



PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 21 ISSUE 3 (2023), Page 99 – 109

ADDRESSING THE ASSESSMENT BIAS IN THE MALAYSIAN LOCAL PROPERTY TAX ASSESSMENT

Bin-Bustamin, Ezwan¹, Alias, Anuar², Ahmad, Rubi³

^{1,2,3} *Centre for Sustainable Urban Planning & Real Estate (SUPRE)*
UNIVERSITY OF MALAYA

Abstract

An assessment bias happens when an assessed property signifies intolerable proportionate between the assessed and market values; reflecting its uniformity within the valuation list and possessing inequity across the group of properties defined by the value. To correct the assessment bias, local government usually revaluates its valuation list. While most other developed countries perform the revaluation whenever the assessment's performance is intolerable, the Malaysian existing law urges the revaluation to be as a quinquennial event. Globally, local assessors use the standard ratio studies promulgated by the International Association of Assessing Officers (IAAO) to measure and evaluate the severity of the assessment bias. Adopting the IAAO standard, this research had performed the ratio studies in Hang Tuah Jaya Municipality for the fiscal year of 2017. The research had revealed a significant assessment bias between the lower-value and higher-value properties and other significant property feature that associated with the assessment bias.

Keywords: Property tax assessment, assessment bias, ratio studies

¹ Student at University of Malaya Email: ezwan.binbustamin@outlook.com

INTRODUCTION

The assessment bias (also known as assessment inequity) in local property tax assessment as contended by the International Association of Assessing Officers (IAAO) is demonstrated by the severity of assessment inequity existed in the valuation list (IAAO, 2010, 2013). There are two forms of assessment bias in property tax; the horizontal and vertical inequity. The latter which is more concern amongst scholars and policy makers, is the systematic dissimilarity of property assessments across levels of property groups defined by value, whilst, the former is regarded to the systematic inconsistency of property assessments within the same value of property groups (Birch, Sunderman, & Radetskiy, 2017; De Cesare & Ruddock, 1998; Paglin & Fogarty, 1972; Sirmans, Diskin, & Friday, 1995).

Revaluation of the valuation list is the usual correctional means adopted by most of the local governments in the event of assessment bias. While Malaysia is trivial and ambiguous regarding the severity of assessment bias in her local governments' valuation lists, the Local Government Act 1976 (Act 171) urges them to execute the revaluation on the fifth year from the previous exercise. Nevertheless, majority of the Malaysian local governments possesses lapsed valuation list with age more than five years old which made them susceptible to assessment bias. This research, therefore, endeavours the standard ratio studies promulgated by The International Association of Assessing Officer (IAAO) to explore and measure the assessment bias in the Malaysian local property tax system. However, this research limits its scope to the jurisdiction of Hang Tuah Jaya Municipality due to the limitation of research timeline.

RESEARCH BACKGROUND

In general, performance is a situational analysis of the observed condition towards its targeted condition (Amos, 2019). Comprehend to this notion, the performance of a particular property tax assessment is an analysis of the latter's assessed value to its current market values. By adopting the sale price as a proxy to the market value, the analysis compared the assessed value with the sale price in form of ratio which known as the assessment ratio (Almy et al., 2008) as shown by the following formula:

$$R = A/S \tag{1}$$

Where, R, the assessment ratio for a particular property is equal to A, the assessed value divided by its S, the observed sale price. Assessors used the ratio studies to analyse the property tax assessment's performance which initially comprises two key observations; the assessment level and the uniformity. With the advance of assessors' practice and standard, the regressive pattern of the

valuation list has been included as the third key observation for the ratio studies (Gloude-mans, 2011; Gloude-mans & Almy, 2011; D.P. McMillen, 2011). The Standard on Ratio Studies as issued in IAAO (2013) consists three measurements of the key observed principles which are the measurement of overall ratio (assessment level), variability (assessment uniformity) and vertical equity (assessment equity).

The Assessment Level

The assessment level or the overall assessment ratio estimates the common or typical ratio of how the properties are assessed relative to the market value (IAAO, 2013). The process of measuring the overall ratio involves observations of the median, arithmetic mean and the weighted mean of assessment ratio. Gloude-mans & Almy, (2011, p. 220) contended the application of weighted mean as to be more appropriate as it accurately “measures the central tendency for estimating the total dollar value of a population of parcels”. The following formula mathematically describes the weighted mean,

$$\bar{A}/\bar{S} = \frac{\sum A}{\sum S} \tag{2}$$

Where, \bar{A} , the overall (weighted mean) assessment ratio is equal to $\sum A$, the sum of assessed values divided by its $\sum S$, the sum of observed sale prices. The IAAO (2013) suggested the acceptable assessment level (overall assessment ratio) should fall at the interval of 0.90 to 1.10 for any type of property.

The Assessment Uniformity

The main reason to measure the uniformity is to observe whether the variability of the assessment ratio is in systematic variation or else (IAAO, 2013). The process usually involves observations of the coefficient of variation (COV) and coefficient of dispersion (COD). Gloude-mans and Almy (2011, p. 226) urged the COD to be most appropriate tool as it “measures the appraisal uniformity in raw percentage points rather than in relative terms”. The following formula mathematically described the calculation of the COD:

$$COD = 100 \times \left(\frac{\sum |(A_i/S_i) - (\bar{A}/\bar{S})|}{n} \right) \div (\bar{A}/\bar{S}) \tag{3}$$

Where, (A_i/S_i) is the assessment ratio of a sample and (\bar{A}/\bar{S}) is the median assessment ratio while n is the size of the sampling. Ideally, the low COD signals good uniformity but in reality, the COD’s outcome subjects to the

homogeneity of the property class. Therefore, an extremely low COD (less than 5%) shall be cautious with errors or biases in data sampling as it is very exceptional to find a perfect homogenous community. In general, the IAAO (2013) suggested the tolerable range of COD should fall between 5.0% and 20.0% for all type of residential properties.

The Assessment Equity

The aim of evaluating the performance of the local property tax assessment to prescribe the severity of the assessment bias in the valuation list. Commonly, the assessors compute the price-related differential (PRD) to indicate the assessment equity (inequity) in the valuation list (Denne, 2011; Gloudemans, 2011; Gloudemans & Almy, 2011). The PRD is computed by engaging the following formula: -

$$PRD = (\overline{A/S})/(\overline{A}/\overline{S}) \quad (4)$$

Where, the PRD is equal to $(\overline{A/S})$, the mean assessment ratio, divided by $(\overline{A}/\overline{S})$, the weighted mean assessment ratio. IAAO (2013) suggested that a neutral assessment should have a PRD between the ranges of 0.98 to 1.03. Any result of lower than 0.98 indicates a progressive property tax assessment while any PRD greater than 1.03 would signal a regressive property tax assessment.

Tests of horizontal equity

Though it is not compulsory in the Standard on Ratio Studies, recent researches about the performance of property tax assessment often included the tests of horizontal equity in their analysis. Hodge et al. (2017, p. 5) argued that the anticipation of horizontal inequity always complements the vertical inequity exists. The tests of horizontal equity have a double edge purpose; while to ascertain the existence of the horizontal inequity, the tests also meaningful for determining the factors that influence the performance of property tax assessment. This research has considered the tests of horizontal equity as a part of the research method to evaluate the performance of the property tax assessment and to determine 'property type' as a significant factor that affected the outcome of the performance.

RESEARCH METHODOLOGY

This research is a cross-sectional study that initially involved the data of 1,580 residential properties that were transacted in the year 2017. The study obtained the data from the National Property Information Centre (NAPIC) and restricted them to the Hang Tuah Jaya Municipality's jurisdiction. Eventually, the research

only observed 680 them after completed a systematic process that purposely to eliminate irrelevant data. The following paragraphs will explain about the process accordingly to the stages as exhibited in the Table 1.

Data restrictions

The research imposed a set of data restriction to ensure the sale prices are *bona fide* transactions that comply with the cardinal principles of market value definition (Board of Valuers, 2019; IAAO, 2010b). There were three key issues that required attention when examined the data within the transaction records. Firstly, the partial share transaction between parties involved as it explicitly does not represent the sale price of the whole property per se as adopted in Fleissig (2018) and Hodge et al. (2017) for exclusion of non-market representable sale price. Secondly, the transactions which either party involved is a developer as suggested in IAAO (2013, p. 11), "it is unlikely that the sample is representative ... when the sample consists of new construction, first-time sales of improved properties...". Finally, the transactions that involved family members as argued by D. McMillen and Singh (2020) that family-related sale prices often appeared to be lower than the assessed value and might performed as outliers in the ratio studies.

Table 1: Elimination of irrelevant data

NAPIC's Data of Residential Sales in Hang Tuah Jaya Municipality		1,580
Data Restrictions Stage		1,580
Partial sales	30	
Developer's sales	690	
Family-related sales	9	
Less: Non <i>Bona Fide</i> sales		(729)
Data Cross-observation & Similarity Matching Stage		851
Unmatched properties	37	
Untraceable	93	
Less: none cross-observed data		(130)
Data Cleaning and Trimming Stage		721
Duplication	9	
Lower-boundary outliers (<0.2405)	0	
Upper-boundary outliers (>1.0165)	30	
Less: Questionable data		(39)
Final Sampling		682

Source: Author

Data cross-observation and similarity matching

The primary purpose of the data cross-observation is to collect essential data from the valuation list. It began with the data similarity-matching process to verify that both data set during the cross-observation were identical property. The process should achieve at least three similarities in the property's address, title number, type or name of the owner in both data set of the NAPIC and the valuation list during a single cross-observation. Determining the similarities in the property's address, title number and type are straight forward and simple; if both data were not identical, it was unmatched.

Data cleaning and trimming

Initially, the data cleaning process involved data elimination for duplications and samples that contained missing data. Later, the cross-observed data were examined for outliers trimming as the latter are very sensitive to the analysis and may result in significantly different outcomes. Similar to Hodge et al. (2017), this research had applied the interquartile range (IQR) method to for the outliers trimming; a method that is also recommended by the IAAO (2013). Cornia and Slade (2005) contended the elimination of outliers in the ratio studies as they are susceptible to questionable transactions. By using the IQR method, this research only accepted assessment ratios that lie between the range of 0.2405 (lower-bound) and 1.0165 (upper-bound).

RESULTS AND DISCUSSIONS

Results on the assessment level

As shown in Table 2, all indicators for the assessment level have differential results yet is signalling an assessment level below the ideal percentage of one hundred per cent of the market value. The mean ratio is 0.618, with a standard deviation of 0.137. The median ratio is 0.630, with an absolute average deviation of 0.108, while the weighted mean ratio is 0.604.

Table 2: Results on the assessment level

	Results (n = 682)
Mean (standard deviation)	0.618 (0.137)
Median (absolute average deviation)	0.630 (0.108)
Weighted Mean	0.604

Source: Author

As commended in IAAO (2013), this research has commenced the binomial and chi-square tests to ascertain the probability of the overall ratio is less than 0.90, that is, the lower bound of the acceptable assessment level. The test proportion was set at 0.50 and the use of one-tailed binomial test at 95 per cent confidence level. As shown in Table 3, the binomial test had observed 35

assessment ratios or 5 per cent with values equal to or greater than 0.900. On the other hand, the same test had also observed 650 assessment ratios or 95 per cent with values lower than 0.900. Meanwhile, the chi-square test for testing the assessment level involved the setting of equal probability for Group 1 (assessment ratios equal to or greater than 0.900) and Group 2 (assessment ratios less than 0.900). Both tests have the p-value less than 0.01 and significant enough to determine that the assessment level is below the minimum tolerable assessment level of 0.900.

Table 3: Results for testing the level of assessment

	Results (n= 682)
Assessment ratio \geq 0.900 (proportion)	32 (0.05)
Assessment ratio < 0.900 (proportion)	650 (0.95)
Binomial test (test proportionate = 0.50)	
z-value	23.626
p-value	0.000**
Chi-square test	
χ^2	560.006
degree of freedom	1
p-value	0.000**

**significant at p-value less than 0.01

Source: Author

Results on the assessment uniformity

The COV and COD in Table 4 indicate the assessment uniformity of all the involved 682 properties in the ratio studies. In general, the indicators suggest low variability of the assessment ratio. The COV for the assessment ratios is 21.3 per cent. Nevertheless, the COD as the most powerful indicator to indicate assessment uniformity is 17.5 per cent which falls within the tolerable range as suggested by the IAAO (2013).

Table 4: Results on the assessment uniformity

	Results (n = 682)
Coefficient of Variation (COV)	21.7%
Coefficient of Dispersion (COD)	17.5%

Source: Author

Validating these indications of the assessment uniformity requires the test of the horizontal equity. Therefore, the later section about the horizontal equity test will present and discuss the results.

Results on the assessment equity

The PRD and PRB, as shown in Table 5, indicate the assessment equity for all the 682 properties. Both indicators suggest a regressive assessment; a negative relationship between the assessment ratios and the values of the properties. The PRD for the ratio studies is 1.043, and it is beyond the tolerable range, as suggested by the IAAO (2013). The result suggests a regressive assessment bias within the valuation list. For robustness of the result, this research has taken two vertical equity models namely of the Price-Related Bias model (PRB) and the classic vertical equity test model also known as the IAAO 1978 model.

Table 5: Results on the assessment equity

Results (n = 682)	
Price-Related Differential (PRD)	1.043

Source: Author

Table 6: Results of the vertical equity model tests

Test Model	Model name (Null Hypothesis)	Results of β_1 (t-statistic)
$Y_i = \beta_0 + \beta_1 X_i + \varepsilon$ $X_i = \frac{\ln V_i}{\ln 2}$ $V_i = 0.5SP_i + 0.5 \left(\frac{AV_i}{AV/SP} \right)$	PRB $(\beta_1 = 0)$	-0.033** (-3.138)
$AV/SP = \beta_0 + \beta_1 SP + \varepsilon$	IAAO 1978 $(\beta_1 = 0)$	-1.939E-7** (-7.502)

Y = price related bias ratio; V = proxy sale price; AV = assessed value; SP = sale price; β = coefficient estimator; and b = coefficient estimator

**significant at p-value less than 0.01

Source: Author

As shown in Table 6, the PRB test had revealed a statistically significant relationship between the observed dependent and independent variables ($\beta = -0.033$, $t = -3.138$, $p = 0.002$). The observed independent variable explained 1.4% of the dependent variable, $r^2 = 0.014$. The negative coefficient of the independent variable indicated regressive assessment inequity. Similarly, the IAAO 1978 test had revealed a statistically significant relationship between the assessment ratio and the sale price ($\beta = -1.939E-7$, $t = -7.502$, $p = 0.00$). The observed sale price explained 7.6% of the assessment ratio, $r^2 = 0.076$. The negative coefficient of the sale price indicated regressive assessment inequity. Therefore, both tests had ascertained the regressive assessment bias in the valuation list.

Results on the horizontal equity test

In order to test the existence of horizontal inequity, the research had engaged the Mann-Whitney on the type of properties as it is often used as a factor in the past researches. The ‘property type’ has two groups to be observed; strata- and landed-properties. There are three categories of price segregation for the horizontal equity test which of ‘RM0-RM180,000’, ‘RM180,000-RM400,000’ and ‘RM400,001 and above’.

Table 8: Results of Mann-Whitney test for property type

Statistic	RM0 - RM180,000 (n =228)	RM180,001 – RM400,000 (n=338)	RM400,000 and above (n=116)
U-statistic	7,936.500	5,899.500	35.000
z-value	5.012	2.820	-2.339
p-value	0.000**	0.005**	0.012*

*significant at confidence level 95%

** significant at confidence level 99%

Source: Author

The Mann-Whitney test, as shown in Table 8, had resulted in a significant difference in the assessment ratio between the strata- and landed-type properties for all observed price categories.

Results within the price range ‘RM0-RM180,000’ revealed a statistically significant difference in strata-type properties (Median = 0.577, n = 72) and landed-type properties (Median = 0.707, n = 156), U = 7,936.500, z = 5.012, p-value = 0.000. As for the ‘RM180,000-RM400,000’ price range, the Mann-Whitney test revealed a statistically significant difference in apartment-type properties (Median = 0.583, n = 29) and landed-type properties (Median = 0.615, n = 309), U = 5,899.500, z = 2.820, p-value = 0.005. Lastly, the results within the price category of ‘RM400,001 and above’ revealed a significant difference in apartment-type properties (Median = 0.725, n = 3) and landed-type properties (Median = 0.552, n = 113), U = 35.000, z = -2.399, p-value = 0.012.

In conclusion, the Mann-Whitney test had ascertained the existence of horizontal assessment inequity in the valuation list. For this context, the research suggested there is an assessment bias between strata- and landed properties.

CONCLUSION

The ratio studies had revealed an intolerance assessment level for the residential properties in the valuation list of Hang Tuah Jaya Municipality. The overall ratio is lower than the suggested minimum level of IAAO (2013) and indicating that the Hang Tuah Jaya Municipality under-assessed its taxable residential properties at 60.4 percentage of the market value during the fiscal year of 2007.

Meanwhile, the results of the assessment uniformity are mixed yet the COD, as the main indicator for ratio studies, suggesting a systematic variation of assessment ratio amongst the residential properties in Hang Tuah Jaya Municipality in the fiscal year of 2017. Nevertheless, the horizontal equity test by employing the Mann-Whitney test between strata- and landed-properties in three price range categories had revealed the existence of horizontal inequity.

Further, the results suggested that the horizontal inequity had over-assessed the strata-properties while under-assessed the landed-properties.

The empirical results in the assessment equity test together with the vertical equity tests had ascertained the existence of a regressive assessment bias in the valuation list. In the fiscal year of 2017, residential properties in Hang Tuah Jaya Municipality experienced an assessment bias that was favourable to the higher-value properties.

The existence of assessment bias in a recently established valuation list (less than the five years age maturity) is alarming as the Local Government Act 1971 coerces the revaluation of the valuation list when the latter only reach five years old. With majority of the Malaysian local governments are currently experiencing the revaluation lapse; they are highly susceptible to assessment bias and more severe than Hang Tuah Jaya Municipality was experiencing. Therefore, it is imperative for the Malaysian local governments to evaluate the performance of their property tax assessment and conduct the revaluation of the valuation list if they are signalling assessment bias.

ACKNOWLEDGEMENTS

The authors would like to thank the Municipal of Hang Tuah Jaya, Melaka for their high cooperation and assistance during the cross-observation of NAPIC's data upon their respective valuation list.

REFERENCES

- Amos, D. (2019). A review of facilities management performance measurement. *Property Management*, 37(4), 490-511. doi: 10.1108/PM-08-2018-0051
- Almy, R., Dornfest, A., & Kenyon, D. (2008). Fundamentals of tax policy
- Birch, J. W., Sunderman, M. A., & Radetskiy, E. (2017). Reducing Vertical and Horizontal Inequity in Property Tax Assessments. *Journal of Property Tax Assessment & Administration*, 14(2), 73-83.
- Board of Valuers, A., Estate Agents and Property Managers. (2019). Malaysian Valuation Standards Sixth Edition. Malaysia. Cheng, P. L. (1970). The Common Level of Assessment in Property Taxation. *National Tax Journal*, 23(1), 50-65.
- Cornia, G. C., & Slade, B. A. (2006). Horizontal Inequity in the Property Taxation of Apartment, Industrial, Office and Retail Properties. *National Tax Journal*, 59(1), 33-55.
- De Cesare, C. M., & Ruddock, L. (1998). A new approach to the analysis of assessment equity. *Assessment Journal*, 5(4), 57-69.

- Denne, R. C. (2011). The PRB and other potential successors to the flawed PRD as a measure of vertical assessment inequity. *Fair & Equitable*, 9, 3-11.
- Fleissig, A. R. (2018). Who benefits most from property assessment taxes? Evidence from Los Angeles County. *Applied Economics Letters*, 25(20), 1471-1474. doi: 10.1080/13504851.2018.1430312
- Gludemans, R. J. (2011). The coefficient of price-related bias: A measure of vertical equity. *Fair & Equitable*, 9, 3-8.
- Gludemans, R. J., & Almy, R. (2011). *Fundamentals of mass appraisal*. Kansas City: IAAO.
- Hodge, T. R., McMillen, D. P., Sands, G., & Skidmore, M. (2017). Assessment Inequity in a Declining Housing Market: The Case of Detroit. *Real Estate Economics*, 45(2), 237-258. doi: 10.1111/1540-6229.12126IAAO. (2010). *Standard on property tax policy*. Kansas City: IAAO.
- IAAO. (2010a). *Standard on property tax policy*. Kansas City: IAAO.
- IAAO. (2010b). *Standard on verification and adjustment of sales*. Kansas City: IAAO.
- IAAO. (2013). *Standard on ratio studies*. Kansas City: IAAO.
- McMillen, D., & Singh, R. (2020). Assessment Regressivity and Property Taxation. *Journal of Real Estate Finance and Economics*, 60(1-2), 155-169. doi: 10.1007/s11146-019-09715-x
- McMillen, D. P. (2011). Assessment regressivity: a tale of two Illinois counties. *Land Lines*, 23, 9-15. Mikesell, J. L. (1980). Property-Tax Reassessment Cycles - Significance for Uniformity and Effective Rates. *Public Finance Quarterly*, 8(1), 23-37. DOI: 10.1177/109114218000800102
- Paglin, M., & Fogarty, M. (1972). Equity and The Property Tax: A New Conceptual Focus. *National Tax Journal*, 25(4), 557-565.
- Sirmans, G. S., Diskin, B. A., & Friday, H. S. (1995). Vertical Inequity in The Taxation of Real Property. *National Tax Journal*, 48(1), 71-84.

Received: 19th December 2022. Accepted: 19th June 2023