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Measuring Tom and Tol Elasticity in Forced Sales Auctions: Lessons Learned from Indonesia

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Abstract: While many studies have explored the relationship between time-on-the-market (TOM) and price, few have looked at time-on-the-liquidation (TOL). This study measures TOM and TOL elasticity in real estate auctions, analyzing data from 12 State Assets and Auction Service Offices between 2021 and mid-2023 using convenience sampling. The results show TOM elasticity for forced sales is elt=1, while TOL elasticity is elt=0. TOM elasticity responds to price changes, but TOL does not. Lower auction prices affect TOM elasticity, but not TOL. To make TOL elasticity dynamic, regulatory changes allowing for flexible TOL could be introduced.

Keywords: Time-on-the-market (TOM) elasticity, time-on-the-liquidation (TOL) elasticity, real estate, auctions, foreclosure.

INTRODUCTION

One of the main uses of real estate is as a place to live. The Real estate sector makes a substantial economic contribution to a nation (Wickramaarachchi et al., 2021). Due to the high price of real estate, most people find it difficult to make a cash home purchase (Jandásková et al., 2020). Thus, bank loans are used for the majority of real estate transactions. On the other hand, people who have limited purchasing power can use the auction mechanism to buy real estate. Auction mechanisms are one of the mechanisms other than direct sales (Hungria-Gunnelin et al., 2020). The majority of buyers think that prices are lower when using an auction mechanism (He et al., 2017). Mostly, the real estate that was sold at auction is real estate that becomes debt collateral and is under the bad debt category (Chen et al., 2013).

Foreclosed homes saw a lower price increase than the typical price growth of nearby properties (Pennington-Cross, 2006). The borrower is in a weak position when the real estate is sold under a mortgage. Then the borrower has the right to file a lawsuit if they feel that the auction price is unfair. In other hand, compared to market prices, auction prices are relatively cheaper, this is due to the high risks that must be borne by auction buyers such as difficulty

emptying if the house is in an inhabited condition and does not want to leave voluntarily, potential lawsuit from creditors, because the auction price is considered too cheap (Kuo et al., 2023). The difference in interest between creditors, debtors, and auction buyers on the auction price often creates legal problems after the auction.

The liquidation value of assets is necessary in determining the asset's price in an auction. The amount of liquidation value is influenced by the amount of remaining debt and the results of debt renegotiation (Paliński, 2018). If the company experiences financial difficulties, it will reduce the value of asset liquidation (Boccaletti, 2021). In Italy, the liquidation value is set at 80% of the market value of the real estate (including legal risks). (Pelizza & Schenk-Hoppé, 2020). A creditor that has an unsecured debt contract is entitled to a portion of the liquidation value of only the bankrupt firm's assets that were not used as collateral with other creditors (Jindal, 2020).

The differences between normal sales and auction sales are that in the normal sales mechanism, the seller determines the list price as the highest price, while in the auction sale mechanism, the seller determines the bid price as the lowest price (Hungria-Gunnelin et al., 2020). The correlation between the ratio of list price and auction price with overpricing is positive, but negative to TOM (Time-on-the-market) (Jandásková et al., 2020). TOM has been one of the attributes taken into account in housing studies along with other variables. The real estate auction mechanism in Indonesia adopts a fixed TOM system of 30 days. Price and TOM have an impact on home sales, including auctions (Hayunga & Pace, 2019a; Wickramaarachchi et al., 2021). According to Björklund et al. (2006), TOM is influenced by the quality of the real estate being auctioned; the higher the quality of the real estate auctioned, the smaller the TOM. On the other hand, if the quality is lower, it will increase the TOM.

Overpricing in a buyer's market will hurt the seller financially. The consequences of overpricing are widely studied in the literature. The effects of overpricing on TOM are dynamic, and they change over time. The market conditions, the supply of alternatives, and the search cost for potential buyers affect the degree of impact that overpricing has on TOM (Nikiforou et al., 2022). A very high list price relative to observable characteristics (known in the literature as a higher degree of overpricing) discourages buyers from further investigating the real estate (Guren, 2018). The DOP is measured as the percentage deviation from a typical list price given the observable characteristics of the house(Montalvo & Raya, 2023). When housing specifications exhibit inverse relations between prices and TOM, researchers often cite the theoretical model of Taylor (1999) and attribute the negative parameter estimates to overpricing or a structural defect. Severe overpricing, therefore, is a possible omitted variable that leads to a unique market outcome at the upper end of the TOM distribution. Severe overpricing and quality can be thought of as omitted variables in price models. At times, the literature attributes an inverse correlation between prices and TOM to severe overpricing, such as in Knight (2002).

METHODS

The definition of liquidation value, according to International Valuation Standards (2017), is the amount of money that will be realized when an asset or group of assets is sold in pieces. "Liquidation Value is the amount that would be realized when an asset or group of assets is sold on a piecemeal basis. Liquidation Value can be determined under two different premises of value: (a) an orderly transaction with a typical marketing period, or (b) a forced transaction with a shortened marketing period."

In the context of asset valuation, there are various values that are used to describe the price that an item can achieve in different situations. The four values that are often used in the process of selling or auctioning assets are liquidation value, auction list price, market value, and auction price, which reflect differences in urgency, process, and existing market dynamics.

The liquidation value is usually applied in urgent circumstances, while the market value reflects a stable and realistic price in more organized market conditions. The auction list price acts as a safeguard for the seller so that the auctioned item does not fall at too low a price, while the auction price is the result of dynamic interaction between the seller and the buyer in the auction process. By understanding these four values, the parties involved in the transaction or auction can make more informed decisions about the expected price of the sale of the item. The following is data on several auction transactions that illustrate the types of auction values and prices.

The auction in Indonesia uses the second method, namely forced sales with a shortened marketing period of 30 days from the time it is offered. Given that the auction sale carried out is a forced sale with a shortened period, the appraiser, in drafting an opinion, the liquidation value should be lower than the market value (Campbell et al., 2011; Michaletz & Artemenkov, 2018). This is because the auction sale period is shorter than the market sale period. For more details, see the following Chart 1:

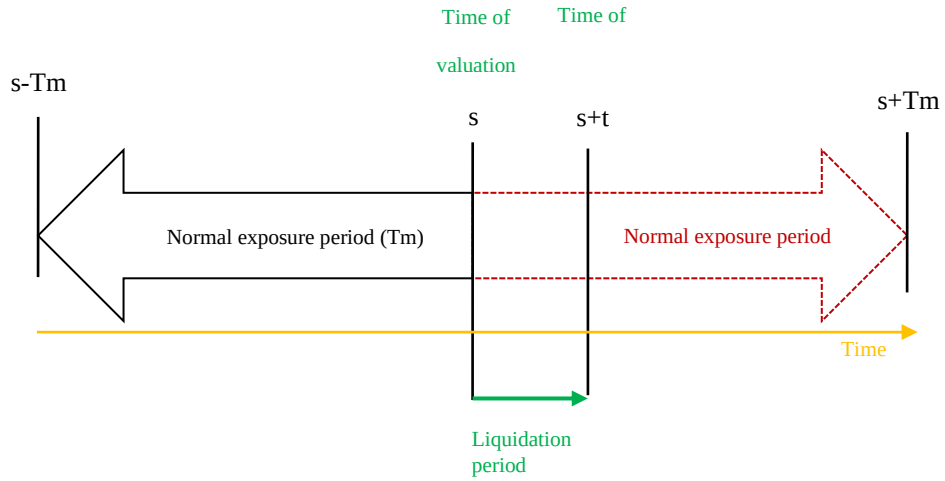


Chart 1. Comparison of bidding timeframes (market and auction)
Source: Adapted from (Michaletz & Artemenkov, 2018)

If we want to sell real estate based on market prices, then it takes a relatively long time (Tm). If we intend to sell the real estate in a relatively short period of time (t < Tm), then the seller must be willing to reduce the auction price so that it can attract the market (Campbell et al., 2011). The next step is how to determine the magnitude of the price decline so as to form a liquidation value. The seller can sell the real estate at a price below Vs+Tm. The proceeds of the sale will be invested until the normal time of market sale (Tm). So if it is made in the following equation:

$$\text{Market value} = \text{liquidation value} + \text{Yield}, \quad (1)$$

or:

$$MV = LV + \Delta (r, T\Delta) , \quad (2)$$

Where:
MV : market value
LV : liquidation value
Δ(r, TΔ) : Yield

The amount of yield Δ(r, TΔ) can be calculated using the following compounded value formula:

$$\Delta (r, T\Delta) = LV * ((\mathbf{1} + \frac{r}{m})^{T\Delta * m} - 1), \quad (3)$$

Where:
r : real estate discount rate
m : Period discount
If it is substituted, then it becomes:

$$MV = LV * (\mathbf{1} + \frac{r}{m})^{T\Delta * m}, \quad (4)$$

So that the amount of liquidation value is as follows:

$$LV = Vms+Tm * \frac{1}{(1+\frac{r}{m})^{T\Delta * m}}, \quad (5)$$

Or in other words:

$$LV = Vms+Tm * LDA, \quad (6)$$

Where:
LDA : liquidation discount adjustment

So from the supply/seller side, it can be concluded that the factors that affect the deviation between the liquidation value and the market value are determined by various factors, including:

MV : Market value of real estate
r : Real estate discount rate
t : Liquidation period
Tm : Market period

RESULTS AND DISCUSSION

Descriptive Analysis

To provide an overview of the data population in 12 KPKNL (State Assets and Auction Service Office), we present data on the number of auction minutes of Hak Tanggungan (one kind of forced sales) as follows:

Table 2. The Total of Hak Tanggungan Auction Prices

(billions)

No.	KPKNL	2021	2022	Semester I of 2023	Total
1	Jakarta I	181,37	129,10	157,75	468,22
2	Jakarta II	71,15	165,62	n/a	236,78
3	Jakarta III	373,94	572,07	480,45	1,426,47
4	Jakarta IV	84,51	34,34	34,62	153,49
5	Jakarta V	551,88	360,52	42,19	954,60
6	Tangerang II	75,83	125,07	139,16	340,07
7	Bogor	228,07	67,24	606,63	901,95
8	Bekasi	n/a	179,16	95,48	274,65
9	Medan	n/a	57,27	31,95	89,23

10	Semarang	113,94	212,76	147,75	474,46
11	Surabaya	164,28	223,84	709,84	1.097,97
12	Sidoarjo	79,94	150,42	155,14	385,51

Source: Directorate General of State Assets Management (DGSAM)

Until the first semester of 2023, KPKNL Jakarta III has had the highest number of Hak Tanggungan auction prices. In Table 3, the auction price (AP) is the price formed in the bidding process by the auction participant. The auction bid starts from the list price (LP) set by the seller. To be able to set the auction list price, the seller can propose an appraisal request to a public or internal appraiser. The appraiser then provides an opinion of the market value (MV) and the liquidation value (LV). The liquidation value is the lowest limit in determining the limit value

Table 3. Auction Value and Price Basis

(IDR)

No.	Liquidation Value/LV	List price/LP	Market Value/MV	Auction Price/AP
1	2,472,000,000	2,500,000,000	3,803,000,000	2,705,000,000
2	48,754,875,950	48,754,875,950	88,645,229,000	48,754,875,950
3	717,000,000	775,000,000	1,103,000,000	780,000,000
4	1,783,000,000	2,000,000,000	2,547,000,000	2,000,000,000
5	2,487,600,000	2,525,000,000	3,553,700,000	2,901,500,000
6	1,006,656,000	1,500,000,000	1,677,760,000	1,500,000,000
7	1,006,600,000	1,010,000,000	1,830,200,000	1,010,000,000
8	9,521,000,000	10,000,000,000	19,041,000,000	10,001,500,000
9	1,977,900,000	2,000,000,000	3,420,000,000	2,001,000,000
10	722,100,000	830,000,000	1,031,600,000	830,000,000

Source: Directorate General of State Assets Management (DGSAM)

For illustration, we examine the first set of data in Table 3. With a list price of IDR 2,500,000,000, an auction price of IDR 2,705,000,000, and a liquidation value of IDR 2,472,000,000, the auction price is more than the liquidation value and auction limit but still less than the market value of IDR 3,803,000,000. In contrast, the auction price for some other real estates, like number two, is IDR 48,754,875,950, which is the same as the auction list price. This means that the real estates was successfully sold at the lowest possible price. On the other hand, depending on the participant's level of interest, the auction price may be significantly higher or lower than the market value in other situations..

Overall, the information in Table 3 shows how the auction market works and how liquidation values, list prices, auction prices, and market values are different in real-world situations. An overview of the ways in which internal and external real estate elements impact real estate values is also given.

TOM elasticity of real estate based on market time

Based on market time, the TOM elasticity of real estate is computed. Formula 10 by Michaletz and Artemenkov (2018) can be used to illustrate how market time affects time elasticity. It states that market value, liquidation time, market time, and TOM elasticity are the four variables that affect the liquidation value.

$$VL = VM \text{ x } \left[\frac{t}{TM}\right]^{\frac{1}{TOM\ elt}}, \quad (7)$$

Where:

LV : liquidation value

MV : market value

t : liquidation time
TM : market time
TOM elt : TOM elasticity

With a liquidation time of t=30 and one of the data sets displayed in Table 3's initial data set, the calculation equation is as follows:

$$2{,}705{,}000{,}000 = 3{,}803{,}000{,}000\ x\ \left[\frac{30}{\mathrm{TM}}\right]^{\frac{1}{\mathrm{TOM\ elt}}}$$

$$\frac{2{,}705{,}000{,}000}{3{,}803{,}000{,}000} = \left[\frac{30}{\mathrm{TM}}\right]^{\frac{1}{\mathrm{TOM\ elt}}}$$

$$\sqrt[\frac{1}{\mathrm{TOM\ elt}}]{\frac{2{,}705{,}000{,}000}{3{,}803{,}000{,}000}} = \left[\frac{30}{\mathrm{TM}}\right]$$

$$\mathrm{TM} = \frac{30}{\left[\frac{2{,}705{,}000{,}000}{3{,}803{,}000{,}000}\right]^{\mathrm{TOM\ elt}}}, \qquad (8)$$

The equation above indicates that market time and TOM elasticity are directly associated or have an impact on one another. Equation 7 of Michaletz & Artemenkov (2018) can be used to express elasticity, which is also defined as the percentage change in price relative to the percentage change in time.

$$\mathrm{TOM\ elt} = \frac{\frac{\mathrm{t-Tm}}{\left[\frac{(\mathrm{t+Tm})}{2}\right]}}{\frac{\mathrm{Vt-Vm}}{\left[\frac{(\mathrm{Vt+Vm})}{2}\right]}}, \qquad (8)$$

Thus, if the information is entered as shown in Table 3, the following outcomes are attained:

$$\mathrm{TOM\ elt} = \frac{\frac{30-\mathrm{Tm}}{\left[\frac{(30+\mathrm{Tm})}{2}\right]}}{\frac{2{,}705{,}000{,}000-3{,}803{,}000{,}000}{\left[\frac{(2{,}705{,}000{,}000+3{,}803{,}000{,}000)}{2}\right]}}$$

Additionally, market time cannot be calculated, as shown by equation 8 above. Therefore, we will employ the trial-and-error method to determine a specific TOM elt in order to address this problem. The TOM elt value is 1.181, for example, when we discover that the equation's TM value is 40. Upon adding the TOM elasticity value to the computation, the TM value comes to 44.8603. Nevertheless, the operation is repeated until the TM value is the same because there is still a 4.8603 disparity. The data analysis results show that TOM elt=1 is the optimal value of TM. In other words, the value of TM is at its ideal when TOM elt=1. Therefore,

$$\mathrm{TM} = \frac{\mathrm{t}}{\left[\frac{\mathrm{VL}}{\mathrm{VM}}\right]^{\mathrm{TOM\ Elt}}}$$

$$\mathrm{TM} = \frac{\mathrm{t}}{\left[\frac{\mathrm{VL}}{\mathrm{VM}}\right]}$$

$$\mathrm{TM} = \frac{30}{\left[\frac{2{,}705{,}000{,}000}{3{,}803{,}000{,}000}\right]}$$

$$\mathrm{TM} = 42.1774$$

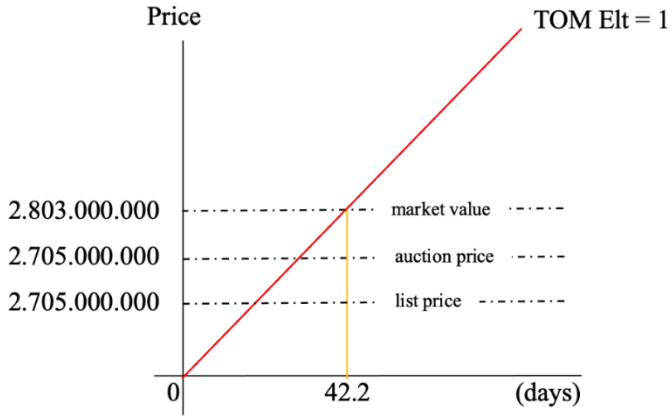
The computation indicates that we can sell the property for the best market value in about 42 days. The value of each TM can be determined using the same computation. Table 4 displays a few of the calculation's outcomes:

Table 4. Market Time and Time Elasticity Calculation

No.	Liquidation Value/V_L (IDR)	Auction price/P_A (IDR)	Market value /V_M (IDR)	Liquidation time/t (days)	Market time/T_M (days)	Time on the market elasticity (TOM Elt)
1	2,472,000,000	2,705,000,000	3,803,000,000	30	42.1774	1
2	48,754,875,950	48,754,875,950	88,645,229,000	30	54.5454	1
3	717,000,000	780,000,000	1,103,000,000	30	42.4230	1
4	1,783,000,000	2,000,000,000	2,547,000,000	30	38.2050	1
5	2,487,600,000	2,901,500,000	3,553,700,000	30	36.7434	1
6	1,006,656,000	1,500,000,000	1,677,760,000	30	33.5553	1
7	1,006,600,000	1,010,000,000	1,830,200,000	30	54.3624	1
8	9,521,000,000	10,001,500,000	19,041,000,000	30	57.1143	1
9	1,977,900,000	2,001,000,000	3,420,000,000	30	51.2742	1
10	722,100,000	830,000,000	1,031,600,000	30	37.2871	1

Source: Processed by the author (2023)

Based on the ten samples above, we may infer that the market time ranges from 33 days to 57 days. The shorter the market period, the more interested the participants are, and vice versa. The quality of real estate and external factors like the status of the economy both have an impact on one of the participants' strong interest in real estate. The following is the graph that results from compiling the first data in Table 4.



Furthermore, using the data from Table 2, this computation is performed on all data in 12 KPKNL. After computation and analysis, the calculation's summary is shown in Table 5.

Table 5. Market Time Percentage

No	T_M	Percentage
1.	30	7.28 %
2.	31 - 35	11.85 %
3.	36 - 40	16.71 %
4.	41 - 45	29.85 %
5.	46 - 50	20.31 %
6.	51 - 55	6.57 %
7.	56 - 60	3.99 %

8.	61 - 65	0.98 %
9.	66 - 70	0.12 %
10.	71 - 75	0.35 %
11.	76 - 80	0.04 %
12.	81 - 85	0.16 %
13.	86 above	0.31 %

Source: Processed by the author (2023)

Most of the market time is in the range of T_M=41 – 45, T_M=46 – 50, and T_M=36 – 40. Surprisingly, there are 7.28% of market time equal to liquidation time or market value equal to liquidation value. However, according to Hayunga and Pace (2019b), the length of traditional market time sales (week on market) is between 10 and 19 weeks or approximately 70 to 133 days. Therefore, if we compare the market time in auctions and traditional sales, the traditional sales are relatively longer than auctions. The magnitude of market time is dynamic and is influenced by the quality of real estate and external factors such as economic conditions.

TOL elasticity of real estate

The real estate TOL elasticity is computed using the liquidation time. According to formula 10 by Michaletz & Artemenkov (2018), the calculation equation for TOL elasticity is as follows if we use one of the data items, such as list price = 2,500,000,000, auction price = 2,705,000,000, liquidation time t = 30, and market time Tm = 30, as shown in Table 3.

$$LP = AP * \left[\frac{30}{30}\right]^{\frac{1}{Elt}}$$

$$2{,}500{,}000{,}000 = 2{,}705{,}000{,}000 * \left[\frac{30}{30}\right]^{\frac{1}{Elt}}$$

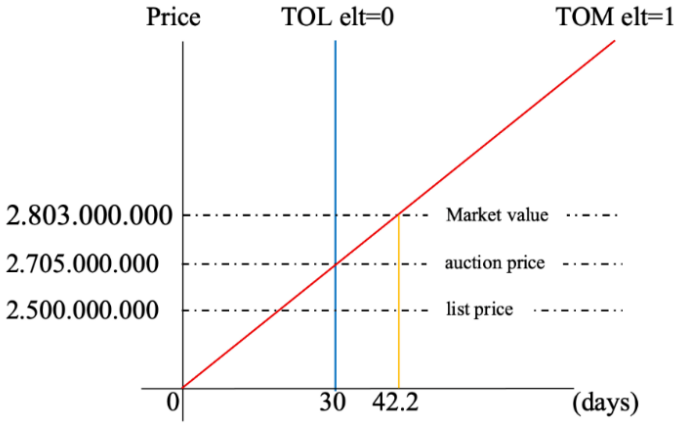
$$\frac{2{,}500{,}000{,}000}{2{,}705{,}000{,}000} = \left[\frac{30}{30}\right]^{\frac{1}{Elt}}$$

$$\sqrt[\frac{1}{Elt}]{\frac{2{,}500{,}000{,}000}{2{,}705{,}000{,}000}} = \left[\frac{30}{30}\right]$$

$$\left[\frac{2{,}500{,}000{,}000}{2{,}705{,}000{,}000}\right]^{Elt} = \left[\frac{30}{30}\right]$$

$$Elt = 0$$

if it were created as a graphic:



Due to the auction TOL elasticity value is equal to elt = 0, which indicates that the auction price are IDR 2,705,000,000, and TOL = 30 days. The difference between the auction price and the market price is IDR 98,000,000 (IDR 2,803,000,000 – IDR 2,705,000,000) or 3.6%. And if the market time is increase to 12.2 days. (42.2 – 30), there is a chance for the real estate reach the market price IDR 2,803,000,000.

CONCLUSION

Real estate elasticity based on market time (TOM elasticity) generates optimal elasticity at elt=1, while real estate elasticity based on liquidation time (TOL elasticity) generates elasticity at elt=0. The elasticity of auction properties is based on liquidation time. So, the elasticity of auction real estate is equal to elt=0, it is because the liquidation time is fixed, which is 30 days. Changes in the elasticity of auction properties can be made by changing the auction policy from fixed time to market time. Lower prices in the auction will not change its elasticity, but will affect the number of participants.

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