statistics in 2006 resemble those in the years 2005 and 2007. The descriptive statistics in 2009 are comparable to the years 2008 and 2010. It is worth noting that in 2000 many counties did not report their sales. By 2006, data collection improved across the state, the assessment ratios were closer to the statutory requirements, and the uniformity of assessments as measured by the COD improved. Conversely, in 2009, in many counties the coefficient of dispersion exceeded 50 percent and many of the median assessment ratios exceeded 1.0. This is evidence of two processes occurring simultaneously: on the one hand, assessors strived to increase the assessed values in line with the trending requirements and the past record of housing price increases. On another hand, as housing prices began to crumble, many sales occurred below the assessed value. In some counties, those sales were so numerous that the resulting median assessment ratio for the entire county exceeded the 100 percent threshold. Higher coefficients of dispersion in 2008-2010 indicate lower accuracy in performing property assessments and increased horizontal inequity. Most of this inequity resulted from volatile sales prices in a turbulent residential housing market, as well as from overly optimistic trending adjustments and a long time since the last mass reassessment.

CONCLUSIONS

Indicators of the property tax administration in Indiana varied over time during the 1998-2010 time period. Notable improvements in assessment uniformity and assessment equity were recorded during 2004-2007. As the housing market began to falter beginning in 2008, all of the assessment indicators deteriorated rapidly, and both vertical and horizontal inequity of assessments for the purposes of property taxation increased.

Three reasons are at the heart of property tax system deterioration in 2008-2010: Firstly, the volatility of house selling prices derailed the market value-based system as a whole; Secondly, amid the crumbling housing prices, assessors continued trending their assessed valued based upon the past housing market growth, which was no longer in place; Thirdly, a considerable time lag since the last mass reassessment in 2000-2002 contributed to assessment inequity.

These findings are recent, new, and generalizable to any market value-based assessment system in the broader geographical area of the United States. Future research could be conducted in several directions. First, the quality of data reporting by the counties to the state ought to be investigated. In the present study, many observations have been discarded, since either the sales price or the assessed value was missing from the public records. Second, it would be interesting to extend the present study to the mass reassessment of 2011-2012 and see whether there was a correction of the 2008-2010 over-assessments and an improvement to the property tax equity. Finally, a study of county or neighborhood effects could provide more information about the regional specifics of the real property assessment equity in property taxation.

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Notes

[1] Source: US Census Bureau. 2008 State and Local Government Finances. http://www.census.gov/govs/ estimate accessed on August 20, 2011.

[2] Previously the State Board of Tax Commissioners, the Department of Local Government Finance (DLGF) oversees the property tax assessment function at the state level, and also serves as a central depository of property and sales records in the state of Indiana.

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