Deal or No Deal? The Time-on-Market, Time-to-Close, and Residential Transaction Prices

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2024 AREUEA-ASSA conference, San Antonio

January 5, 2024

The purpose of this paper

- In contrast to other major asset classes: considerable time between buying a piece of real estate (physical asset) and legally owning it.

- This period – ***the time-to-close (TTC)*** – can easily be a couple of months (negotiable).

- The purpose of this paper is twofold:

  1. Discuss the role of *TTC* in the real estate transaction process.
     - Versus for example the time-on-market (TOM).
     - Focus on residential real estate [nice Dutch data].

  2. Examine the effect of *TTC* on transaction prices.
     - Bargaining model + hedonic regressions.

Contribution and main results

- Previous studies on TTC are virtually non-existent (but Lu Han, 2022); the literature primarely focusses on the time-on-market (TOM) (Benefield and Harding, 2015).
- Role in the transaction process? The TTC is used for the buyer to obtain a mortgage and the seller to find a new home.
- We theoretically and empirically show that a higher TTC has a positive effect on transaction prices ($\overline{TTC} = 73$ days, SD change in TTC $==>$ 2.4% higher transaction price).

  The intuition:
  - Mismatch: short term rental or double mortgage costs.
  - Foregone capital appreciation.
- Forgot TTC? Overestimation bias TOM of 6.3 percent.

Timing of events: TOM and TTC

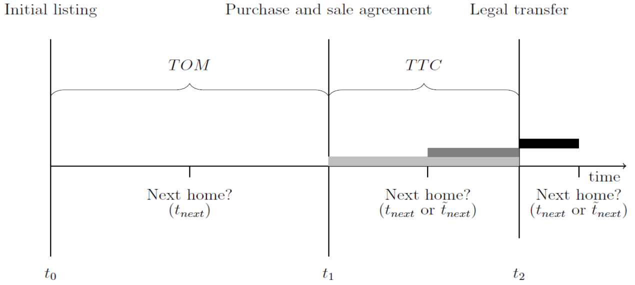


Figure 1. The transaction process: time-on-market and time-to-close.

- A seller list his house at t_0, it is purchased at t_1, and legally transferred at t_2.
- *TTC* is part of the purchase agreement at t_1, so look at the costs incurred from the perspective of t_1.
- ***3 main costs***: foregone price appreciation, double mortgage costs, short-term rental costs. Latter two depend on t_{next}.

Economic rationale I

- Succesful bid: $P = P^* + \beta C^S - (1-\beta)C^B,\ P \geq P^R$
  - P = final transaction price
  - P^* = price if $t_2 = t_1$, and proper marketing (TOM)
  - !!!C^S = **expected costs for the seller**!!!
  - $C^B = F$, expected costs for the buyer (fixed)
  - β = Nash bargaining parameter, $0 < \beta < 1$

- C^S depends on
  - $(t_2 - t_1) * g$ [price appreciation]
  - $(t_2 - t_{next}) * m$ [bridge loan]
  - $(t_{next} - t_2) * r$ [short-term rental costs]

-*Assumption A1*: *Both seller/buyer know the cost function.*

-*Assumption A2*: *Both buyer and seller are risk neutral.*

Economic rationale II

- Two cases: t_{next} is known or not, latter one economically interesting to model (matching problem). t_{next} is known $=$ corner solutions.
- $\tilde{t}_{next} \sim \exp(\lambda) = f_{\tilde{t}_{next}}(t)$
- Normalizing $t_1 = 0$, the expected cost function (C):

$$C(t_2; g, m, r, \lambda) = \underbrace{\int_0^{t_2} f_{\tilde{t}_{next}}(t)\,(gt_2 + m(t_2 - t))\,dt}_{\tilde{t}_{next} < t_2} + \underbrace{\int_{t_2}^{\infty} f_{\tilde{t}_{next}}(t)\,(gt_2 + r(t - t_2))\,dt}_{\tilde{t}_{next} > t_2} = -\frac{m}{\lambda} + (g + m)t_2 + \frac{m + r}{\lambda} e^{-\lambda t_2}. \qquad (1)$$

Economic Rationale III

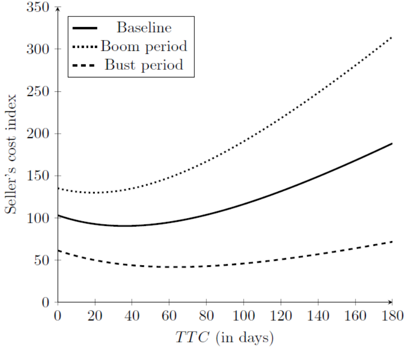


FIGURE 2 – CALIBRATED SELLER'S COST FUNCTION.

- Hypothesis 1: On average, *TTC* has a positive effect on transaction prices.
- Hypothesis 2: *TTC* has a larger effect on house prices during booms than during busts.

Those appendices that no one reads but are important

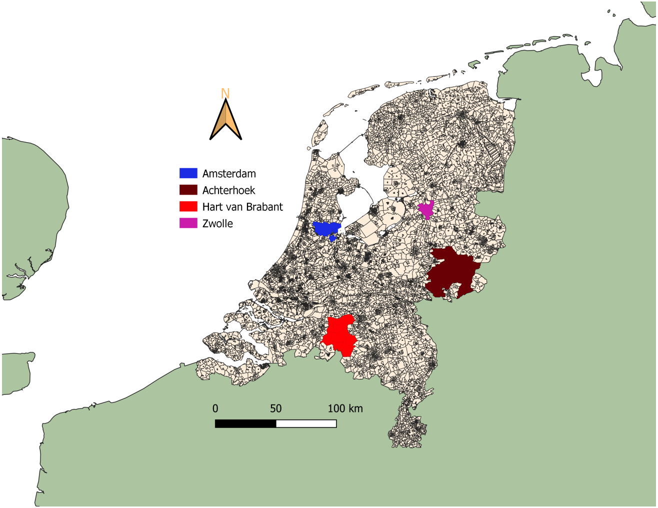
- A more formal exploration of the cost function:

Proposition

Given Assumptions 1 and 2, and $m > 0$, $r > 0$, $g > 0$, and $t_2 >> 0$, the marginal effect of TTC on the final transaction price is positive.

- What if the buyer's costs are not fixed?
  - Symmetric and non-symmetric Nash bargaining solutions.
  - Optimal TTC: lower during busts.

Data: 4 regions in the Netherlands, 2006-2016



Data: descriptive statistics

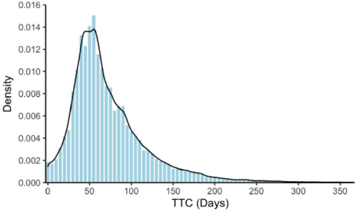
Table: Descriptive statistics

Variables	Mean	Std.Dev.	Min	Max
Dependent Variables				
P (in euros)	265,443	168,632	50,000	2,000,000
TOM (in days)	155	195	1	1,095
TTC (in days)	73	47	0	366
$TOM + TTC$ (in days)	229	200	1	1,361

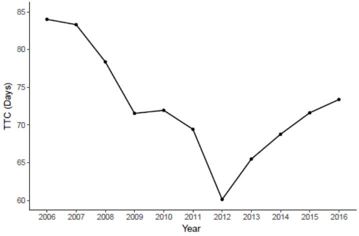
Number of observations, $N = 115,279$.

- Housing characteristics: size, plot area, construction period, house type, maintenance condition, monument, garden, parking, attic, exact location.

Data: TTC



(c) Kernel density time-to-close



(d) Time series plot time-to-close

- After controling for housing characteristics, year and location fixed effects, location-specific trends: *90 percent of the variation in TTC remains unexplained*.

Methodology

- Hedonic approach (OLS):

$$\log P_{i,t} = \beta_{ttc} \log TTC_{i,t} + \beta_{tom} \log TOM_{i,t} + x'_{i,t}\beta_X + \alpha_j + \tau_t + \varepsilon^p_{i,t}$$

- ***Spatio-temporal lagged IV (500m, 90 days):***

$$\log P_{i,t} = \beta_{ttc} \log \hat{T}TC_{i,t} + \beta_{tom} \log T\hat{O}M_{i,t} + x'_{i,t}\beta_x + \alpha_j + \tau_t + \varepsilon^p_{i,t}.$$

- Results robust to repeat sales, difference with listing price, location x year FE, different spatio-temporal lagged IV's and ... Seemingly unrelated regression (SUR):

$$\begin{bmatrix} \log P_{i,t} \\ \log TOM_{i,t} \\ \log TTC_{i,t} \end{bmatrix} = \begin{bmatrix} X_p & 0 & 0 \\ 0 & X_{tom} & 0 \\ 0 & 0 & X_{ttc} \end{bmatrix} \begin{bmatrix} \beta_p \\ \beta_{tom} \\ \beta_{ttc} \end{bmatrix} + \begin{bmatrix} \varepsilon^p_{i,t} \\ \varepsilon^{tom}_{i,t} \\ \varepsilon^{ttc}_{i,t} \end{bmatrix}.$$

Empirical results

Table: The effect of TTC on house prices (2SLS)

(Dependent variable: log house price)

	(1) 2SLS	(2) 2SLS	(3) 2SLS
log *TTC*	0.0479***		
	(0.0024)		
log *TOM*	−0.0377***	−0.0401***	
	(0.0012)	(0.0012)	
log(*TOM* + *TTC*)			−0.0382***
			(0.0019)
Housing characteristics	Yes	Yes	Yes
Fixed effects: Zip code	Yes	Yes	Yes
Fixed effects: Year_{t_1}	Yes	Yes	Yes
Observations	115,279	115,279	115,279
R^2	0.8656	0.8683	0.8675

- Hyp. 1: A SD increase in *TTC* (1.5 months) evaluated at the average *TTC* increases house prices by 2.4% (€6,400).
- SD increase in TOM: −3.0%.
- Overestimation bias TOM: 6.3 and 1.3 percent.

Heterogeneity

Table: Boom-bust and regional markets

(Dependent variable: log house price)

	Market Phases		Regional Markets			
	Bust	Boom	Achterhoek	Amsterdam	Hart van Brabant	Zwolle
	(1)	(2)	(3)	(4)	(5)	(6)
log $\hat{TOM}$	-0.0061^{***}	-0.0435^{***}	-0.0065^{***}	-0.0482^{***}	-0.0066^{***}	-0.0138^{***}
	(0.0018)	(0.0017)	(0.0020)	(0.0020)	(0.0018)	(0.0030)
log $\hat{TTC}$	0.0380^{***}	0.0653^{***}	0.0399^{***}	0.0421^{***}	0.0434^{***}	0.0272^{***}
	(0.0034)	(0.0034)	(0.0040)	(0.0037)	(0.0036)	(0.0056)
Durbin-Wu-Hausman χ^2-test	33.84^{***}	459.82^{***}	8.46^{***}	272.50^{***}	10.14^{***}	2.33^{*}
t-test on endogeneity of log TOM	-0.52	19.69^{***}	-1.26	18.74^{***}	-1.91^{*}	1.71^{*}
t-test on endogeneity of log TTC	-8.22^{***}	-19.05^{***}	-4.05^{***}	-11.49^{***}	-4.35^{***}	-1.07
Housing characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects: Zip code	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects: Year$_{t_1}$	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,456	73,823	13,703	62,559	28,449	10,568
Residual Std. Error	0.1497	0.1769	0.1517	0.1528	0.1370	0.1227
R^2	0.8852	0.8566	0.8568	0.9065	0.8821	0.8871

- Hypothesis 2: TTC effect 20% lower during busts, 35% higher during booms. Effect higher in a place like Amsterdam.

Conclusion

- ***TTC plays an important role in the transaction process of residential real estate.***
- Allows seller to find his next home and buyer to arrange financing.
- *TTC* is expected to have a positive effect on house prices (capital appreciation + matching problem).
- *TTC* is quite sizeable and inversely related to *TOM* over time.
- SD increase in *TTC* increases house prices by 2.4%, higher during booms.
- Given that *TTC* has an opposite effect to *TOM* and ignoring *TTC* leads to estimation bias in *TOM*: add *TTC* separately when examining house prices.

Thank you for listening!

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