The influence of relisting on selling price and time-on-market of residential properties

Master Thesis

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Abstract. *When a listing contract expires without a sale, sellers must decide whether to withdraw the property from the market or to relist it. A property can also deliberately be delisted and relisted which is hoped to facilitate the sale as it improves visibility for agents and prospective buyers through appearance at the top of the search interface. The aim of this study is to examine the effect of relisting as a selling strategy on selling price and time-on-market (TOM) of residential properties. Transaction data from the Province of Utrecht, The Netherlands during the market downturn from 2008 to 2013 are analysed with a two-stage least squares (2SLS) method. Results reveal a price premium of 2.76 percent for relisted properties and a significant prolongation of marketing duration. Sellers were best off when relisting their property after a waiting period of 8 to 30 days. However, price effects for different property type (flats or houses) and price categories (from low-priced to high-priced) differ. Relisting causes a price premium for all categories but for mid-priced flats, where relisting brings about a price discount, and low-priced houses, where the effect is not significant. Relisting affects TOM positively in all categories. The results have implications for market players, such as agents and sellers, as well as for research regarding the trade-off between selling price and TOM.*

Keywords: listing strategies, relisting, housing market, property transactions, two-stage least squares

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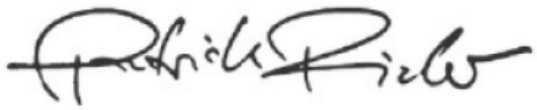
"Obstacles do not block the path, they are the path"

(Zen Proverb)

Preface

Throughout this year at the University of Groningen I had tremendous opportunities to challenge myself and develop myself further with regards to academic and interpersonal skills. Following the Leadership-Programme at the Honours College besides my regular studies demanded a lot from me at times, but it gave me even more than I could have asked for. I enjoyed the interactive and personal atmosphere in my study programme and especially the enthusiasm of all members of the Faculty of Spatial Sciences involved in teaching in the M.Sc. Real Estate Studies. I want to thank all of them and especially my supervisor Dr. Xiaolong Liu, who was very helpful and always tried to push my limits a little bit further. A special thanks goes to Prof. Arno van der Vlist for his valuable comments and his support in obtaining the data for this study. Being on that academic journey for the last five years in Germany, the United Kingdom and the Netherlands would not have been possible without the support of my family for which I am particularly grateful. I will always look back at these years and at my time in Groningen as an enriching experience and look forward to the future.



Patrick Rieder

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1. INTRODUCTION

1.1. Motivation

When offering a property, agents often make use of *Multiple Listing Services* which are centralized platforms on which they list a property for sale or rent and make it available to other agents who may want to collaborate or who represent a potential buyer for the property.[1] The configuration of MLS platforms differs between countries; however, its main features are similar all over the world with the interface showing property characteristics, photos, the desired selling price and the days the respective property has been on the market. As new listings usually appear at the top of the search interface, these properties receive more attention than listings further down on the interface which have already been on the market for a longer period. In practice, real estate agents and sellers acknowledge the negative impact a long time-on-market (TOM) can have on the chances of selling. A long TOM is often regarded as sign of overpricing or raises suspicion that the characteristics and quality of the property are not depicted accurately, in other words, the property becomes stigmatized (Weintraub, 2016). When a property is not sold by the time the listing contract expires, sellers have multiple options. They can relist the property, either immediately or after a certain time. They also have to make a decision about whether to proceed with the same agent or switch to a different one. Properties can also be actively delisted (before contract expiration) and relisted thereafter which can have multiple effects on market participants. This undertaking – and relisting in general - is hoped to remove the described stigma as the listing appears to be fresh, accelerate the selling process by creating additional market exposure through being placed at the top of the search interface and help to achieve a higher sales price (Smith et al., 2016; Weintraub, 2017). Furthermore, research has shown that agents put increased pressure on sellers as contract expiration approaches which can lead to a sale below the desired price (Geltner et al., 1991; Asabere et al. 1996). This pressure may be reduced when the sellers decide to relist the property with the agent (Smith et al., 2016).

As it is often falsely assumed that the relisted property is a new offer taking it off- and afterwards putting it on the market again can give wrong indications about market activity and liquidity as it appears at first glance that houses are sold faster than they really are. In extreme cases, this behaviour might even distort property indices and research (Propcision, 2016). Consequently, several multiple listing services have started to introduce policies that require a cumulative total of days on the market to be shown for the property (Tucker et al., 2013). This means, that a property can be relisted after contract expiration (or be withdrawn and relisted before contract expiration), but that the days on market shown reflect the sum of the days of all listings the property had so far.

[1] An example is http://www.mls.com/

The question if relisting is a useful strategy has recently triggered the interest of researchers and is at the core of this study.

1.2. Academic context and contribution to research

The topic of the influences of certain variables, such as physical attributes, locational characteristics or temporal attributes on and the interplay between selling price and TOM has been extensively researched. This study contributes to the existing academic literature with an explicit focus on the aspect of relisting and its impact on selling price and marketing duration. As assumed by practitioners (Weintraub, 2017) and researchers (e.g. Tucker et al., 2013; Smith et al., 2016; Benefield & Hardin, 2015), it is possible that relisting leads to a price premium compared to properties that where not relisted as relisting a property may set the depicted TOM to zero and therefore removes the presumed stigma. Removing this stigma enhances the attractiveness of the building. Furthermore, it improves the property´s visibility on the marketplace, thereby attracting more bidders. As its visibility is improved the property is suspected to be sold faster compared to the case in which it has not been not relisted, thereby reducing its TOM. Existing studies have largely ignored relisted properties or have treated them as equal to properties which are listed for the first time. This practice, however, can lead to severe distortions in estimating the determinants of TOM. As Benefield and Hardin (2015) state, "[…] the definition of TOM has a major influence on which factors are shown to impact marketing time […]" (Benefield & Hardin, 2015, p. 54).

When researching which factors determine selling price and marketing duration it is important to consider the two-way causal relationship between the two variables. A comprehensive literature review on TOM and price-related studies by Benefield et al. (2014) concludes that there is still tremendous inconsistency in this relationship. Studies show that it can either be positive (Miller, 1978; Anglin et al., 2003; Asabere & Huffman, 1993) or negative (Turnbull & Dombrow, 2007; Turnbull & Zahirovic-Herbert, 2011), with the different results in parts probably being caused by different market environments (Kang & Gardner, 1989; Asabere & Huffman, 1993). Most studies, however, agree that a longer TOM causes a lower selling price, whereas the effect of price on TOM remains highly inconsistent (Benefield et al., 2014). Other studies examining influences on selling price and TOM focus on buyer/seller behaviour (e.g. Springer, 1996; Liu & Van der Vlist, 2018) or property and neighbourhood attributes (e.g. Kang & Gardner, 1989; Zahirovic-Herbert & Turnbull, 2008) as main variables of interest. The impact of relisting on selling price and TOM has received less attention or was ignored due to a lack of appropriate data, instead relisted properties were often included as separate observations and therefore treated as equal to original listings (e.g. Kalra & Chan, 1994, Rutherford et al., 2007). Recent studies using a continuous TOM measure by taking into account relisted properties found mixed results. For instance, a study on a new policy in Massachusetts, which prohibits agents to reset days on market to zero through relisting, finds a significant sales price reduction compared to

before the introduction of the policy which supports the notion that relisting did help to achieve price premia (Tucker et al., 2013). A positive effect of relisting on selling price is also found in a study by Smith et al. (2016), who, aside from that, investigate the impact of the time gap in between listings and the effect of agent changes on selling price. A study on residential listings for Miami-Dade County, Florida, finds a positive effect of relisting on price if the seller sticks to the same agent and a negative effect if multiple agents are involved over the course of the selling process (Benefield & Hardin, 2015). To the best of our knowledge, the effect of relisting on the total marketing duration of a property (in this study referred to as *Cumulative TOM*), i.e. the duration of the original listing plus any subsequent relisting period until sale, has not been analysed so far.

While most papers in the field examine the U.S. market, no research has been conducted for the Netherlands. In the Netherlands, NVM, the Dutch Association of Real Estate Brokers and Real Estate Valuers, acts as the equivalent to overseas multiple listing services and it is therefore regarded as a relevant setting for investigation.

1.3. Aim and research questions

The aim of this study is to empirically examine the effect of relisting on selling price and TOM on the Dutch residential real estate market using NVM data.

The central research question and sub-questions of this study are:

What is the effect of relisting on selling price and cumulative TOM on the Dutch residential property market?

a) What is the theory of the effect of relisting on selling price and cumulative TOM?
b) What is the effect of single and multiple relistings on selling price and cumulative TOM?
c) Does the time gap in between listings affect the selling price?
d) Are there variations of the influence of relisting on selling price and TOM across different price categories?

Sub-question *a)* will be answered with an extensive literature review. The remaining research questions are approached with hedonic regression analyses. To cope with the simultaneity problem between TOM and selling price, a two-stage least squares approach (2SLS) is utilized. The estimations include a range of control variables as for instance property and neighbourhood attributes and year- and spatial-fixed effects. Due to the fact that the available dataset does not provide information on broker characteristics, the effects of potential agent changes on the dependent variables cannot be taken into account.

1.4. Structure of this study

The rest of the paper is organized as follows. Chapter 2 reviews existing and relevant literature, thereby providing a theoretical framework, and concludes with the hypotheses of this study. In Chapter 3 the methodology and the empirical model are explained, and Chapter 4 introduces the data and provides descriptive statistics. Chapter 5 reports the results of the empirical estimations, Chapter 6 provides the robustness models and Chapter 7 concludes with a discussion and recommendations for further research.

2. THEORETICAL FRAMEWORK

The analyses in this study are about determining causal effects on marketing duration (TOM) and selling price of residential properties with a special focus on determining the impact of relisting as a selling strategy on both variables. In literature, the stigma that can be caused by a long TOM has already been described by Taylor (1999). A potential buyer might be suspicious about a house that has already been on the market for a substantial amount of time and is still for offer. Taylor describes three possibilities for why a property might still be on the market, the first being that the buyer is in fact the first person to discover the property on the marketplace, secondly, that the house is severely overpriced and thus deters potential buyers and, third and the most unfavourable possibility, that earlier interested parties " […] may have detected a flaw which is not apparent to him" (Taylor 1999, p. 555). The study concludes with that TOM is indeed seen as a sign of quality by a prospective buyer but less so if he believes that the property was severely overpriced and did not sell for that reason (as he thinks that the high price, and not an actual flaw, deterred bidders). If a house which is not overpriced fails to sell, however, the buyer is more suspicious about its quality. Examining if relisting a property helps to diminish or remove these suspicions and leads to quicker sale or higher transaction price is the object of this study. At this point is important to bring up the two-way causality between selling price and TOM. Selling price is partly influenced by marketing duration but marketing duration is also partly influenced by some form of a price variable, such a list price or the degree of overpricing. Benefield et al. (2014) provide an extensive literature review on studies which use TOM to predict selling price and some form of price variables to predict TOM. Their results show that of a total of 197 analysed price estimations containing a time-on-market control, 100 turn out to be significant and negative and 24 significant and positive. The rest remains insignificant. For models using some form of a price variable to predict TOM they find that 87 of 232 estimations are significant and positive, 76 significant and negative and the rest insignificant. Especially the very strong inconsistency with regards to price controls in TOM prediction reveals the necessity of refining research in this field.

Regardless of the direction, it is generally accepted that TOM is influenced by list price, i.e. the price initially asked for by the seller. Studies on the exact relationship between TOM and the actual transaction price have produced mixed results. The following section gives a review of relevant studies grouped by

their primary purpose starting with literature that directly explores the relationship between TOM and price. In order to provide some background of other determinants of selling price and TOM we continue with seller studies, studies on property and neighbourhood characteristics and finally, studies on the influences of relisting. This review serves as a basis for the inputs of the applied statistical models. At the end of this chapter, our hypotheses for the subsequent empirical analyses are stated.

2.1. Direct studies on the relationship between selling price and TOM

It becomes apparent that trying to successfully handle the trade-off between maximizing selling price and at the same time minimizing TOM to achieve an optimum is in practice a virtually impossible undertaking.

Asabere and Huffman (1993) describe two seller strategies, of which the first is to price the property close to market value to attract the maximum number of bidders, but only make small price concessions during the bidding process. The second is to set the list price substantially above perceived market value in the hope of achieving a higher sales price and make larger concessions if necessary. This strategy however, can significantly lengthen marketing time and therefore lead to higher opportunity costs for the seller. The authors look at 337 residential transactions between 1986 and 1990 in three Pennsylvania counties and find that TOM shows a significant and positive coefficient in explaining the eventual selling price. They assume that over time the probability increases that a higher offer takes place. However, the authors point out that in the examination of the relation of TOM and selling price attention must be paid to the market environments, too. Different market environments might lead to different outcomes. With respect to the effect of price setting on the eventual sales price they find a negative coefficient for the price concession variable, i.e. when homes are overpriced and do not sell early, substantial price discounts are necessary to attract buyers.

Asabere et al. (1993) find that both overpricing and underpricing prevent the seller from achieving the optimal TOM and lead to therefore to suboptimal selling prices. Overpriced homes have a longer marketing duration, whereas TOM for underpriced homes is shorter. Thus, the authors conclude that intentional overpricing in the hope of achieving an above-market bid is rather counterproductive than helpful.

Yavas and Yang (1995) find ambiguous results with regards to the influence of listing price on TOM. By examining 270 house sales in the State College School District in Pennsylvania, they detect a negative impact of listing price on marketing duration for mid-priced houses, but no effect on TOM of low- and high-priced properties. They were amongst the first to apply a 2SLS method in the empirical analyses of TOM and price.

With regards to expectations about selling price Ong and Koh (2000), in a study of high-rise condominiums, find that the average TOM increases when sellers of private housing expect capital gains, i.e. in the expectation of an upward moving market. They also state that floor level affects the relationship between sales price and TOM. They find that only the lower floor levels significantly impact TOM - flats on lower floors sell at a relatively low price and need relatively long to market. Flats on higher floors, however, do not sell within a shorter time but for higher prices which means the relatively long TOM is caused by the higher prices asked for these apartments. The authors also point at existing variations across sub-markets (defined by geographic regions and unit types) with regards to the determinants of TOM.

Anglin et al. (2003), in a study of 3,685 single-family house transactions in Arlington, Texas between 1996 and 1997, find that a higher list price causes a longer TOM and that houses which are withdrawn from the marketplace before a sale took place have a higher average list price than the ones which were sold before contract termination. Specifically, they find that houses with a lower degree of overpricing (DOP), measured as the difference between list price and the expected list price, sell faster than the ones with a higher DOP. They also consider property attributes, macroeconomic variables and neighbourhood characteristics as influences on selling price. With regards to the effect of TOM on selling price they do not find significant results.

One of the few studies looking at a European country, namely the U.K., sheds light on the complexities inherent in the relationship between sales price, list price and marketing time across different sub-groups (McGreal et al., 2009). By analysing the Belfast residential property market, it is found that TOM does influence selling price but that the effects are not consistent across the sample. Different from the U.S. where discounts from list price are most common and the list price is seen as the upper boundary in price negotiations, in the U.K. both price premiums and discounts can occur, reflecting behavioural differences between the countries. The authors find a negative impact of TOM on selling price after the property has been on the market for 180 days, but only for those properties eventually selling at a discount to list price. For the properties selling at a premium, TOM is not found to have an impact on the eventual sales price. It is notable that this study is one of the few using a 2SLS approach.

A recent paper by Hayunga and Pace (2018) sheds light on the enormous discrepancy in estimating TOM coefficients in price models as described in the literature review by Benefield et al. (2014). They conclude that “weak instrumental variables account for the varied empirical relations between transaction prices and TOM” (Hayunga & Pace, 2018, p. 1) and state that strong instruments should lead to a positive relation between marketing duration and selling price.

2.2. Studies on seller characteristics and behaviour

Miller (1978) was amongst the first to investigate the trade-off between selling price and TOM and finds a positive correlation between the two variables. He states that TOM is largely predicted by listing price which is in turn a result of the seller´s motivation. Sellers with high opportunity costs prefer to sell quickly and therefore set the initial price lower in order to attract buyers. Sellers with lower opportunity costs set the initial price higher as they do not feel the urgency to sell quickly and are inclined to wait for a better offer, hence the property stays on the market longer. The importance of inflation is also emphasized as sellers may adjust price reservations upwards over time to adjust for the former. Being one of the earliest studies on the topic there are still a lot of unclarities, e.g. how sellers´ price expectations change over time or the influence of brokers.

Also pointing at the influence of seller motivation, Springer (1996) finds that several indicators of seller motivation negatively influence the selling price (e.g. eager sellers, relocation or financial distress). The impact of seller motivation on marketing time is less pronounced with a some exerting a positive influence, some a negative and some being inconclusive. The author therefore argues that sellers can affect the selling price but not the marketing duration unless they change the list price. Using TOM as a control variable in the selling price models he reports a significant and negative impact of TOM on selling price.

Turnbull and Zahirovic-Herbert (2011) focus on potential stigmas of vacant properties and find mixed results, depending on the current market environment. Using TOM and selling price as control variables they find that TOM is in all models significantly and negatively related to selling price and vice versa.

A study by Liu and Van der Vlist (2018) focuses on listing strategies during housing busts and finds that when sellers face a potential loss, they are more likely to set higher initial list prices than sellers who do not face a loss in order to mitigate this prospective loss. The study also points out the importance of seller motivation in the context of understanding sales dynamics, as motivated sellers with prospective loss are found to adjust list prices downwards more aggressively after the initial listing than other sellers.

2.3. Studies on property and neighbourhood characteristics

Property and neighbourhood characteristics are intuitively often regarded as the most material determinants of sales price. Kang and Gardner (1989) focus on house features (e.g. age, size, number of bathrooms) and housing market characteristics and their influence on selling price and TOM. By looking at 1,877 transactions in two cities in Central Illinois between 1982 and 1986, they find significant and positive coefficients for size, the number of bathrooms, the existence of a garage, brick or stone houses and a fireplace as determinants of selling price. In the same model, a significant and negative coefficient

is found for the age of the property. The total sample shows a negative influence of days on market on selling price. When they group the observations in different time periods they discover that the relationship between TOM and selling price depends on current market conditions, with a longer TOM in periods of high interest rates leading to higher sales prices whereas in periods of low interest rates a quick sale results in higher prices. However, overpriced homes take longer to sell regardless of market conditions. A weakness of the study is that it does not consider the simultaneity problem between selling price and TOM.

Ong and Koh (2000) find variations across flat types for TOM. Other Studies reach from the examination of noise levels (Huang & Palmquist, 2001) via school quality (Zahirovic-Herbert & Turnbull, 2008) through to the usage of photographs in a MLS (Benefield et al., 2011).

2.4. Studies on relisting

Few studies have shed light on relisting of properties and its impacts on TOM and selling price. Rather than testing for relisting and matching these with the original listing, many studies (e.g. Kalra and Chan, 1994, Rutherford et al., 2007) treat relisted properties as separate observations and therefore fail to adjust for potential effects caused by taking a property off- and on the market again. Rutherford et al. (2007) analyse selling prices and marketing time of agent-owned properties and find that these properties achieve a higher selling price but have to stay on the market longer to achieve this premium. They mention that the actual TOM may be higher than the calculation of TOM they use in their research as they do not have information on which properties are relisted. Kalra and Chan (1994) find that the sale price/list price ratio is a significant negative predictor of marketing time. They recognize that TOM is a censored variable as it can only be measured for properties that were eventually sold and not for listings which expire unsuccessfully. However, they still regard relistings as separate observations in their analysis. Carrillo and Pope (2012) also consider TOM as a censored variable but do not distinguish between original listings and relistings as they examine the total time a listing stays on the market rather than a property.

Benefield and Hardin (2015) point at the need for a proper definition of TOM and state that most studies so far do not include prior listings in their marketing duration measure. The authors find that TOM is influenced by differing factors, depending on how it is defined and propose that much of the existing research on TOM must be re-evaluated considering these definitions. By estimating a hedonic price model, they find ambiguous effects of relisting. Relisting a property with the same agent has a positive effect on selling price whereas listing the property with different brokers over the course of several subsequent listing periods negatively affects its selling price. Relisting a property multiple times fails to have an effect on selling price in the provided models.

A study on the adoption of a new policy that prohibits agents from resetting the days on market of properties to zero through relisting finds that buyers do indeed draw quality inference from TOM as it has been stated by Taylor (1999). By comparing MLS listings in Massachusetts (where the new policy was introduced) with MLS listings from Rhode Island (which did not introduce such a policy), the authors find that the sudden display of *true* days on the market (i.e. days on market including any prior listing period in which the property was not sold) decreased the average selling price of homes by $16,000 (Tucker et al., 2013).

A study conducted by Smith et al. (2016) finds that relisting of single-family homes in a slow market (2011-2013) in Atlanta, Georgia, leads to a higher selling price and that owners maximize the selling price when they relist a property within 30 days after withdrawal from a marketplace with the same agent. The choice to conduct the research in a slow market is based on the notion that sellers are less likely to find a buyer by the end of the listing contract and are therefore inclined to relist the property. The researchers explicitly look at different cases, the first being that the house was sold during the original listing period, secondly, that the house was relisted without an agent change after a gap in time and, third, that the house was relisted with an agent change. A dummy for multiple relistings is also included. Their research underpins the notion of inefficiency in the real estate markets as relisting leads to a higher selling price compared to houses which are on the market for the same time, but not de- and relisted in between. Results reveal that immediate relisting with the same agent results in the highest selling price compared to the other scenarios as immediate relisting is assumed to increase market exposure as it maximizes the total time a property is visible on the marketplace. Multiple relistings of the same property with the same agent also continue to have a significant positive influence on selling price.

2.5. Hypotheses

Resulting from the theoretical framework laid out in the previous sections our hypotheses are formulated. A conceptual model is shown which depicts the assumed relations between the variables. The hypotheses for the research questions are:

1. *Relisting has a positive impact on the selling price.*

As stated by Benefield and Hardin (2015) and Smith et al. (2016) relisting with the same agent leads to a higher selling price. Therefore, we hypothesize that relisting has a positive effect on ultimate transaction prices.

2. *Relisting reduces cumulative TOM*

It is aimed to compare properties which are listed and relisted with properties that are only listed once but stay on the market longer, i.e. taking into account the cumulative time-on-market. By doing so it can be revealed if (delisting and subsequent) relisting on the marketplace leads to the property selling faster as compared to properties which are not relisted.

The hypotheses for the additional sub-questions as stated in Chapter 1) are:

3. *Multiple relistings continue to exert a positive (negative) effect on selling price (cumulative TOM).*

As stated by Smith et al. (2016), multiple relistings continue to exert a positive effect on the selling price of the home. It is examined if this holds for our market of interest as well and additionally light is shed on the effect of multiple relistings on TOM.

4. *The time gap in between listings has a negative impact on selling price.*

Relisting a property immediately after delisting might increase its market exposure and is therefore most likely to achieve the highest price (Smith et al., 2016). However, regulations with regards to relistings and the minimum time gap in between listings differ between MLS platforms, for which reason it is aimed to take a closer look at the Dutch case and the effect of withholding a property from the market for a certain time on selling price.

Sub-question *d)* serves as a robustness test in order to check for potential variations across different price categories for houses and apartments. This will give indications about the consistency of the results from the main models.

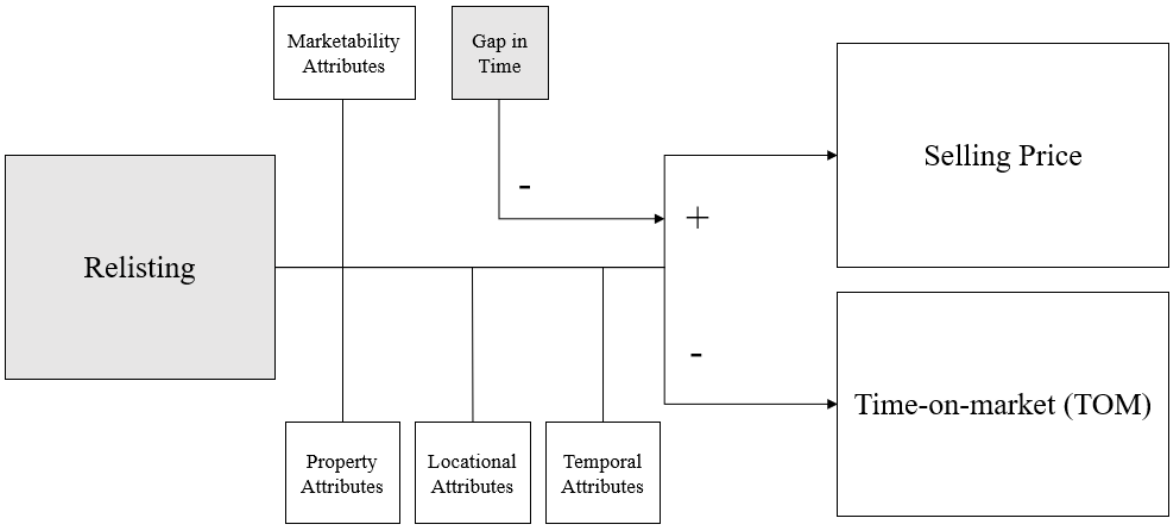

Figure 1. Conceptual model explaining the hypothesized relationship between relisting, selling price and TOM on the Dutch residential property market (*Source:* Own work)

3. METHODOLOGY

3.1. Hedonic analyses

The following chapter lays out the empirical methods used in the analyses and introduces the hedonic functions as well as the regression specifications. It ends with a description of the methodological challenge in this research, namely the problem of endogeneity. A possible solution for this problem is described in more detail in the subsequent chapter.

In the explanation of the effects of, e.g., economic events, structural changes and externalities on the selling price of real estate, hedonic regression analysis has established itself as a widely used methodology. It was first introduced by Rosen (1974) and has since been applied to a broad range of topics in the housing market literature. A review of studies using a hedonic approach can be found in Sirmans et al. (2005). Hedonic modelling is also used in the study by Smith et al. (2016) which matches much of what we want to analyse and is therefore considered as a reliable method for the purpose of this study.

The basic specifications developed to analyse the hypotheses of interest are:

$$SP = f(TOM, M, P, L, T, R) \tag{3.1}$$

$$TOM = f(DOP, M, P, L, T, R) \tag{3.2}$$

SP represents the selling price and *TOM* the cumulative time-on-market, i.e. the total marketing duration of the property beginning from the initial listing until its sale, subtracting time gaps in between listings. *M* refers to the marketability of the property, *P* refers to physical property attributes, *L* to locational characteristics, *T* represents temporal variables and *R* some form of relist variables. Additionally, in equation (3.2), *DOP*, refers to the degree of over- or underpricing of the property.

Based on the specifications we arrive at the hedonic functions used in the regression analyses which are

$$\log(SP)_i = \alpha_0 + \alpha_1 \log(TOM)_i + \alpha_2 \boldsymbol{M}arketability_i + \alpha_3 \boldsymbol{P}roperty\ Attributes_i + \alpha_4 \boldsymbol{L}ocational\ Attributes_i + \alpha_5 \boldsymbol{T}emporal\ Attributes_i + \alpha_6 \boldsymbol{R}elist_i + \varepsilon_i \tag{3.3}$$

$$\log(TOM)_i = \beta_0 + \beta_1 DOP_i + \beta_2 \boldsymbol{M}arketability_i + \beta_3 \boldsymbol{P}roperty\ Attributes_i + \beta_4 \boldsymbol{L}ocational\ Attributes_i + \beta_5 \boldsymbol{T}emporal\ Attributes_i + \beta_6 \boldsymbol{R}elist_i + \varepsilon_i \tag{3.4}$$

with

*Log(**SP**)*	Natural logarithm of selling price
*Log(**TOM**)*	Natural logarithm of cumulative TOM calculated as

$$\log(date\ of\ sale_i - date\ of\ first\ registration_i - time\ gaps\ in\ between\ listings_i) \quad (3.5)$$

***P**roperty Attributes*	Property attributes as explained afterwards
***L**ocational Attributes*	Locational attributes: Dummies for location in the Municipalities of Utrecht and Amersfoort and presence of locational amenities
***T**emporal Attributes*	Time dummies: Quarter of sale
DOP	Degree of overpricing measured as the percentage difference between original list price and expected selling price which is calculated as

$$\frac{Initial\ list\ price_i - Expected\ sales\ price_i}{Expected\ sales\ price_i} \quad (3.6)$$

***M**arketability*	Marketability of the property, expressed by dummies for vacancy and luxury and variables for relative size of the property in the municipality (*Smaller* and *Larger*)
***R**elist*	Variable (dummy or continuous) indicating if/how often the property was relisted or the length of the gap in between listings.

Property attributes, ***P***, refer to a set of physicial characteristics of the i-th property, including its size (living area and lot size), number of rooms, the existence of a garage and central heating its state of maintenance, the property type and its building period (e.g. Kang & Gardner, 1989; Ong & Koh, 2000). The set of locational attributes, ***L***, includes a binary variable for if the building is located in the Municipality of Utrecht (as it is the centre of the province) and a dummy for location in the Municipality of Amersfoort as the second major city in the province. For reasons of parsimony we do not include the full set of spatial-fixed effects. As the other municipalities are rather small compared to Utrecht and Amersfoort and appear to be relatively homogenous we think that the inclusion of only those two municipalities delivers sufficient results with regards to the coefficients. Furthermore, a binary variable is included for the existence of amenities in the direct vicinity of the property telling if it is located at a forest, close to water, next to a park or if there is unobstructed view from the building which might result in price premiums (Benson et al., 1998). We incorporate a binary time variable, ***T***, indicating in which quarter of a specific year the property was sold to account for time trends in the real estate market such as inflation (Miller, 1978). ***R*** refers to either a dummy variable telling if the property was relisted or not, to the number of relistings for the i-th property or to the time gap in between listings before the final sales period. *DOP* provides a measure for the list price premium set over predicted selling prices (or discount if the predicted selling price is higher than the set list price). There is evidence that overpriced properties take longer to sell (e.g. Asabere et al., 1993; Knight, 2002; Anglin et al., 2003) for which

reason it should not be ignored in explaining marketing duration. The following equation is specified in order to obtain the predicted transaction prices:

$$\log(Expected\ Sales\ Price)_i = \gamma_0 + \gamma_1 \boldsymbol{M} arketability_i + \gamma_2 \boldsymbol{P} roperty\ Attributes_i + \gamma_3 \boldsymbol{L} ocational\ Attributes_i + \gamma_4 \boldsymbol{T} emporal\ Attributes_i + \varepsilon_i \quad (3.7)$$

Equation (3.7) is a version of equation (3.3) and serves as to predict the sales price of the i-th property. As market prices are not time-invariant and our dataset encompasses transactions from a period of several years, a rolling window regression is applied in this case with a window size of 100 days in order to obtain more precise coefficients determining the expected sales price if a property was listed within a certain time frame during the whole period of the dataset.

M provides a set of marketability measures, expressed by a dummy variable which shows if the property was vacant at the time of the listing – which might diminish the seller´s bargaining power and therefore the ultimate transaction price (Knight, 2002; Turnbull & Zahirovic-Herbert, 2011) - and if it was characterized as luxury. Luxury properties might need longer to market as there are generally less potential buyers but trade at a premium to ordinary properties. Furthermore, the relative size of the property´s living area compared to the average size in the respective municipality is included in order to account for atypicality. Atypicality is assumed to cause a longer marketing duration (Haurin, 1988). Hereby, we follow Smith et al. (2016) and create a measure for local size which is defined as

$$Localsize_i = \frac{Living\ area_i - \sum_{j \in J} Living\ area_j / N_j}{\sum_{j \in J} Living\ area_j / N_j} \quad (3.8)$$

with N_j representing the number of properties in the municipality J. In the next step two variables are created which show the relative size in absolute values, grouped by if it is above average ($Larger_i$) or below average ($Smaller_i$).

$$Larger_i = \begin{cases} 0\ , if\ Localsize_i \leq 0 \\ |Localsize|\ , if\ Localsize_i > 0 \end{cases} \quad (3.9)$$

$$Smaller_i = \begin{cases} 0\ , if\ Localsize_i \geq 0 \\ |Localsize|\ , if\ Localsize_i < 0 \end{cases} \quad (3.10)$$

As already stated, it is important to emphasise that selling price and TOM are determined simultaenously. Literature provides evidence that marketing duration has an impact on selling price and that some form of a price variable (e.g. list price markup over market prices) exerts an influence on marketing duration. Price and TOM are therefore endogenous variables which violates one of the CLRM

assumptions, namely the independence of the explanatory variables, X and the error term, ε which is formally stated as $E(X'\varepsilon) = 0$. In the case of violation, the *X*s are stochastic. Applying classic OLS regressions in this context would lead to biased estimators (*simultaneity bias*) as well as to inconsistency which might distort the results (Brooks & Tsolacos, 2010).

3.2. Simultaneity problem

To cope with the simultaneous equation problem, a two-stage least squares (2SLS) approach is used. Instrumental variables are found for the endogenous variables which serve as a proxy for the removed original variables but are not correlated with ε. The method is conducted in two stages which are laid out formally in the following paragraphs. The analyses are carried out with STATA´s `ivregress` command. We follow closely the model developed by Knight (2002) who was the first researcher to provide a 2SLS model for both selling price and TOM.

An instrument has to fulfill several conditions to be seen as strong. A weak instrument in a 2SLS procedure would not entirely remove the bias resulting from OLS regression. To test for the strength of the instruments we report the *F* statistic for each model, which should not only be statistically significant but equal or exceed a value of 10 for the instrument to be seen as strong (Stock et al., 2002). Furthermore, we estimate the partial R-squared. This statistic measures the correlation between the instrumented variable and its respective instruments after partialling out the effect of the exogenous variables. Hayunga and Pace (2018) report partial R-squared values of around 15 percent for strong instruments. As the applied equations are exactly identified, there are no overidentifying restricitions to be tested.

3.2.1 2SLS selling price model

In equation (3.12), the log of the selling price is regressed on all variables stated in the previous equations, but now *TOM* is not included in its original form but instrumented by the exogenous variables plus an additional instrument, *reviseddown*. This dummy indicates if the property´s list price was reduced during the whole cumulative listing period. Reducing the list price might attract more bidders and therefore impact marketing duration (Knight, 2002). A similar dummy is also applied in the estimation of predicted TOM in the study by Smith et al. (2016). In the first stage, *TOM* is therefore regressed on all exogenous variables stated in equation (3.4) and additionally on the described instrument, *reviseddown*, which is supposed to remove the endogeneity from the equation. The predicted values from the first stage are then used as input for the second stage (3.12).

First-stage regression:

$$\log(TOM)_i = \delta_0 + \delta_1 \boldsymbol{M}arketability_i + \delta_2 \boldsymbol{P}roperty\ Attributes_i + \delta_3 \boldsymbol{L}ocational\ Attributes_i + \delta_4 \boldsymbol{T}emporal\ Attributes_i + \delta_5 \boldsymbol{R}elist_i + \delta_6 reviseddown_i + \varepsilon_i \quad (3.11)$$

Second-stage regression:

$$\log(SP)_i = \theta_0 + \theta_1 \log(\widehat{TOM})_i + \theta_2 \boldsymbol{M}arketability_i + \theta_3 \boldsymbol{P}roperty\ Attributes_i + \theta_4 \boldsymbol{L}ocational\ Attributes_i + \theta_5 \boldsymbol{T}emporal\ Attributes_i + \theta_6 \boldsymbol{R}elist_i + e_i \quad (3.12)$$

3.2.2 2SLS TOM model

The endogenous variable in the TOM model is *DOP*, through the inclusion of list price in the numerator. Hence, we use the expected selling price obtained from equation (3.7) as instrumental variable for *DOP*. In the first stage, *DOP*, as described in section 3.1, is therefore regressed on *Expected Sales Price* and all exogenous variables as can be seen in equation (3.13) and its predicted values are used as independent variable in the second stage (3.14), thereby removing the endogeneity from the equation.

First-stage regression:

$$DOP_i = \vartheta_0 + \vartheta_1 \boldsymbol{M}arketability_i + \vartheta_2 \boldsymbol{P}roperty\ Attributes_i + \vartheta_3 \boldsymbol{L}ocational\ Attributes_i + \vartheta_4 \boldsymbol{T}emporal\ Attributes_i + \vartheta_5 \boldsymbol{R}elist_i + \vartheta_6 \boldsymbol{E}xpected\ Sales\ Price_i + \varepsilon_i \quad (3.13)$$

Second-stage regression:

$$\log(TOM)_i = \rho_0 + \rho_1 \widehat{DOP} + \rho_2 \boldsymbol{M}arketability_i + \rho_3 \boldsymbol{P}roperty\ Attributes_i + \rho_4 \boldsymbol{L}ocational\ Attributes_i + \rho_5 \boldsymbol{T}emporal\ Attributes_i + \rho_6 \boldsymbol{R}elist_i + e_i \quad (3.14)$$

4. DATA

4.1. Dataset

The dataset contains transaction data of residential properties for the years 2008 to 2013 from the Province of Utrecht. It is obtained from NVM, the Dutch Association of Real Estate Brokers and Real Estate Valuers, which constantly collects data on 75 percent of housing transactions taking place in the Netherlands. It can be seen as equivalent to multiple listing services in the United States. Due to its extensive coverage of transactions it can be regarded as representative for the market. Utrecht us located in the East of the Randstad agglomeration which is a metropolitan area in the West of the Netherlands including the cities of Amsterdam, Rotterdam, Utrecht and The Hague. It is the fourth-largest metropolitan area of Europe after London, Paris and the Rhine-Ruhr region. With a population of 8.1 million people it accounts for almost half of the Dutch population. A large share of economic value

produced in the country comes from the Randstad area with a gross regional product of 367 billion € in 2017, accounting for more than half of the country´s gross national product (Randstad Region, 2017). Its economic and demographic characteristics make the region an attractive destination for both real estate investors and occupiers.

The Province of Utrecht includes 26 municipalities. It has an area of 144,915 hectares which makes it one of the smallest provinces in the Netherlands, but due to a total number of 1.2 million inhabitants it is also one of the most densely populated provinces in the country (Province of Utrecht, 2018). The two major cities in the province in terms of population and economic activity are Utrecht and Amersfoort. The City of Utrecht serves as the capital of the province. With 338,000 inhabitants it is the fourth largest city in the Netherlands and the largest in the province (City of Utrecht, 2018). In terms of infrastructure it is very well connected and Amsterdam, the country´s capital, can be reached within 30 minutes by train making it a favourable residential area. Amersfoort, the second-largest city in the province with 155,000 inhabitants is in the East of the region. As it is located at two of the country´s main railway lines it is very well connected to all parts of the country.

The period between 2008 and 2014 marked a major downturn in the Dutch housing market as a consequence of the global financial crisis. In such a *slow* market it can be expected that sellers look more desperately for ways to accelerate the sale of their property as it normally takes longer to sell a home in a slow market and because potential financial distress causes a stronger urgency to sell. In a *hot* market, however, the probability of facing the decision whether to relist or not is lower as there are more potential buyers (Smith et al., 2016). Hence, we expect a substantial amount of relisted properties in our dataset. A detailed description of the variables is given in the following chapter.

4.2. Descriptive statistics

The dataset originally contained 96,565 listings which after merging listings for the same property and further data cleansing to remove outliers collapsed to 37,235 observations. Table 2 provides an overview of variables grouped by price variables, relist variables, TOM variables, property attributes locational and temporal attributes.

Reshaping the dataset to merge observations which contain the same property but for different listing periods allows us to create the relist variables. A property is defined to be relisted if it was re-entered once or several times in the system and not sold in between. Following Smith et al. (2016) a property is only defined to be relisted if the time gap in between listings was not longer than 60 days, otherwise it

is seen as a *new* listing[2]. If the properties physical characteristics have changed over the course of subsequent listing periods they are removed from the sample as changes in the physical structure can have an impact on selling price and marketing duration. These properties can therefore not be compared to the ones which have not changed over time. These two steps (merging observations for the same property and deleting properties with inconsistent attributes over time) remove a substantial amount of observations from the sample (36,622 observations dropped). Repeated sales are removed from the sample to ensure that only one transaction per property took place (412 observations dropped). Doing this makes the observations more comparable in terms of calculating the cumulative TOM, starting from one initial listing and ending with a single sales period, with no interruptions caused by intermediate sales. As we only consider four subsequent listing periods (as the number of relisted properties falls rapidly with every period) we drop all properties which were not sold after four listing periods. We drop outliers from the dataset to approximate a normal distribution in the variables. Properties which are sold for more than € 2 million or for less than € 25,000 are removed (with the least expensive properties remaining in the sample being *Portiekflats*). To consider unusual list prices we drop all listings which had an initial list price of more than € 2.2 million or less than € 25,000. Adjusting for price variables removes 510 observations. Uncommon physical characteristics are also considered. Properties with a lot size of more than 3,000 square meters (or less than 30 square meters if the property is not an apartment) are deleted. The above described variables *Smaller* and *Larger* account for unusual living areas, for which reasons we do not adjust for outliers regarding this variable. Furthermore, we eliminate properties of which the number of rooms is less than 1 and the number of bathrooms is unknown or less than 1. Adjusting for uncommon observations regarding size variables removes in total 5,226 observations. Homes whose building period is unknown are also removed as the age of a property is an important determinant of transaction price. Finally, we delete all observations which are not defined as regular homes or when the number of observations for a particular property type is very low. This removes properties which are mobile homes/trailers, homes characterized as simple *(eenvoudig)*, house boats, recreation properties, care homes, two-floor apartments and large country estates (1,134 observations dropped). After conducting the rolling window regression to obtain the values for predicted sales price we clean the dataset for further outliers regarding the *DOP* variable as suggested by Springer (1996) to consider occurring prediction error. Deleting observations where the *DOP* variable exceeds a value of 1.5 or is smaller than -0.8 removes 797 observations. Data trimming left us with 37,235 observations which are analysed in the following paragraphs.

Single-family homes make for the bulk of properties in the sample (56.5 percent). *Portiekflat*s, which is a Dutch expression for an apartment in a multi-family property where the inhabitants share a hallway

[2] Smith et al. (2016) use 60 days, Benefield & Hardin (2015) use 48 days and Genesove & Mayer (1997) use 4 weeks. As 84 percent of relisting in our sample occured after seven days we see no need to use a shorter time period than 60 days.

or staircase, rank second place with 12 percent of all observations. The different building periods are relatively equally distributed, with the exemption that houses built before 1906 are relatively seldom as well as houses built during or shortly after the period of the second world war. 32.6 percent of all properties in sample are located in the Municipality of Utrecht, making it the municipality with the most transactions in the sample.

Regarding the price variables it is worth mentoning that the initial list price during the period of the sample is in average higher than the eventual sales price. This indicates that list prices in the Netherlands are seen as upper boundary in price negotiations. The average markup of initial list price over eventual selling price for single family homes is 28,271 €, for apartments it is 14,605 €.

Of the total sample, 90.7 percent of properties were not relisted. 7.7 percent were relisted once and only 1.3 percent were relisted twice. Relisting a property three times does barely occur, with 104 observations or 0.27 percent. Due to this vanishing occurence all properties that were relisted more than three times were removed from the sample. The mean time gap between the sales period and the prior period for relisted properties is 4.7 days. 83.7 percent of all relisted properties were relisted within seven days from taking it off the market before a sale occured, 9.5 percent between eight and 30 days and 6.1 percent between 31 and 60 days.

When looking at the variables indicating marketing duration it is intruguing to see that the average total marketing duration (*Cumulative TOM*) is 174.2 days but there is a substantial difference between the different listing periods. With TOM in the first listing period having an average value of 160.3 days, this number is shrinking to 126.6 days for Period 2 and 118.4 days in Period 3. Properties that are relisted three times stay on the market for only 109.8 days in Period 4 before they are sold. Table 1 summarizes the mean *Cumulative TOM* for properties that were relisted from zero to three times as well as the mean selling price for these properties. Here it can be seen that total marketing duration increases with the number of relistings. At the same time, mean selling prices increase with the number of relistings of a property. This might be a first indication that relisting does indeed cause price premiums as stated in Smith et al. (2016). However, it is important to mention that these statistics do not provide causal effects. It would also be possible that other variables are a positive determinant of sales price over relisting periods, such as *Cumulative TOM* itself which has been found to prove true in several studies (e.g. Hayunga & Pace, 2018). Causal effects are analyzed in the follwing chapters with hedonic regression analyses. In average, a property was relisted after it has been on the market for 201.8 days.

Table 1. Mean cumulative TOM and sales price for properties that were relisted i times.

Number of relistings	Observations	Cumulative TOM in days (mean)	Sales price in € (mean)
0	33732	156.06	275554.1
1	2861	351.78	285230.9
2	488	435.64	289204.8
3	101	494.68	294686.4

When calculating the correlation coefficients between the main variables of interest (price, TOM and relist variables) close-to-zero correlations are found between sales price and relisting and sales price and relist gap variables (Table 3). A stronger, positive correlation is found between the relist dummy and *Log TOM* (0.2874) as well as between multiple relistings and *Log TOM* (0.2802) and *Rel07* and *Log TOM* (0.2542).

With regards to the year in which the property was sold we see a downward trend in the number of transactions between 2008 and 2013, starting from 8,212 properties being sold in 2008 and ending with 5,131 successful transactions in 2013. This decreasing number of transactions reflects the housing bust, with real estate prices reaching their low point in 2013 before they recover. This price drop of more than 15 percent from 2008 to 2013 can also be seen in Figure 2 which shows an index created from the sample. Figure 3 shows the deviation of list price and sales price. Over the years the gap between list price and sales price slightly increases, i.e. sellers´ expectations with respect to the achievable sales price were too high. It is possible that sellers set an unusually high list price in order to avoid financial losses as they hoped that this would curb the price slump[3].

Figure 2. Price index of residential real estate in the Province of Utrecht 2008-2013 with base year 2008 (*Source*: own work).

[3] Liu and Van der Vlist (2018) find that sellers who expect a loss set higher initial list prices.

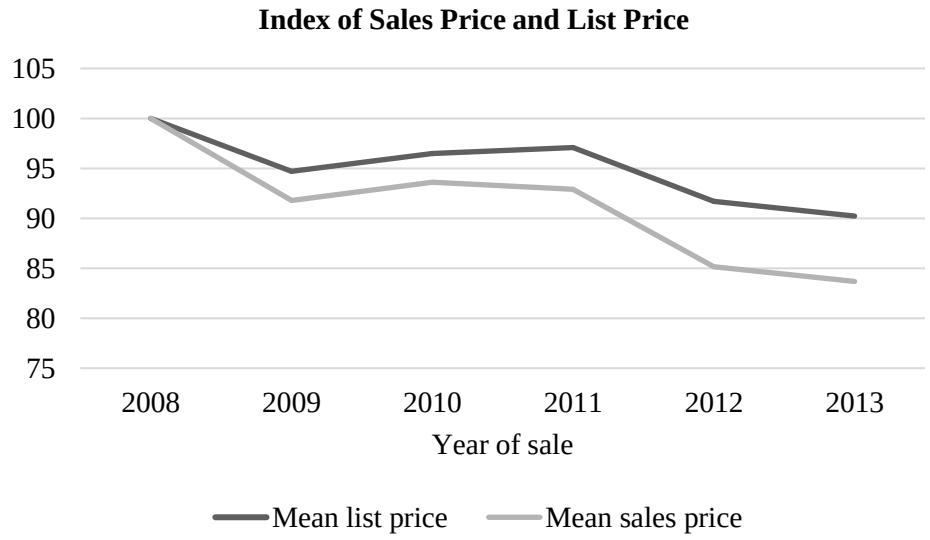

Figure 3. Mean list price and mean sales price of residential real estate in the Province of Utrecht 2008-2013 with base year 2008 (*Source*: Own work).

Figure 4. Dutch Provinces with major cities in the Randstad area (*Source:* Own work).

Table 2. Summary statistics of dependent and independent variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Price Variables					
Sales price	37,182	276529.8	150628.2	25000	1915000
Initial list price	37,182	300930.2	171233.7	29000	2200000
DOP	37,182	.0127199	.3591883	-.7997987	1497864
Relist Variables					
Relist (1=yes)	37,182	.0927868	.2901374	0	1
Sum of relistings	37,182	.1113442	.3761621	0	3
Relgap (for relistings only)	3,450	4.664348	11.99001	0	60
Rel07 (for relistings only) (1=yes)	3,450	.8368116	.369591	0	1
Rel830 (for relistings only)	3,450	.0947826	.2929569	0	1
Rel3160 (for relistings only)	3,450	.0605797	.2385923	0	1
TOM Variables					
Cumulative TOM	37,182	174.2216	197.4662	3	2104
TOM Listing Period 1	37,182	160.3043	181.9922	0	2104
TOM Listing Period 2	3,450	126.5603	129.0768	0	1123
TOM Listing Period 3	589	118.416	129.8506	0	1142
TOM Listing Period 4	101	109.8416	86.91211	1	377
Marketability Attributes					
Vacant (1=yes)	37,182	.0009144	.030226	0	1
Luxury (1=yes)	37,182	.0390243	.1936553	0	1
Relative size: smaller	37,182	.125288	.1641688	0	.7635325
Relative size: larger	37,182	.1247973	.2507711	0	3.900246
Property Attributes					
Sq.m.	37,182	113.4504	40.78436	26	525
Lot Size	37,182	157.0421	235.1244	0	3000
Number of rooms	37,182	4.381663	1.391677	1	16
Number of bathrooms	37,182	1.056829	.2425247	1	4
Number of balconies	37,182	.3116024	.4746265	0	3

Garage (1=yes)	37,182	.1831262	.3867752	0	1
Central heating (1=yes)	37,182	.9498951	.2181643	0	1
Maintenance: Good (1=yes)	37,182	.9014039	.298123	0	1
Single family home (1=yes)	37,182	.5650315	.4957595	0	1
Canal house	37,182	.0015599	.0394652	0	1
Manor	37,182	.0500242	.2179978	0	1
Farmhouse	37,182	.0014254	.0377283	0	1
Bungalow	37,182	.0146576	.1201798	0	1
Villa	37,182	.0366306	.1878557	0	1
Countryhouse	37,182	.0019364	.0439627	0	1
Groundfloor apartment	37,182	.0479533	.2136704	0	1
Upstairs apartment	37,182	.0497553	.2174418	0	1
Maisonette	37,182	.0349632	.183689	0	1
Portiekflat	37,182	.1205422	.3255989	0	1
Galerijflat	37,182	.0755204	.2642328	0	1
Building Period: 1500-1905 (1=yes)	37,182	.0542467	.2265069	0	1
Building Period: 1906-1930	37,182	.1207843	.3258808	0	1
Building Period: 1931-1944	37,182	.0747943	.2630626	0	1
Building Period: 1945-1959	37,182	.0640902	.2449168	0	1
Building Period: 1960 1970	37,182	.1436717	.3507612	0	1
Building Period: 1971-1980	37,182	.1485934	.355692	0	1
Building Period: 1981-1990	37,182	.1290678	.3352795	0	1
Building Period: 1991-2000	37,182	.1440751	.3511706	0	1
Building Period: after 2000	37,182	.1205153	.3255675	0	1
Locational Attributes					
Location: Utrecht (1=yes)	37,182	.3256145	.4686103	0	1
Location: Amersfoort (1=yes)	37,182	.1391534	.3461111	0	1
Amenities (1=yes)	37,182	.3691033	.4825685	0	1
Temporal Attributes					
Year of Sale					
2008 (1=yes)	37,182	.2208596	.4148316	0	1
2009	37,182	.1589748	.3656575	0	1

2010	37,182	.1750847	.3800447	0	1
2011	37,182	.1582755	.365004	0	1
2012	37,182	.1488086	.3559045	0	1
2013	37,182	.1379969	.3449013	0	1

Table 3. Correlation matrix of dependent variables and relist variables.

Correlation matrix	Log sales price	Log TOM	Relist	Sum of relistings	Rel07	Rel830	Rel3160
Log sales price	1.0000						
Log TOM	0.0020	1.0000					
Relist	0.0225	0.2874	1.0000				
Sum of relistings	0.0223	0.2802	0.9256	1.0000			
Rel07	0.0164	0.2542	0.9072	0.8436	1.0000		
Rel830	0.0129	0.0980	0.2945	0.2685	-0.0273	1.0000	
Rel3160	0.0143	0.0782	0.2351	0.2120	-0.0218	-0.0071	1.0000

5. RESULTS

Table 4 provides the 2SLS estimation results for the selling price model. Model (1) tests for the effect of relisting on selling price and shows a positive and significant coefficient for relisting on price. If a property was relisted, it therefore sold for 2.76 percent more than properties which were no relisted. This in line with the findings of Smith et al. (2016) who find a price premium of 2.98 percent for relisted properties and thus supports *Hypothesis 1)*. Model (2) provides estimations for the effect of multiple relistings. Relisting a property twice leads to a price premium of 2.89 percent over properties that were not relisted and relisting a property three times has an even stronger impact with a premium of 5.24 percent. These results are also in line with Smith et al. (2016) and supports *Hypothesis 3)* regarding price. Model (3) and (4) report the coefficients for the restricted sample (only properties that were relisted once) to test for the influence of the gap in between listings as described by Smith et al. (2016). There is a positive influence of the time gap in between listings on the selling price with an additional premium of 0.57 percent for each additional percentage increase in the time gap between listings. In order to further refine this result, Model (4) includes dummies for the length of the time gap in between listings (*Rel07* and *Rel830*). Results show a significant and positive coefficient for *Rel830*, meaning that properties that were relisted after a waiting period of 8 to 30 days achieved a price premium of 2.27 percent compared to properties that were relisted between 0 and 7 days. When sellers waited for more than 30 days, no significant price advantage could be gained compared to relisting the property immediately. It can therefore not be concluded that the time gap in between listings has a negative impact on sales price as stated in *Hypothesis 4)*. In all four models, *Cumulative TOM* is included as its instrumented version and exerts a negative and highly significant impact on selling price in all of them (a discount between -2.67 percent and -5.78 percent for each one-percent-increase in *Cumulative TOM*) which is in line with the findings of several studies (e.g. Springer, 1996; Turnbull & Zahirovic-Herbert, 2011). As the time period of the sample represents a major downturn in the market this is not surprising. With prices falling constantly over the years it can be expected that properties that stayed on the market for a longer time eventually sold for a lower price. On the other hand, it contradicts findings from search theory (e.g. Trippi, 1977; Miller, 1978) which claims that over time the probability of achieving a higher sales price increases as well as the findings from Hayunga & Pace (2018) who argue that TOM should always have a positive coefficient in price models, regardless of the market environment. However, they also find that a negative slope of TOM does not change the slope of the other coefficients for which reason we do not see it as troublesome as it is unlikely to affect the relisting coefficient.

With regards to the statistic measuring the strength of the applied instruments it is important to mention that the instruments are regarded as strong in all models. The *F* statistic, which is supposed to take on a value of 10 or more for the instrument to be seen as strong, is sufficiently large in all models.

The partial R-squared measure is lower in the restricted Models (3) and (4), with a value of 13 percent than in Models (1) and (2), with values of 35 percent. However, in both cases the measure is seen as sufficiently strong. Hayunga & Pace (2018) report partial R-squared values of around 15 percent for strong instruments.

Table 4. 2SLS estimations for selling price

VARIABLES	(1) Log SP	(2) Log SP	(3) Log SP (only relist observations)	(4) Log SP (only relist observations)
IV Log TOM	-0.0272***	-0.0271***	-0.0595***	-0.0595***
	0.00160	0.00159	0.0144	0.0144
Relist (1=yes)	0.0271***			
	0.00386			
Sum relist: 1 (1=yes)		0.0260***		
		0.00405		
Sum relist: 2 (1=yes)		0.0285***		
		0.00901		
Sum relist: 3 (1=yes)		0.0511***		
		0.0196		
Log Relist gap			0.00570**	
			0.00290	
Rel830				0.0224**
				0.0111
Rel3160				0.0158
				0.0153
Marketability Attributes	YES	YES	YES	YES
Property Attributes	YES	YES	YES	YES
Locational Attributes	YES	YES	YES	YES
Temporal Attributes	YES	YES	YES	YES
Observations	37,176	37,176	2,860	2,860
R-squared	0.812	0.812	0.824	0.824
Partial R-squared	0.3508	0.3533	0.1306	0.1307
Robust F	25426.3	25661.6	473.88	474.047

Note: Reference category for Models (1) and (2) is a single-family house which is not, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 5 shows the estimation results for the TOM models of interest. Model (1) regresses the independent variables from equation (3.14) on the logarithm of *Cumulative TOM* and includes *Relist* as control variable. *DOP*, as described in chapter 3.2 is instrumented by a price variable obtained from the

rolling window sales price prediction. The partial R-squared measure is fairly high in both TOM models and the *F* statistics (with values of 580) point at a strong instrument. In Model (1) we find a positive impact of relisting on marketing duration, i.e. relisting a property lengthens marketing time by 212.7 percent compared to properties that were not relisted. Model (2) takes a closer look at the number of times a property was relisted. We see an amplifying effect with multiple relistings. Relisting a property twice already leads to an increase in marketing duration of 304.7 percent, relisting three times lengthens TOM by 400.3 percent. This in line with the descriptive statistics from chapter 4.2 and neglects the hypothesis that relisting reduces *Cumulative TOM*. With the results from the regression it can now also be argued that relisting is in fact a causal factor in lengthening marketing duration. The *IV DOP* variable has in both model specifications a highly significant and positive impact on TOM which was expected (see for example Anglin et al., 2003 or Smith et al. 2016). A higher markup of list price over predicted selling price might deter bidders and therefore cause a longer TOM. Interestingly, properties with locational amenities and good maintenance need longer to sell (details can be seen in the appendix). A possible explanation for this might be that sellers are inclined to wait for a better offer when they are convinced that their property is high-quality. A common issue in marketing duration models is the low explanatory power, expressed by the R-squared, which lays at 19.4 and 19.6 percent in our models.

Table 5. 2SLS estimations for TOM

VARIABLES	(1) Log TOM	(2) Log TOM
IV DOP	0.0760**	0.0778**
	0.0378	0.0377
Relist (1=yes)	1.140***	
	0.0134	
Sum relist: 1 (1=yes)		1.081***
		0.0146
Sum relist: 2 (1=yes)		1.398***
		0.0256
Sum relist: 3 (1=yes)		1.610***
		0.0454
Marketability Attributes	YES	YES
Property Attributes	YES	YES
Locational Attributes	YES	YES
Temporal Attributes	YES	YES
Observations	37,176	37,176
R-squared	0.194	0.196
Partial R-squared	0.2664	0.2666
Robust F	580.429	580.658

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

6. ROBUSTNESS

Several studies provide evidence for variations in the relationship between selling price and TOM depending on property attributes (Ong & Koh, 2000) or price categories (Yavas & Yang, 1995) for which reason we have to consider the possibility that the effect of relisting might also be inconsistent. Hence, several models are computed which test for the effect of relisting on selling price and TOM in different price categories for houses and apartments. Table 6 shows the results for the selling price estimation for houses. Price ranges are defined as: Low-priced (< € 224.001), mid-priced (> € 224,00 & < € 355,001) and high-priced (> € 355,000). Low-priced houses therefore reflect the lowest 25 percent and high-priced houses the most expensive 25 percent of all house observations. Relisting exhibits a positive and statistically significant effect on selling price only for mid- and high-priced houses but with differing strength. For mid-priced houses, relisting leads to a premium of 1.43 percent and for high-priced houses of 2.87 percent.

Table 7 provides the regression models for apartments with selling price as dependent variable. Here, a different picture emerges. For low-priced apartments (<€ 149,501), relisting causes a price premium of 3.37 percent. For high-priced apartments (> € 212,000), the premium resembles more the findings from the main model with a bonus of 2.75 percent. For mid-priced homes (> € 149,500 & < € 212,001) however, there is a weak negative effect of relisting on transaction price with -0.66 percent compared to properties that were not relisted. Sellers of mid-priced flats could therefore not expect a price premium when relisting, which is intriguing as the percentage of relistings in this property type and price category is slightly above average with 9.79 percent of mid-priced flats being relisted compared to 9.28 percent for the total sample, meaning that sellers might indeed have certain intentions when relisting and hope to gain an advantage from this undertaking. A potential explanation for this result might be that demand and search activities are much more pronounced for mid-priced flats which represent about 50 percent of the condominium market in our sample. Buyers might therefore memorize listings better than in the assumedly thinner markets of low- and high-priced flats and the effect of relisting might therefore disappear. Marketing duration exerts a negative influence on price in all three price categories but is not significant for low-priced flats.

With regards to the influence of relisting on marketing duration we apply the same price categories as in the selling price models. Table 8 shows that relisting lengthens marketing time in all price categories for houses, with the strongest effect for mid-priced homes which could again be a sign that the market for mid-priced properties is the most efficient and that there exists a better market memory than in the other submarkets which leads to market participants remembering previous listings better.

For apartments, there is no considerable difference of the relisting coefficient across price categories. Relisting causes a relatively stable lengthening of marketing duration of 183 to 203 percent (Table 9).

Detailed tables including the coefficients for all applied independent variables can be found in the appendices.

Table 6. 2SLS estimations for selling price of houses: Low, mid- and high-priced houses

	(1) **Low-Priced**	(2) **Mid-Priced**	(3) **High-Priced**
VARIABLES	Log SP	Log SP	Log SP
IV Log TOM	-0.00665***	-0.0142***	-0.0294***
	0.00169	0.00150	0.00343
Relist (1=yes)	0.00644	0.0140***	0.0283***
	0.00410	0.00385	0.00792
Marketability Attributes	YES	YES	YES
Property Attributes	YES	YES	YES
Locational Attributes	YES	YES	YES
Temporal Attributes	YES	YES	YES
Observations	6,263	12,457	6,234
R-squared	0.377	0.358	0.674
Partial R-squared	0.4057	0.3561	0.3383
Robust F	4877.69	9022.75	4232.14

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 7. 2SLS estimations for selling price of apartments: Low-, mid- and high-priced apartments

	(1) **Low-Priced**	(2) **Mid-Priced**	(3) **High-Priced**
VARIABLES	Log SP	Log SP	Log SP
IV Log TOM	-0.0104	-0.00605***	-0.0342***
	0.00652	0.00174	0.00541
Relist (1=yes)	0.0331**	-0.00660*	0.0271***
	0.0141	0.00366	0.00969
Marketability Attributes	YES	YES	YES
Property Attributes	YES	YES	YES
Locational Attributes	YES	YES	YES
Temporal Attributes	YES	YES	YES
Observations	3,069	6,099	3,054
R-squared	0.277	0.352	0.601
Partial R-squared	0.3347	0.316	0.2705
Robust F	1617.57	3550.1	1499.92

Note: Reference category is a flat in a multi-family house (Galerijflat) which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 8. 2SLS estimations for TOM of houses: Low, mid- and high-priced houses

VARIABLES	(1) **Low-Priced** Log TOM	(2) **Mid-Priced** Log TOM	(3) **High-Priced** Log TOM
IV DOP	-0.0263	-0.0434	0.0371
	0.0807	0.0462	0.0823
Relist (1=yes)	1.109***	1.209***	1.153***
	0.0363	0.0233	0.0326
Marketability Attributes	YES	YES	YES
Property Attributes	YES	YES	YES
Locational Attributes	YES	YES	YES
Temporal Attributes	YES	YES	YES
Observations	6,263	12,457	6,234
R-squared	0.126	0.207	0.227
Partial R-squared	0.4882	0.4923	0.2937
Robust F	801.291	1709.09	225.938

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 9. 2SLS estimations for TOM of apartments: Low, mid- and high-priced apartments

VARIABLES	(1) **Low-Priced** Log TOM	(2) **Mid-Priced** Log TOM	(3) **High-Priced** Log TOM
IV DOP	-0.0757	-0.107*	0.0770
	0.141	0.0601	0.101
Relist (1=yes)	1.109***	1.042***	1.057***
	0.0498	0.0322	0.0394
Marketability Attributes	YES	YES	YES
Property Attributes	YES	YES	YES
Locational Attributes	YES	YES	YES
Temporal Attributes	YES	YES	YES
Observations	3,069	6,099	3,054
R-squared	0.206	0.243	0.281
Partial R-squared	0.3723	0.5543	0.3929
Robust F	175.719	1294.67	126.321

Note: Reference category is a flat in a multi-family house (Galerijflat) which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

7. CONCLUSION

7.1. Discussion

This study analyzed the effect of relisting on selling price and marketing duration of residential properties. Its contribution to research and academic discussion are twofold. First, it gives indications about what is the right choice of a seller once a listing contract expires without a sale or once the seller thinks about deliberatly using relisting as a strategy to improve market exposure and to achieve a price premium. Does relisting lead to a premium and an acceleration of the selling process? When is the optimal time to relist a property? To the best of our knowledge there are only a few studies scrutinizing the effect of relisting on selling price (Tucker et al., 2013, Benefield & Hardin, 2015; Smith et al., 2016) and none which addresses the effect of relisting on marketing duration. So far, the definition of marketing duration in most studies did not include prior listing time and therefore ignoring relisted properties. However, the exact definition of TOM has a major impact on the size and significance of influence factors on marketing duration (Benefield & Hardin, 2015). The second contribution is more of a methodological nature and addresses the simultaneity problem between selling price and TOM. The majority of studies on the trade-off between price and TOM have not considered endogeneity in their model specifications with most of them applying an OLS approach. This can, however, result in flawed coefficients as the CLRM assumption of exogeneity is not met. The few studies coping with 2SLS so far do not always find common ground either. This paper represents another attempt to use instrumental variable regressions in the determination of TOM and selling price and hopefully contributes to the methodological debate.

The initial assumption was that enhanced visibility on the marketplace trough relisting might lead to more bids and therefore to a higher selling price. Relisting a property might remind the agents of its existence. This notion is supported in our analyses. We find that relisting leads to an increase in selling price of 2.76 percent. Relisting a property multiple times amplifies this effect with a price premium of 2.89 percent for relisting twice and a premium of 5.24 percent for relisting the property three times. These results resemble the findings of Smith et al. (2016) and partly of Benefield and Hardin (2015), who report a positive effect of relisting on selling price in case of no agent change and a negative effect in case of an agent change, a mediating effect which could not be investigated in this study due to data limitations. Regarding the time gap in between listings, we hypothesized that immediate relisting has the strongest positive effect on selling price as it increases market exposure (Smith et al., 2016). However, for the restricted sample which only includes properties that were relisted once we find a weakly significant positive relation between the time gap in between listings and selling price. By taking a closer look at a different version of the model with dummies instead of a continuous variable we find that relisting a property after waiting for 8 to 30 days delivers the highest price premium, with a bonus of 2.27 percent compared to properties that were relisted in a time frame of up to seven days from taking

it off the market. In the case of Utrecht, it did therefore not make sense to relist a property immediately after taking it from the market as argued by Smith et al. (2016). Sellers were better off waiting for some time before relisting their home and in the best case they waited for 8 to 30 days. An explanation for this might be some form of market memory. First, after a certain time, bidders looking for a property might change. New bidders do not remember the relisted property from previous listings as they were not actively searching at the time of this listing. Secondly, the time gap might also contribute to buyers´ agents and bidders forget the property. The listing therefore appears to be fresh. More detailed information on the ratio of bidders to sellers and the frequency and length of search activities of bidders is necessary to analyse these assumptions. Generally, the possibility to manipulate prices through relisting supports the existence of inefficiencies in the real estate markets. This in line with the findings of Tucker et al. (2013).

Regarding the impact of relisting on TOM results reveal a strongly positive effect. Relisting a property leads to more than doubling the *Cumulative TOM* compared to properties that were not relisted. Here it would be interesting to have more information about sellers´ opinion about future market movements. Sellers who are optimistic about future market development might be more inclined to wait until prices start to go up again, at the same time trying to keep their property as visible on the marketplace as possible through relisting. As Springer (1996) finds, a characterization of sellers as eager results in a significant prolongation of marketing duration. Hence, it would be useful to have access to more information on sellers´ motivation and this is worth examining in future research. Besides sellers´ opinion about future market development, insights into their personal financial situation would be valuable. It is possible that sellers who relisted their properties were in general financially better endowed and could afford to wait longer. Matching the pattern for the selling price model, multiple relistings reinforce this effect and lead to an even longer marketing duration. It can therefore be concluded that relisting did lead to a higher selling price, but also that relisted properties stayed on the market for much longer before they were sold. The explanatory power of the TOM models is relatively low compared to the price model which is the case is many earlier studies as well (e.g. Knight, 2002; Benefield et al., 2012). Therefore, another recommendation for future research is to identify stronger determinants of marketing duration.

To check for the robustness of our results we divide the sample in several subsamples according to predefined price categories for houses and for apartments. We find partly differing coefficients for the effect of relisting on selling price. For houses, the percentage price premium achieved through relisting increases with transaction price, i.e. relisting higher priced homes leads to a higher premium than relisting lower priced houses. For apartments, the results are less consistent. In fact, relisting mid-priced apartments even leads to a small price discount in our sample. A possible explanation might be that the market for mid-priced flats, which represent about 50 percent of the condominium market in our sample,

is much more efficient than the thinner markets of low- and high-priced flats. As demand and search activity is more pronounced in this submarket, the effect of relisting might vanish as market memory is better. More offers might also lead to diminish the effect of relisting as relisted properties appear at the top of the search interface for only a limited amount of time until new listings (with the number of new listings being higher in this price category than for low- and high-priced flats) cut out relisted properties from their favourable position on the marketplace. Regarding variations of the effect of relisting on TOM, for houses there is a consistently positive but, with regards to size, differing coefficient. For mid-priced homes, relisting causes the largest prolongation of marketing duration, which might again point at the relative efficiency of the submarket of mid-priced properties. Applying relisting as a strategy to achieve a quicker sale does therefore not only fail (and cause in fact the reverse effect) in all submarkets but it does so particularly for mid-priced houses. Another possible explanation for this phenomenon might also be that owners of mid-priced houses were more patient as they expected to face greater demand than in the (smaller) submarkets of low- and high-priced homes. Hence, they might be inclined to wait for better offers. For apartments, relisting has a consistent positive effect on TOM across all price categories which resembles the findings from the main model.

7.2. Managerial implications

Besides private sellers of real estate the findings have particularly strong implications for holders of large portfolios of distressed properties. Especially during a crisis, a strongly increasing loan-to-value ratio often results in borrower default as sellers cannot repay the total debt upon sale[4]. As a means of last resort, the property is then transferred to the lender who tries to sell it and recoup as much of the loan as possible. For large lenders such as banks who are likely to face a substantial amount of borrower defaults, the decision of how to market these distressed properties can make a considerable financial difference. Financial institutions are therefore well advised to take considerations such as the decision whether, and in which way, to use relisting actively as a marketing strategy or not seriously.

7.3. Limitations

Like every academic study this one does also have several limitations. With regards to the dataset it is unfortunate that it does not provide variables on agent characteristics and, more importantly, information on if sellers worked with different agents in different listing periods. Agent change has proven to be a significant determinant of selling price when relisting in several studies (Smith et al.,

[4] According to a report by Dutch bank ABN AMRO (Van Leeuwen & Bokeloh, 2012) the mortgage default rate in the Netherlands only saw a modest increase during the financial crisis despite a high level of mortgage debt and was amongst the lowest internationally. Other countries however experienced a considerable increase of delinquency rates which can severely affect the banks´ balance sheets. Hence, the institutional setting in specific countries (such as insolvency law) must be considered when determining the exact implications of mortgage defaults.

2016; Benefield & Hardin, 2015). In fact, Benefield & Hardin (2015) find that the effect of relisting on transaction price is mediated by an agent change variable. They find that relisting with the same agent increases selling price, whereas changing the agent causes a lower price. Sellers´ loyalty seems to pay off in this case, but the lack of data does not allow us to make this differentiation in this study.

Furthermore, the results of this paper are most likely not replicable across different market environment. As stated by Benefield & Hardin (2015), "[…] selling strategies in normal markets are likely different from those in distressed markets." (Benefield & Hardin, 2015, p. 71). We do explicitly focus on a market downturn. In a hot market, when liquidity is much higher, and demand exceeds supply, relisting might not have the same effect. In fact, it is hardly justifiable to relist a property in this market environment. In a hot market, only those properties which not only suffer from *perceived* flaws because of an already long time-on-market but the ones which do in fact have these flaws are not sold and therefore relisted. Relisting a property in a hot market might therefore have a strongly negative correlation with quality or marketability measures.

Lastly, the dataset only included successful transactions which might cause a sample selection bias. For future research it would therefore be valuable to conduct the analyses with data that contain all listings, the ones that led to a sale and the ones that were eventually withdrawn.

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APPENDICES

Appendix A. Glossary of key terms

Term	Explanation
CLRM Assumptions	Classical linear regression model assumptions as stated by Gauss-Markov
Cumulative Time-on-Market (TOM)	Total marketing duration, starting from initial listing and ending with ultimate selling date, less the time gap in between listings
Degree of Overpricing (DOP)	Percentage difference between initial list price and *Expected Sales Price*
Expected Sales Price	Expected transaction price, obtained from a reduced form of equation (3.3)
Gap in Time ($\widehat{=}$ *Relist Gap*)	Either continuous variable (*RelGap*), defined as the sum of days between taking the property off the market and relisting it in the following period which is the selling period, or dummy variable (*Rel07*, *Rel830*, *Rel3160*), taking a value of 1 if the property was relisted within a period of 0 to 7 (8 to 30, 31 to 60) days and a value of 0 otherwise
Instrumental Variable (IV)	Instrumental variable replacing the endogenous independent variable in a 2SLS estimation to comply with CLRM assumptions
Locational Attributes	Dummy variables indicating location in Utrecht (1=yes) or Amersfoort (1=yes) and dummy variable indicating presence of at least one of several locational amenities: located at a forest, close to water, next to a park or if there is unobstructed view from the building (1=yes)
Marketability	Dummy variables indicating marketability of property (*Luxury* (1=yes), *Vacancy* (1=yes)) and relative size of the property (*Smaller* (1/0), *Larger* (1/0))
Multiple Listing Service (MLS)	Database used by real estate professionals to share information on listed properties to facilitate a sale and to enable collaboration
*Nederlandse Vereniging van Makelaars en Taxateurs in onroerende goederen (**NVM**)*	Dutch association of real estate brokers and real estate experts; branch organization of real estate agents in the Netherlands
Ordinary Least Squares (OLS)	Ordinary least squares regression
Property Attributes	Variables indicating physical attributes of property. Variables include size (square meters of living area and lot size), number of rooms, the existence of a garage (1=yes) and central heating

	(1=yes), its state of maintenance (1=good), the property type and its building period
Relative Size	Dummy variables indicating relative size of properties compared to other properties in the same municipality (*Smaller* or *Larger* than the average property in the municipality (1=yes))
Relist	Variables indicating if property was relisted (Relist (1=yes)) or how many times it was relisted (*Sum relist: 1*, *Sum relist: 2*, *Sum relist: 3*; (1=yes)), as well as time gap in between listings
Reviseddown	Dummy variable indicating if list price was revised downwards during the course of all subsequent listings (1=yes)
Selling Price (SP)	Ultimate selling price of the property
Temporal Attributes	Dummy variables indicating quarter of sale, starting from Q1 2008 and ending with Q4 2013
Time-on-Market (TOM)	Time-on-market; defined as period between listing date and delisting date (*TOM Listing Period 1* (2, 3, 4)), in regressions applied as *Cumulative TOM* as defined above
Two-Stage Least Squares (2SLS)	An estimation method used in the case of an independent variable in a regression being endogenous. The endogenous variables is replaced by an instrumental variable

Appendix B. Full estimation results

Table 10. 2SLS estimations for selling price

VARIABLES	(1) Log SP	(2) Log SP	(3) Log SP (only relist observations)	(4) Log SP (only relist observations)
IV Log TOM	-0.0272***	-0.0271***	-0.0595***	-0.0595***
	0.00160	0.00159	0.0144	0.0144
Relist (1=yes)	0.0271***			
	0.00386			
Sum relist: 1 (1=yes)		0.0260***		
		0.00405		
Sum relist: 2 (1=yes)		0.0285***		
		0.00901		
Sum relist: 3 (1=yes)		0.0511***		
		0.0196		
Log Relist gap			0.00570**	
			0.00290	
Rel830				0.0224**

				0.0111
Rel3160				0.0158
				0.0153
Canal house (1=yes)	0.189***	0.189***	0.207*	0.207*
	0.0331	0.0331	0.111	0.111
Manor (1=yes)	0.140***	0.140***	0.118***	0.118***
	0.00585	0.00585	0.0184	0.0183
Farm house (1=yes)	-0.142***	-0.142***	-0.304***	-0.303***
	0.0527	0.0527	0.113	0.113
Bungalow (1=yes)	0.197***	0.197***	0.143***	0.143***
	0.0115	0.0115	0.0357	0.0356
Villa (1=yes)	0.206***	0.207***	0.178***	0.178***
	0.00837	0.00836	0.0236	0.0236
Country house (1=yes)	0.0819*	0.0819*	0.0990	0.0985
	0.0426	0.0426	0.228	0.228
Groundfloor apartment (1=yes)	-0.00448	-0.00450	-0.0208	-0.0208
	0.00576	0.00576	0.0196	0.0196
Upstairs apartment (1=yes)	-0.0906***	-0.0907***	-0.0994***	-0.0991***
	0.00588	0.00588	0.0196	0.0196
Maisonnette (1=yes)	-0.0705***	-0.0705***	-0.0642***	-0.0648***
	0.00556	0.00556	0.0181	0.0182
"Portiekflat" (1=yes)	-0.0360***	-0.0360***	-0.0210	-0.0210
	0.00539	0.00539	0.0176	0.0176
"Galerijflat" (1=yes)	-0.0802***	-0.0802***	-0.0404**	-0.0406**
	0.00578	0.00578	0.0186	0.0186
Vacant (1=yes)	-0.123*	-0.123*		
	0.0632	0.0633		
Luxury (1=yes)	0.160***	0.160***	0.189***	0.189***
	0.00611	0.00611	0.0200	0.0200
Relative size: Smaller	-0.290***	-0.290***	-0.425***	-0.427***
	0.0297	0.0297	0.0948	0.0947
Relative size: Larger	-0.179***	-0.179***	-0.0582	-0.0566
	0.0268	0.0268	0.0889	0.0888
Sq.m.	0.00547***	0.00547***	0.00425***	0.00424***
	0.000255	0.000255	0.000844	0.000843
Lot size	0.000341***	0.000341***	0.000376***	0.000376***
	1.32e-05	1.32e-05	4.07e-05	4.07e-05
Number of rooms	0.0175***	0.0175***	0.0219***	0.0219***
	0.00153	0.00153	0.00583	0.00582
Number of bathrooms: 2 (1=yes)	0.0737***	0.0737***	0.105***	0.105***
	0.00647	0.00647	0.0206	0.0206
Number of bathrooms: 3-4 (1=yes)	-0.0963**	-0.0962**	0.148*	0.149*
	0.0449	0.0449	0.0900	0.0900
Number of balconies	0.0392***	0.0392***	0.0261***	0.0262***
	0.00294	0.00294	0.00957	0.00957
Garage (1=yes)	0.125***	0.125***	0.132***	0.132***
	0.00345	0.00345	0.0118	0.0118
Central heating (1=yes)	0.0554***	0.0555***	0.0565***	0.0561***
	0.00539	0.00539	0.0188	0.0188
Built: 1500-1905	0.174***	0.174***	0.180***	0.180***

	0.00582	0.00582	0.0181	0.0181
Built: 1906-1930	0.0615***	0.0615***	0.0889***	0.0885***
	0.00449	0.00449	0.0151	0.0151
Built: 1931-1944	0.0764***	0.0764***	0.0892***	0.0886***
	0.00515	0.00515	0.0166	0.0167
Built: 1945-1959	-0.0968***	-0.0967***	-0.0696***	-0.0702***
	0.00634	0.00633	0.0214	0.0214
Built: 1960-1970	-0.222***	-0.222***	-0.227***	-0.228***
	0.00418	0.00418	0.0155	0.0156
Built: 1971-1980	-0.202***	-0.202***	-0.190***	-0.190***
	0.00382	0.00382	0.0149	0.0149
Built: 1981-1990	-0.125***	-0.125***	-0.102***	-0.102***
	0.00368	0.00368	0.0144	0.0144
Built: 1991-2000	-0.0540***	-0.0540***	-0.0493***	-0.0497***
	0.00350	0.00350	0.0131	0.0132
Maintenance: Good (1=yes)	0.0975***	0.0975***	0.0709***	0.0705***
	0.00368	0.00368	0.0150	0.0151
q108	0.119***	0.119***	0.0699*	0.0701*
	0.00662	0.00662	0.0362	0.0362
q208	0.134***	0.134***	0.105***	0.105***
	0.00661	0.00661	0.0309	0.0309
q308	0.132***	0.132***	0.0577**	0.0577**
	0.00661	0.00661	0.0282	0.0282
q408	0.110***	0.110***	0.0659**	0.0662**
	0.00718	0.00718	0.0288	0.0288
q109	0.0945***	0.0945***	0.0331	0.0336
	0.00709	0.00709	0.0255	0.0255
q209	0.0999***	0.0999***	0.0382	0.0384
	0.00678	0.00678	0.0243	0.0243
q309	0.105***	0.105***	0.0745***	0.0746***
	0.00698	0.00698	0.0239	0.0238
q409	0.104***	0.104***	0.0746***	0.0744***
	0.00697	0.00697	0.0241	0.0241
q110	0.110***	0.110***	0.0769***	0.0774***
	0.00669	0.00669	0.0238	0.0237
q210	0.114***	0.114***	0.0604**	0.0604**
	0.00691	0.00691	0.0252	0.0252
q310	0.105***	0.105***	0.0758***	0.0759***
	0.00708	0.00708	0.0244	0.0244
q410	0.119***	0.119***	0.0813***	0.0816***
	0.00664	0.00664	0.0233	0.0233
q111	0.119***	0.119***	0.0893***	0.0892***
	0.00735	0.00735	0.0256	0.0256
q211	0.101***	0.101***	0.0483*	0.0480*
	0.00720	0.00720	0.0283	0.0283
q311	0.0996***	0.0996***	0.0618**	0.0619**
	0.00701	0.00701	0.0241	0.0241
q411	0.0840***	0.0839***	0.0275	0.0278
	0.00725	0.00725	0.0238	0.0238
q112	0.0689***	0.0688***	0.0233	0.0232

	0.00716	0.00716	0.0229	0.0229
q212	0.0451***	0.0450***	0.0279	0.0280
	0.00707	0.00707	0.0254	0.0254
q312	0.0261***	0.0261***	-0.00582	-0.00615
	0.00733	0.00733	0.0301	0.0301
q412	0.00111	0.00113	-0.0256	-0.0254
	0.00675	0.00675	0.0298	0.0298
q113	-0.0157*	-0.0157*	-0.0634	-0.0630
	0.00890	0.00890	0.0395	0.0395
q213	0.00146	0.00141	-0.0131	-0.0129
	0.00738	0.00738	0.0275	0.0275
q313	-0.0103	-0.0103	-0.00154	-0.000955
	0.00720	0.00720	0.0294	0.0293
Utrecht (1=yes)	0.0255***	0.0255***	-0.0161	-0.0164
	0.00565	0.00565	0.0201	0.0201
Amersfoort (1=yes)	-0.0640***	-0.0640***	-0.0889***	-0.0890***
	0.00321	0.00321	0.0115	0.0115
Amenities (1=yes)	0.0109***	0.0110***	0.0210***	0.0212***
	0.00217	0.00217	0.00789	0.00790
Constant	11.65***	11.65***	12.04***	12.04***
	0.0334	0.0333	0.134	0.134
Observations	37,176	37,176	2,860	2,860
R-squared	0.812	0.812	0.824	0.824
Partial R-squared	0.3508	0.3533	0.1306	0.1307
Robust F	25426.3	25661.6	473.88	474.047

Note: Reference category for Models (1) and (2) is a single-family house which is not, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 11. 2SLS estimations for TOM

VARIABLES	(1) Log TOM	(2) Log TOM
IV DOP	0.0760**	0.0778**
	0.0378	0.0377
Relist (1=yes)	1.140***	
	0.0134	
Sum relist: 1 (1=yes)		1.081***
		0.0146
Sum relist: 2 (1=yes)		1.398***
		0.0256
Sum relist: 3 (1=yes)		1.610***
		0.0454
Canal house (1=yes)	0.125	0.128
	0.129	0.129
Manor (1=yes)	0.124***	0.124***
	0.0288	0.0288

Farm house (1=yes)	0.0305	0.0377
	0.172	0.172
Bungalow (1=yes)	0.268***	0.271***
	0.0501	0.0501
Villa (1=yes)	0.127***	0.130***
	0.0391	0.0391
Country house (1=yes)	0.133	0.130
	0.130	0.130
Groundfloor apartment (1=yes)	0.0503*	0.0492*
	0.0290	0.0289
Upstairs apartment (1=yes)	0.118***	0.114***
	0.0278	0.0278
Maisonnette (1=yes)	0.0352	0.0345
	0.0325	0.0325
"Portiekflat" (1=yes)	0.104***	0.102***
	0.0248	0.0248
"Galerijflat" (1=yes)	0.0577**	0.0568**
	0.0283	0.0282
Vacant (1=yes)	0.882***	0.881***
	0.201	0.201
Luxury (1=yes)	-0.00814	-0.00749
	0.0294	0.0293
Relative size: Smaller	-0.485***	-0.483***
	0.124	0.124
Relative size: Larger	0.220*	0.223*
	0.115	0.115
Sq.m.	0.000120	0.000101
	0.00106	0.00106
Lot size	1.69e-05	1.49e-05
	3.96e-05	3.96e-05
Number of rooms	-0.0665***	-0.0663***
	0.00738	0.00738
Number of bathrooms: 2 (1=yes)	-0.00142	-0.00353
	0.0283	0.0283
Number of bathrooms: 3-4 (1=yes)	0.193	0.194
	0.128	0.128
Number of balconies	-0.0337**	-0.0333**
	0.0144	0.0143
Garage (1=yes)	0.153***	0.152***
	0.0175	0.0174
Central heating (1=yes)	-0.00225	-0.00207
	0.0260	0.0260
Built: 1500-1905	-0.214***	-0.216***
	0.0291	0.0291
Built: 1906-1930	-0.279***	-0.280***
	0.0242	0.0241
Built: 1931-1944	-0.353***	-0.352***
	0.0270	0.0270

Built: 1945-1959	-0.228***	-0.227***
	0.0286	0.0286
Built: 1960-1970	-0.0902***	-0.0895***
	0.0229	0.0229
Built: 1971-1980	-0.190***	-0.189***
	0.0227	0.0227
Built: 1981-1990	-0.166***	-0.165***
	0.0227	0.0227
Built: 1991-2000	-0.0500**	-0.0502**
	0.0214	0.0214
Maintenance: Good (1=yes)	0.137***	0.137***
	0.0197	0.0197
q108	-0.963***	-0.963***
	0.0358	0.0358
q208	-1.040***	-1.040***
	0.0349	0.0349
q308	-0.960***	-0.960***
	0.0360	0.0360
q408	-0.784***	-0.785***
	0.0386	0.0386
q109	-0.618***	-0.620***
	0.0393	0.0394
q209	-0.610***	-0.611***
	0.0379	0.0379
q309	-0.483***	-0.487***
	0.0382	0.0382
q409	-0.504***	-0.507***
	0.0389	0.0389
q110	-0.342***	-0.342***
	0.0470	0.0469
q210	-0.554***	-0.556***
	0.0384	0.0384
q310	-0.465***	-0.468***
	0.0394	0.0394
q410	-0.430***	-0.433***
	0.0378	0.0378
q111	-0.368***	-0.370***
	0.0406	0.0406
q211	-0.386***	-0.387***
	0.0472	0.0471
q311	-0.356***	-0.356***
	0.0393	0.0392
q411	-0.257***	-0.259***
	0.0397	0.0397
q112	-0.147***	-0.153***
	0.0398	0.0398
q212	-0.166***	-0.169***
	0.0400	0.0400

q312	-0.137***	-0.137***
	0.0427	0.0427
q412	-0.111***	-0.111***
	0.0391	0.0391
q113	-0.0286	-0.0300
	0.0483	0.0483
q213	-0.128***	-0.130***
	0.0426	0.0426
q313	-0.178***	-0.179***
	0.0424	0.0423
Utrecht (1=yes)	-0.271***	-0.271***
	0.0264	0.0264
Amersfoort (1=yes)	-0.182***	-0.181***
	0.0181	0.0181
Amenities (1=yes)	0.0441***	0.0442***
	0.0119	0.0119
Constant	5.302***	5.306***
	0.136	0.136
Observations	37,176	37,176
R-squared	0.194	0.196
Partial R-squared	0.2664	0.2666
Robust F	580.429	580.658

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 12. 2SLS estimations for selling price of houses: Low, mid- and high-priced houses

	(1)	(2)	(3)
	Low-Priced	**Mid-Priced**	**High-Priced**
VARIABLES	Log SP	Log SP	Log SP
IV Log TOM	-0.00665***	-0.0142***	-0.0294***
	0.00169	0.00150	0.00343
Relisted (1=yes)	0.00644	0.0140***	0.0283***
	0.00410	0.00385	0.00792
Canal house (1=yes)	-0.281***	0.0712***	0.154***
	0.0102	0.0228	0.0343
Manor (1=yes)	0.00830	0.0649***	0.0531***
	0.0180	0.00520	0.00573
Farm house (1=yes)	-0.0554***	-0.200***	-0.0452
	0.0184	0.0684	0.0405
Bungalow (1=yes)	-0.0748**	0.0892***	0.0899***
	0.0301	0.0108	0.0113
Villa (1=yes)	-	0.111***	0.164***
	-	0.0182	0.00711

Country house (1=yes)	-	0.0788	0.137***
	-	0.0640	0.0363
Vacant (1=yes)	-0.411***	0.0393	0.117*
	0.0642	0.0427	0.0618
Luxury (1=yes)	-	-	-
	-	-	-
Relative size: Smaller	0.0359	0.295***	-0.0480
	0.0310	0.0284	0.0786
Relative size: Larger	-0.280***	-0.313***	-0.0353
	0.0332	0.0236	0.0465
Square meter	0.00334***	0.00532***	0.00273***
	0.000273	0.000225	0.000419
Lot size	2.70e-05	0.000283***	0.000227***
	1.85e-05	3.27e-05	1.05e-05
Number of rooms	0.00273	0.00677***	0.0159***
	0.00198	0.00132	0.00241
Number of bathrooms: 2 (1=yes)	0.00384	0.0168***	0.0722***
	0.00892	0.00557	0.00667
Number of bathrooms: 3-4 (1=yes)	-0.0744***	0.0310	0.0597
	0.0219	0.0616	0.0377
Number of balconies	0.00664	0.0167***	0.0249***
	0.00467	0.00316	0.00481
Garage (1=yes)	0.0313***	0.0448***	0.0343***
	0.00619	0.00313	0.00503
Central heating (1=yes)	0.0409***	0.00916*	0.0396***
	0.00691	0.00551	0.0113
Built: 1500-1905	-0.00524	0.0775***	0.146***
	0.00938	0.00679	0.0115
Built: 1906-1930	-0.0333***	0.0447***	0.101***
	0.00727	0.00456	0.00870
Built: 1931-1944	-0.0362***	0.0428***	0.0918***
	0.0102	0.00504	0.00846
Built: 1945-1959	-0.0673***	0.00205	0.0661***
	0.00904	0.00633	0.0113
Built: 1960-1970	-0.0726***	-0.0762***	-0.0269**
	0.00750	0.00441	0.0115
Built: 1971-1980	-0.0679***	-0.0932***	-0.0638***
	0.00728	0.00355	0.00992
Built: 1981-1990	-0.0389***	-0.0664***	-0.0258***
	0.00707	0.00339	0.01000
Built: 1991-2000	-0.0118	-0.0356***	-0.0314***
	0.00727	0.00318	0.00812
Maintenance: Good (1=yes)	0.0568***	0.0440***	0.0771***
	0.00394	0.00470	0.00839
q108	0.0897***	0.0318***	0.0839***
	0.00641	0.00633	0.0141
q208	0.0945***	0.0412***	0.101***
	0.00681	0.00635	0.0136
q308	0.0952***	0.0366***	0.0826***
	0.00814	0.00645	0.0142

q408	0.0902***	0.0236***	0.0717***
	0.00738	0.00690	0.0156
q109	0.0825***	0.0250***	0.0362**
	0.00760	0.00703	0.0157
q209	0.0936***	0.0287***	0.0400***
	0.00689	0.00673	0.0152
q309	0.0846***	0.0331***	0.0676***
	0.00763	0.00664	0.0153
q409	0.0791***	0.0335***	0.0729***
	0.00808	0.00706	0.0148
q110	0.0825***	0.0355***	0.0738***
	0.00727	0.00676	0.0150
q210	0.0860***	0.0404***	0.0789***
	0.00779	0.00665	0.0142
q310	0.0691***	0.0315***	0.0560***
	0.00756	0.00696	0.0150
q410	0.0915***	0.0403***	0.0875***
	0.00684	0.00677	0.0155
q111	0.0649***	0.0454***	0.0650***
	0.00939	0.00701	0.0162
q211	0.0646***	0.0381***	0.0728***
	0.0109	0.00699	0.0145
q311	0.0531***	0.0395***	0.0837***
	0.00780	0.00710	0.0166
q411	0.0566***	0.0298***	0.0557***
	0.00759	0.00724	0.0162
q112	0.0446***	0.0285***	0.0422**
	0.00789	0.00755	0.0165
q212	0.0380***	0.0153**	0.0387**
	0.00721	0.00722	0.0165
q312	0.0239***	-0.00536	0.0177
	0.00764	0.00766	0.0178
q412	0.0191***	-0.00657	-0.00457
	0.00655	0.00709	0.0155
q113	0.00480	0.000141	0.0378*
	0.00873	0.00948	0.0217
q213	0.00679	0.00527	-0.0164
	0.00705	0.00753	0.0163
q313	-0.0128*	-0.00354	-0.00444
	0.00747	0.00816	0.0155
Utrecht	0.0400***	0.0932***	0.0274*
	0.00580	0.00603	0.0142
Amersfoort	-0.00981***	-0.0173***	-0.0376***
	0.00344	0.00321	0.00801
Locational amenities (1=yes)	0.00228	0.0101***	-0.000282
	0.00284	0.00205	0.00458
Constant	11.77***	11.77***	12.33***
	0.0362	0.0304	0.0605
Observations	6,263	12,457	6,234

R-squared	0.377	0.358	0.674
Partial R-squared	0.4057	0.3561	0.3383
Robust F	4877.69	9022.75	4232.14

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 13. 2SLS estimations for selling price of apartments: Low-, mid- and high-priced apartments

	(1)	(2)	(3)
	Low-Priced	**Mid-Priced**	**High-Priced**
VARIABLES	Log SP	Log SP	Log SP
IV Log TOM	-0.0104	-0.00605***	-0.0342***
	0.00652	0.00174	0.00541
Relist (1=yes)	0.0331**	-0.00660*	0.0271***
	0.0141	0.00366	0.00969
Groundfloor apartment (1=yes)	0.0252	0.0307***	0.0358***
	0.0173	0.00405	0.0130
Upstairs apartment (1=yes)	0.00104	0.0112**	-0.0172
	0.0181	0.00436	0.0139
Maisonnette (1=yes)	0.0143	0.0117***	-0.0577***
	0.0130	0.00355	0.0134
"Portiekflat" (1=yes)	0.0154	0.0110***	0.0510***
	0.00977	0.00265	0.00912
"Galerijflat" (1=yes)	-	-	-
	-	-	-
Vacant (1=yes)	-	-0.0777***	-
	-	0.00650	-
Luxury (1=yes)	0.0615***	0.0245***	0.0811***
	0.0164	0.00398	0.00744
Relative size: Smaller	-1.894***	0.437***	0.288*
	0.191	0.0498	0.160
Relative size: Larger	1.123***	-0.467***	-0.204
	0.388	0.0592	0.152
Sq.m.	-0.0160***	0.00621***	0.00952***
	0.00180	0.000468	0.00150
Lot size	-	-	-
	-	-	-
Number of rooms	0.0724***	0.00575***	-0.00958**
	0.00683	0.00174	0.00482
Number of bathrooms: 2 (1=yes)	-0.217	0.00424	0.0960***
	0.135	0.0185	0.0200
Number of bathrooms: 3-4 (1=yes)	-	-	-
	-	-	-
Number of balconies	0.0444***	-0.00192	-0.000115
	0.0114	0.00239	0.00612
Garage (1=yes)	-0.0243	0.0464***	0.0831***
	0.0457	0.00839	0.0114
Central heating (1=yes)	0.0355**	0.0171***	0.00484

	0.0180	0.00428	0.0161
Built: 1500-1905	0.0249	0.00845	0.124***
	0.0185	0.00724	0.0144
Built: 1906-1930	-0.0481***	-0.0324***	0.0395***
	0.0171	0.00525	0.0146
Built: 1931-1944	-0.0438**	-0.0176**	-0.0347**
	0.0196	0.00695	0.0170
Built: 1945-1959	-0.283***	-0.0756***	-0.110***
	0.0244	0.00458	0.0194
Built: 1960-1970	-0.196***	-0.113***	-0.135***
	0.0163	0.00392	0.0232
Built: 1971-1980	-0.126***	-0.0936***	-0.0602***
	0.0169	0.00438	0.0173
Built: 1981-1990	-0.143***	-0.0503***	-0.00527
	0.0158	0.00435	0.0144
Built: 1991-2000	-0.0267	0.00226	-0.0167**
	0.0188	0.00381	0.00819
Maintenance: Good (1=yes)	0.0260***	0.0319***	0.0957***
	0.00797	0.00374	0.0166
q108	0.0560	0.0674***	0.0715***
	0.0351	0.00767	0.0211
q208	0.0663**	0.0683***	0.0728***
	0.0338	0.00785	0.0207
q308	0.113***	0.0805***	0.0975***
	0.0254	0.00779	0.0210
q408	0.119***	0.0615***	0.0786***
	0.0270	0.00796	0.0243
q109	0.103***	0.0586***	0.0566**
	0.0278	0.00782	0.0224
q209	0.0614**	0.0574***	0.0589***
	0.0304	0.00765	0.0214
q309	0.0726**	0.0612***	0.0711***
	0.0286	0.00802	0.0219
q409	0.0704***	0.0499***	0.0684***
	0.0267	0.00781	0.0219
q110	0.109***	0.0564***	0.0590***
	0.0195	0.00768	0.0202
q210	0.0722**	0.0544***	0.0623***
	0.0296	0.00773	0.0210
q310	0.0650**	0.0616***	0.0802***
	0.0271	0.00825	0.0217
q410	0.0919***	0.0485***	0.0752***
	0.0194	0.00768	0.0221
q111	0.0541**	0.0549***	0.108***
	0.0250	0.00801	0.0223
q211	0.0598***	0.0526***	0.0679***
	0.0225	0.00801	0.0226
q311	0.0740***	0.0465***	0.0766***
	0.0200	0.00854	0.0220
q411	0.0592***	0.0294***	0.0918***

	0.0185	0.00851	0.0222
q112	0.0650***	0.0288***	0.0486**
	0.0190	0.00879	0.0240
q212	0.00926	0.0338***	0.0163
	0.0198	0.00851	0.0226
q312	0.0392**	0.0205**	0.0146
	0.0190	0.00998	0.0243
q412	0.00584	0.00456	0.0103
	0.0190	0.00878	0.0237
q113	-0.0251	-0.00376	-0.0338
	0.0242	0.0114	0.0317
q213	-0.000915	0.00317	-0.00349
	0.0192	0.00985	0.0244
q313	0.0118	-0.00411	0.0445*
	0.0165	0.00894	0.0246
Utrecht (1=yes)	-0.113***	0.0669***	0.0732**
	0.0212	0.00666	0.0291
Amersfoort (1=yes)	0.0642***	-0.0297***	-0.0639***
	0.0100	0.00305	0.0147
Amenities (1=yes)	-0.0242***	0.00742***	0.0166***
	0.00683	0.00205	0.00620
Constant	13.46***	11.38***	11.47***
	0.204	0.0551	0.185
Observations	3,069	6,099	3,054
R-squared	0.277	0.352	0.601
Partial R-squared	0.3347	0.316	0.2705
Robust F	1617.57	3550.1	1499.92

Note: Reference category is a flat in a multi-family house (Galerijflat) which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 14. 2SLS estimations for TOM of houses: Low, mid- and high-priced houses

	(1)	(2)	(3)
	Low-Priced	**Mid-Priced**	**High-Priced**
VARIABLES	Log TOM	Log TOM	Log TOM
IV DOP	-0.0263	-0.0434	0.0371
	0.0807	0.0462	0.0823
Relist (1=yes)	1.109***	1.209***	1.153***
	0.0363	0.0233	0.0326
Canal house (1=yes)	0.259**	0.346*	0.143
	0.103	0.177	0.177
Manor (1=yes)	-0.174	0.237***	0.160***
	0.301	0.0486	0.0375
Farm house (1=yes)	0.781***	-0.0210	0.100
	0.218	0.442	0.195
Bungalow (1=yes)	0.563***	0.231***	0.253***

	0.143	0.0890	0.0709
Villa (1=yes)	-	0.481***	0.198***
	-	0.137	0.0431
Country house (1=yes)	-	-0.452	0.229
	-	0.332	0.140
Vacant (1=yes)	1.131***	0.504**	0.886***
	0.344	0.232	0.311
Luxury (1=yes)	-	-	-
	-	-	-
Relative size: Smaller	-0.902**	0.488*	0.854*
	0.395	0.274	0.476
Relative size: Larger	0.600	-0.127	0.763***
	0.409	0.228	0.223
Sq.m.	-9.32e-05	0.00699***	-0.00519***
	0.00341	0.00212	0.00201
Lot size	-0.000380***	0.000444***	0.000129***
	0.000124	0.000140	4.84e-05
Number of rooms	-0.0900***	-0.0369***	-0.0185
	0.0212	0.0127	0.0138
Number of bathrooms: 2 (1=yes)	-0.0916	0.171***	-0.0763*
	0.109	0.0495	0.0394
Number of bathrooms: 3-4 (1=yes)	0.821*	0.0962	0.104
	0.484	0.235	0.140
Number of balconies	-0.0432	0.00791	-0.0470
	0.0526	0.0291	0.0300
Garage (1=yes)	0.165***	0.190***	0.116***
	0.0582	0.0267	0.0327
Central heating (1=yes)	-0.00331	0.0447	0.171**
	0.0575	0.0525	0.0755
Built: 1500-1905	-0.157	-0.134**	-0.204***
	0.0972	0.0564	0.0648
Built: 1906-1930	-0.197***	-0.284***	-0.320***
	0.0760	0.0432	0.0556
Built: 1931-1944	-0.158*	-0.340***	-0.366***
	0.0893	0.0449	0.0562
Built: 1945-1959	-0.407***	-0.172***	-0.280***
	0.0881	0.0580	0.0702
Built: 1960-1970	-0.271***	-0.115***	-0.00605
	0.0764	0.0435	0.0705
Built: 1971-1980	-0.392***	-0.161***	-0.0272
	0.0745	0.0380	0.0624
Built: 1981-1990	-0.290***	-0.164***	0.0706
	0.0724	0.0370	0.0680
Built: 1991-2000	-0.218***	-0.0996***	0.0386
	0.0754	0.0346	0.0553
Maintenance: Good (1=yes)	0.160***	0.140***	0.0550
	0.0388	0.0416	0.0508
q108	-0.769***	-0.829***	-0.995***
	0.0843	0.0650	0.0922
q208	-0.791***	-0.989***	-1.005***

	0.0877	0.0634	0.0874
q308	-0.787***	-0.856***	-0.972***
	0.0872	0.0652	0.0936
q408	-0.549***	-0.755***	-0.783***
	0.0899	0.0694	0.0995
q109	-0.465***	-0.553***	-0.494***
	0.0922	0.0729	0.106
q209	-0.456***	-0.432***	-0.727***
	0.0877	0.0680	0.101
q309	-0.405***	-0.331***	-0.461***
	0.0971	0.0692	0.0988
q409	-0.338***	-0.416***	-0.476***
	0.0907	0.0716	0.100
q110	-0.493***	-0.323***	-0.276**
	0.105	0.0796	0.117
q210	-0.534***	-0.517***	-0.496***
	0.0936	0.0689	0.0975
q310	-0.257***	-0.415***	-0.536***
	0.0898	0.0717	0.102
q410	-0.309***	-0.378***	-0.470***
	0.0865	0.0693	0.101
q111	-0.300***	-0.349***	-0.472***
	0.0918	0.0746	0.106
q211	-0.175*	-0.452***	-0.605***
	0.0998	0.0808	0.119
q311	-0.195**	-0.253***	-0.566***
	0.0853	0.0705	0.102
q411	-0.194**	-0.210***	-0.294***
	0.0850	0.0719	0.110
q112	-0.0348	-0.0788	-0.185*
	0.0801	0.0747	0.103
q212	-0.102	-0.163**	-0.187
	0.0820	0.0728	0.115
q312	0.00352	-0.0839	-0.313***
	0.0817	0.0802	0.114
q412	-0.0575	-0.0797	-0.0638
	0.0754	0.0743	0.102
q113	-0.0822	-0.0338	0.131
	0.102	0.0898	0.135
q213	-0.0938	-0.133	-0.117
	0.0803	0.0811	0.116
q313	-0.264***	-0.186**	-0.0882
	0.0814	0.0856	0.110
Utrecht (1=yes)	-0.224***	-0.150***	-0.401***
	0.0717	0.0566	0.0779
Amersfoort (1=yes)	-0.222***	-0.0896***	-0.184***
	0.0416	0.0331	0.0499
Amenities (1=yes)	0.0147	0.0255	-0.00628
	0.0329	0.0209	0.0287
Constant	5.616***	4.051***	5.507***

	0.424	0.279	0.279
Observations	6,263	12,457	6,234
R-squared	0.126	0.207	0.227
Partial R-squared	0.4882	0.4923	0.2937
Robust F	801.291	1709.09	225.938

Note: Reference category is a single-family house which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.

Table 15. 2SLS estimations for TOM of apartments: Low, mid- and high-priced apartments

	(1)	(2)	(3)
	Low-Priced	**Mid-Priced**	**High-Priced**
VARIABLES	Log TOM	Log TOM	Log TOM
IV DOP	-0.0757	-0.107*	0.0770
	0.141	0.0601	0.101
Relisted (1=yes)	1.109***	1.042***	1.057***
	0.0498	0.0322	0.0394
Groundfloor apartment (1=yes)	0.0441	0.0412	-0.0217
	0.0816	0.0531	0.0848
Upstairs apartment (1=yes)	0.0987	0.0996*	0.0859
	0.0810	0.0552	0.0831
Maisonnette (1=yes)	0.0878	-0.0743	0.0332
	0.106	0.0494	0.0812
"Portiekflat" (1=yes)	0.0353	-0.00244	0.0971
	0.0476	0.0348	0.0635
"Galerijflat" (1=yes)	-	-	-
	-	-	-
Vacant (1=yes)	-	-0.696***	-
	-	0.0880	-
Luxury (1=yes)	-0.309***	-0.0585	0.0105
	0.0985	0.0501	0.0446
Relative size: Smaller	2.257**	0.261	-1.097
	0.925	0.553	0.732
Relative size: Larger	-5.376**	-0.767	0.630
	2.675	0.731	0.693
Sq.m.	0.0321***	0.00852*	-0.00308
	0.00835	0.00516	0.00671
Lot size	-	-	-
	-	-	-
Number of rooms	-0.230***	-0.0599***	-0.0857***
	0.0350	0.0217	0.0272
Number of bathrooms: 2 (1=yes)	0.484**	-0.0927	0.0900
	0.239	0.247	0.101
Number of bathrooms: 3-4 (1=yes)	-	-	-
	-	-	-
Number of balconies	-0.00801	-0.0206	-0.0152
	0.0529	0.0320	0.0363

Garage (1=yes)	0.126	0.238***	0.00307
	0.225	0.0847	0.0700
Central heating (1=yes)	-0.113	0.0788	0.0299
	0.0729	0.0543	0.100
Built: 1500-1905	0.00138	-0.198**	-0.226***
	0.136	0.0834	0.0784
Built: 1906-1930	-0.0765	-0.330***	-0.271***
	0.110	0.0628	0.0803
Built: 1931-1944	0.129	-0.337***	-0.414***
	0.151	0.0818	0.100
Built: 1945-1959	-0.0362	-0.190***	-0.141
	0.113	0.0577	0.121
Built: 1960-1970	-0.00396	-0.112**	-0.0884
	0.0993	0.0509	0.132
Built: 1971-1980	-0.280***	-0.336***	-0.0992
	0.106	0.0564	0.0917
Built: 1981-1990	-0.330***	-0.156***	-0.140
	0.105	0.0535	0.0935
Built: 1991-2000	0.219	-0.0162	-0.0478
	0.179	0.0512	0.0519
Maintenance: Good (1=yes)	0.205***	0.198***	0.0653
	0.0509	0.0519	0.107
q108	-1.185***	-1.126***	-1.100***
	0.134	0.101	0.120
q208	-1.142***	-1.143***	-1.088***
	0.141	0.0995	0.120
q308	-1.114***	-1.066***	-0.953***
	0.134	0.100	0.118
q408	-1.002***	-0.806***	-0.879***
	0.159	0.103	0.131
q109	-1.054***	-0.728***	-0.493***
	0.128	0.104	0.123
q209	-0.984***	-0.700***	-0.684***
	0.129	0.104	0.131
q309	-0.983***	-0.599***	-0.532***
	0.125	0.104	0.124
q409	-0.749***	-0.664***	-0.502***
	0.138	0.104	0.132
q110	-0.695***	-0.500***	-0.325**
	0.161	0.112	0.150
q210	-0.732***	-0.596***	-0.544***
	0.146	0.107	0.126
q310	-0.799***	-0.509***	-0.422***
	0.131	0.107	0.129
q410	-0.806***	-0.446***	-0.318**
	0.120	0.103	0.125
q111	-0.478***	-0.317***	-0.274**
	0.138	0.107	0.130
q211	-0.639***	-0.420***	-0.331**
	0.155	0.115	0.158

q311	-0.627***	-0.287***	-0.375***
	0.118	0.111	0.133
q411	-0.538***	-0.165	-0.202
	0.115	0.109	0.130
q112	-0.444***	-0.0464	-0.173
	0.112	0.111	0.144
q212	-0.352***	-0.0805	-0.0296
	0.116	0.111	0.127
q312	-0.295**	-0.107	-0.275*
	0.129	0.121	0.157
q412	-0.359***	-0.135	-0.0456
	0.109	0.115	0.159
q113	-0.233*	0.111	-0.0865
	0.128	0.130	0.157
q213	-0.438***	0.153	-0.103
	0.121	0.121	0.147
q313	-0.167	-0.172	-0.157
	0.110	0.124	0.160
Utrecht (1=yes)	0.136	-0.227***	-0.546***
	0.116	0.0803	0.145
Amersfoort (1=yes)	-0.237***	-0.202***	-0.308***
	0.0607	0.0427	0.0866
Amenities (1=yes)	0.158***	0.0667**	0.0370
	0.0409	0.0272	0.0379
Constant	2.539**	4.416***	5.964***
	1.002	0.613	0.839
Observations	3,069	6,099	3,054
R-squared	0.206	0.243	0.281
Partial R-squared	0.3723	0.5543	0.3929
Robust F	175.719	1294.67	126.321

Note: Reference category is a flat in a multi-family house (Galerijflat) which is not relisted, located outside of Utrecht or Amersfoort, built after 2001, not vacant or luxury, with one bathroom and no garage, no central heating, no good maintenance, no amenities and sold in Q4 2013. ***, **, * indicating significance at 1%, 5% and 10%, respectively.