THE ROLE OF LISTING PRICE STRATEGIES ON THE PROBABILITY OF SALE OF A HOUSE: EVIDENCE FROM VIETNAM

1

Abstract

The aim of this paper is to measure the dynamic effects of listing price strategies and housing features on the probability of sale of a house based on listing periods. We applied the Cox Probability Hazard Model for listing time in 1 month, 3 months, 6 months and 9 months of 448 transactions from the housing survey conducted in Ho Chi Minh City from September 2017 to May 2018.

We find that the overprice listing strategy has significant impact on the probability of sale in the first 30 days of listing time. The effect decreases and becomes ineffective when the listing duration exceeds 180 days. This shows that the first 30 listing days are very important and housing liquidity is affected strongly by selling strategies of seller. If the time on market is over 30 days, the power of sellers on housing liquidity will be restricted.

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Introductution

Housing is heterogeneous and is the most valuable asset for households so determining the price of housing has once made a difficult problem for sellers.

Nowadays, broker websites can provide tools to help the seller determine the market price. Therefore, price decisions are no longer a problem for sellers (BHUIYAN, HASAN 2016).

Identifying factors that affect the liquidity of the house is very helpful for sellers to determine what they can do to help speed up the process of selling the house (BHUIYAN, HASAN 2016)

In which, the strategy of listing price of the seller is one of the factors that are focus (JOHNSON et al. 2008; SMITH 2010; SIRMAN et al. 2015)

The impact of the listing price strategy and housing characteristics on the probability of sale of house will not be fixed, the levels of these impacts will be varied with duration on market of the house.

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Literature review – impact of price strategies on probability of sale for house

The impact of price strategies on probability of sale for house is often measured through a two-stage method (KLUGER, MILLER 1990; KRAINER 1999; JOHNSON et. al. 2008; SMITH 2010; HUI et.al. 2012; CIRMAN et.al. 2015)

In the first stage, Hedonic model was applied to estimate **expected market price** or **expected listing price** of a house

HUI et. al. (2012): the difference of actual listing price and expected market price as proxy for seller's listing strategy.

The ratio of the difference of actual listing price and expected listing price, a proxy for motivation of seller (JOHNSON et. al. 2008, CIRMAN et.al. 2015). The larger difference ratio has lower sell motivation (AMGLIN et.al. 2003)

The atypicality of a house is measured by the sum of the absolute deviation of the house's features from the sample means of the characteristics (KRAINER 1999)

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Literature review – impact of price strategies on probability of sale for house

In the second stage, Cox proportional hazard model (KLUGER, MILLER 1990; KRAINER 1999; SMITH 2010; HUI et.al. 2012; CIRMAN et.al. 2015) or Probit model (JOHNSON et. al. 2008) was used to measure the effect of these factors on the probability of sale for the house.

In general, they confirm the higher in price difference (HUI et. al. 2012), the higher in house a typicality (KRAINER 1999), or the lower in seller's motivation (JOHNSON et. al. 2008; CIRMAN et. al. 2015) will leads to the lower probability of sale.

The effect of overpricing strategy on selling probability of house has been found to have a changing from negative to positive between sub-periods when the house market become shorten in supply of house (HUI et. al. 2012, pp. 391).

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Research Methodology

The paper applies an approach based on 2 phases

Phase 1: Estimating the market expectation price of the house being sold using the hedonic price model to determine the seller's listing price strategy applied to the house for sale on market.

The study will estimate the market's expected price from the actual selling price: $E\left(Ln\left(P_j^S\right)\middle|S_j, L_j, N_j\right) = \alpha S_j + \beta L_j + \theta N_j + \varepsilon_j$

In which: P^S is the value of the actual selling price of the house j; S_j is the vector of structural characteristics of the house j; L_j is the vector of characteristics of location and accessibility of the house j; and N_j is a set of characteristics that belong to the area around the house j.

Then, this estimated market expectation price will be compared to the selling price to determine the seller's listing price strategy:

$$DOP = Ln\left[\frac{P_j^L}{E\left(P_j^S\right)}\right] = Ln\left(P^L\right) - E\left[Ln(P^S)\middle|S_j, L_j, N_j\right]$$

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Research Methodology

Phase 2: Measuring the impact of a listing price strategy of seller [DOP] and other characteristics of a house on the house's probability to successfully trade corresponding with 30-day of listing period, 90-day of listing period, 180-day and 270-day of listing periods.

In order to measure the dynamic of these effect over time, the paper estimates the Cox probability Hazard Model with the 30-day, 90-day, 180-day and 270-day timelines and compares the change of HR index between Cox model

Dependent variables for Cox models as the time on market of house (TOM) with the censorship conditions corresponding to the timeline to consider. If the house has a shorter selling time than the timeline considered, the censor variable will receive values of 1 and 0 for the opposite case.

With 4 different sale timelines (30 days, 90 days, 180 days and 270 days), we have four corresponding censor variables: Onemonth, Threemonth, Sixmonth, and Ninemonth.

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Data source

Data used in this study were collected through a survey of 460 single houses transacted in the seconrdary housing market in Ho Chi Minh City from September 2017 to May 2018

Analytical units are single houses in secondary market where the sellers and buyers have relatively similar positions to ensure that the selling price of the house after negotiation is equally determined. Supporting from professional brokers help the sellers know the housing market price, therefore their listing price may reflect the listing price strategies.

After cleaning data e.g. removing outlier observations, descriptive characteristics of 448 housing transactions surveyed are presented in table 1 below.

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Data source

Variable name	Unit	Description	Mean	Std. Dev.	Min	Max
Price	Million VND	Price	7 932.45	5 777.346	900	26 600
Tom	Days	Time on market	114.38	130.143	1	884
Age	Years	Age of house	8.93	7.178	1	30
Slotarea	m^2	Slot area	71.21	36.636	25	320
Floorarea	m^2	Floor area	186.75	111.696	44	600
Shape	0 square/grew bigger 1 otherwise	shape of the land	0.82	0.387	0	1
Wide	meter	Width of house	4.49	1.436	3	12
Long	meter	Long of house	15.66	4.926	6.8	32
Nbedr	No. of rooms	Number of bedrooms	3.83	1.875	1	14
Nbathr	No. of rooms	Number of bathrooms	3.50	2.002	1	15
Sun	0 sunshine; 1 otherwise	house facing afternoon sunshine	0.36	0.481	0	1
Face	0 alley; 1 frontage	Road frontage	0.23	0.420	0	1
Dstreet	meter	Distance form road frontage	89.18	163.390	0	1 000
widestreet	meter	width of the road in front of the house	8.688	6.299	1	30
Dcbd	Kilometer	Distance to CBD	8.147	3.917	0.6	16.4
Dmarket	Kilometer	Distance to nearest market	0.886	1.192	0	12
Dsch	Kilometer	Distance to nearest school	0.774	0.655	0	5
Tcbd	Minutes	Time to CBD	22.978	10.219	1	60
Tworkpla	Minutes	Time to working place	14.384	8.005	1	40
Tmarket	Minutes	Time to nearest market	6.411	5.916	1	55
Tsch	Minutes	Time to nearest school	6.849	3.610	1	22.5
Safe	1 is worst; 7 is best	Status of safety in neighbourhood	5.830	1.214	1	7
Waste	0 no garbage collection system. 1 otherwise	Status of garbage collection in neighbourhood	0.608	0.365	0	1
Smelly	1 is worst; 7 is best	Status of smell in neighbourhood	4.683	1.948	1	7
Noisy	1 is worst; 7 is best	Status of quiet condition in neighbourhood	5.058	1.813	1	7
Flooding	0 no flooding; 1 flooding	Status of flooding in neighbourhood	0.906	0.292	0	1

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Research results

Results from 3 models above could be used to estimate expected price of house with trivial differences. The aim of this step is to estimate expected price market, therefore the model with more significance in explaining the variation of the expected price is the better one. Model 3 is chosen because R-square is highest, RMSE is lowest and limited correlation problem between features (VIF).

Using model 3, we conduct an estimate of the market's expected price of the house, and determine the list price strategy of the seller for each house as follows

$$DOP = Ln\left[\frac{P^l}{E(P^S)}\right]$$
$$= Ln(P^l) - E\left[Ln(P^S)\,\middle|\,S_j, L_j, N_j\right]$$

Variables	Model 1			Model 2			Model 3		
	Coef.	Robust Std. Err.	VIF	Coef.	Robust Std. Err.	VIF	Coef.	Robust Std. Err.	VIF
Lnage	-0.0318	0.0202	3.4	-0.0417**	0.0201	3.5	-0.0374**	0.0178	3.6
Lnfloorarea	0.1818***	0.0514	4	0.163***	0.0391	2.3	0.1522***	0.0374	2.3
Floorareasqu	1.26E-07	3.70E-07	3.7						
Lnslotarea	0.6044***	0.0741	5.1	0.6253***	0.0715	5.1	0.5297***	0.0556	2.8
Slotareasqu	-3.5E-06*	2.10E-06	2.9	-3.9E-06*	2.20E-06	2.9			
Face	0.1056*	0.0631	2.8	0.0805	0.0584	3.3			
Shape	-0.0892**	0.0348	1.2	-0.0843**	0.0334	1.2	-0.0894*	0.0346	1.2
Widestreet	0.0153***	0.0041	2.6	0.0154***	0.0037	2.8	0.018***	0.0021	1.5
Acar				0.1821**	0.0919	1.3	0.1466*	0.0834	1.3
Dstreet				-1.5E-04*	8.50E-05	1.8	-1.5E-04*	7.90E-05	1.5
Lntworkpla				-0.0509**	0.021	1.2	-0.0471**	0.0213	1.3
Lntcbd				-0.0694***	0.0247	1.8	-0.067**	0.0296	1.9
Sun				0.0672***	0.0242	1.2	0.0543**	0.024	1.3
Safe							0.0143	0.0137	1.7
Waste							0.0585	0.0447	1.2
Smelly							0.0362***	0.0094	2
Noisy							-0.0301***	0.0105	1.9
Flooding							-0.0904**	0.0425	1.3
_cons	4.8235***	0.3116		5.0776***	0.2929		5.4684***	0.2605	
District Control Dummy	Yes			Yes			Yes		
R-squared	0.8706			0.8795			0.888		
Prob(F)	0			0			0		
Root MSE	0.24958			0.24195			0.23412		
Dep. Var.	Lnprice			Lnprice			Lnprice		
N. of obs	448			448			448		

Note: *, **, *** significance at 10%, 5% and 1%.

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Research results

Comparing HR coefficients between Cox Probability Hazard Models with the 30-day, 90-day, 180-day, and 270-day timeline, we find that the over-price listing strategy has positively significant impact on the probability of sale for house.

Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
Lnfloorarea	1.1729	0.2920	1.0558	0.1674	1.2012	0.1732	1.1731	0.1604
Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
lntcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
lntworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	

Note: *, **, *** significance at 10%, 5% and 1%.

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Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

This finding is counterintuitive, but consistent with the results of several studies (CUBBINS 1974; KLUGER, MILLER 1990; HUI et. al. 2012). In growing period of the housing secondary market in Ho Chi Minh city from September 2017 to May 2018, when a seller suggests low listing price strategy, it may create a strong signal for buyers about the poor housing quality then making the probability of sale decreases (CUBBINS 1974, p.186).

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
Lnfloorarea	1.1729	0.2920	1.0558	0.1674	1.2012	0.1732	1.1731	0.1604
Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
lntcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
lntworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	

Note: *, **, *** significance at 10%, 5% and 1%.

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Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

The effect is highest in the first 30 days of listing period, with the possibility of a 1.23% increase in the house's probability to sell for every 1% overprice listing. After that, this impact of the listing price strategy tends to decrease over the listing period.

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
Lnfloorarea	1.1729	0.2920	1.0558	0.1674	1.2012	0.1732	1.1731	0.1604
Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
lntcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
lntworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	
Note: *, **, *** significance at 10%, 5% and 1%.								

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Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

From 30-90 days, each percent adding of overprice listing strategy now can only increase 0.68% of the house's probability of sell, nearly half of its impact when a new home starts selling. If exceeds 180 days, the overprice listing strategy is insignificantly correlated to the probability of sale for house. The time on market of this house, in this case, would become a stigma signal about a "quality problem" of the house so overprice listing strategy becomes ineffective (TAYLOR 1999).

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
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Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
lntcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
lntworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	
Note: *, **, *** significance at 10%, 5% and 1%.								

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Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

House buyers prefer houses with smaller campus areas. every 1 m^2 increase in the campus area will reduce the sale probability of the house by 0.94%. However, after the first 30 days of listing period, the effect of size factor become weaker, with around 0.56% increasing in sale probability. A small-sized house is always preferred by buyers, so a small-sized house with long listing time means a invisible problem of the house.

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
Lnfloorarea	1.1729	0.2920	1.0558	0.1674	1.2012	0.1732	1.1731	0.1604
Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
Intcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
Intworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	

Note: *, **, *** significance at 10%, 5% and 1%.

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Cox Hazard model with the 30-day, 90-day, 180-day, and 270-day timelines

Car-accessible characteristics (ACAR) is a very attractive feature and therefore have a strong impact on the probability of sale for the house in the first 30 days of listing time, after that, this feature no longer works. The cause of this phenomenon may be due to differences in buying behavior between two different buyer groups. Buyers with abundant financial capacity, who are attracted by the car-accessibility, have a short search process and low buying threshold due to high search costs, so houses traded by these buyers will have a short listing time.

	30-day Cox model		90-day Cox model		180-day Cox model		270-day Cox model	
	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.	Haz. Ratio	Robust Std. Err.
DOP	2.2314*	1.0576	1.6813*	0.5130	1.5674*	0.4302	1.3642	0.3464
Age	1.0106	0.0175	1.0109	0.0111	1.0246***	0.0096	1.0261***	0.0095
Lnfloorarea	1.1729	0.2920	1.0558	0.1674	1.2012	0.1732	1.1731	0.1604
Lnslotarea	0.3357***	0.1258	0.6281**	0.1460	0.5962**	0.1253	0.5904**	0.1244
Widestreet	0.9828	0.0211	1.0024	0.0118	0.9912	0.0110	0.9949	0.0097
acar	3.3272*	2.3631	0.8578	0.2481	0.8726	0.2255	0.9227	0.2509
dstreet	1.0007	0.0005	1.0005	0.0003	1.0000	0.0004	1.0000	0.0004
Intcbd	0.9751	0.2408	1.1696	0.1895	1.2351	0.1727	1.1076	0.1356
Intworkpla	0.9238	0.1794	0.9996	0.1174	1.1704	0.1161	1.1684	0.1136
sun	1.1828	0.2500	1.1656	0.1577	1.1052	0.1328	1.1331	0.1331
safe	1.1558*	0.0908	1.1547*	0.0642	1.1474***	0.0602	1.1355**	0.0602
waste	1.6649***	0.2788	1.7576***	0.2210	1.6948***	0.2318	1.6119***	0.2333
smelly	1.2338***	0.0976	1.1552***	0.0524	1.0824**	0.0403	1.081**	0.0398
noisy	0.8291***	0.0501	0.8406***	0.0327	0.8769***	0.0322	0.8928***	0.0333
flooding	1.1157	0.4280	0.9651	0.2166	1.0719	0.2180	1.0546	0.2199
	No. of subjects = 448		No. of subjects = 448		No. of subjects = 448		No. of subjects = 448	
	No. of failures = 108		No. of failures = 260		No. of failures = 366		No. of failures = 380	
	Time at risk = 51242		Time at risk = 51242		Time at risk = 51242		Time at risk = 51242	
	Wald chi2(15) = 58.32		Wald chi2(15) = 90.67		Wald chi2(15) = 62.03		Wald chi2(15) = 55.25	
	Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0		Prob > chi2 = 0	
	Log pseudollh= -626.75		Log pseudollh = -1470.04		Log pseudollh = -1994.22		Log pseudollh = -2057.40	

Note: *, **, *** significance at 10%, 5% and 1%.

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