List prices in Icelandic residential property sales

- A strategic tool for achieving higher sales price or shorter time-on-market?

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Utgångspriser i isländska bostadsförsäljningar – ett strategiskt verktyg för att uppnå högre försäljningspriser eller kortare tid-på-marknaden?

List prices in Icelandic residential property sales – a strategic tool for achieving higher sale prices or shorter time-on-market?

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Abstract

In recent years, Iceland has experienced a growing demand for residential housing and the average square-meter price for apartments and single-family homes in the Capital Region has almost doubled between 2010 and 2019. Property sales in Iceland are most commonly intermediated by real estate brokers and the sales process stands in contrast to other Nordic countries, since it involves a bidding procedure with sealed, or secret, bids. In a property auction with sealed bids, the announced *list price* becomes a particularly important piece of information for buyers as the offers remain secret and are unobservable to other bidding participants as the auction progresses.

This study seeks to address list prices' impact on the final sales price as well as the length of sale in Icelandic housing transactions. We also study the standard practice of list price determination among Icelandic real estate brokers and investigate how their pricing strategies influences the outcome of a sale. The following two hypotheses were formulated: (1) A list price below a property's market value leads to lower sale prices, (2) A list price below a property's market value leads to shorter time-on-market. These hypotheses were formulated based on observations in existing research.

Based on our hypotheses, we conducted a regression analysis based on two different empirical approaches using a comprehensive collection of residential transaction data collected from HMS, Iceland. The data set contained 56 818 transactions of apartments and single-family houses (semi-detached and detached) sold in the Capital Region of Iceland over the period January 2014 to August 2020. Furthermore, we sent out a survey to members of the Association of Real Estate Agents in Iceland, to gain deeper understanding of how Icelandic brokers determines list prices.

The results show that both hypothesis 1 and 2 receive support and thus, we found that a list price below the property's value leads to a lower sale price and shorter time on the market, respectively. This result indicates that there is a trade-off between sales price and the length of a sale. Conversely, there is a positive correlation between a list price above the property's market value and a higher sale price as well as longer time on market. From the survey results, we found that the standard pricing strategy among these brokers is to list objects at, or slightly higher than the market value of the property. In turn, we could conclude that the brokers adopt the pricing strategy that results in higher prices at the expense of time on the market, which becomes elongated.

Sammanfattning

På senare år har det varit en växande efterfrågan för bostäder på Island och det genomsnittliga kvadratmeterpriset för lägenheter och småhus i huvudstadsregionen har nästan fördubblats mellan år 2010 och 2019. Bostadsförsäljningar på Island förmedlas oftast av fastighetsmäklare och försäljningsprocessen står i kontrast till andra nordiska länder, då den involverar en budgivning med slutna, eller hemliga, bud. I en bostadsauktion med slutna bud blir det utannonserade utgångspriset en särskilt viktig information för köpare eftersom buden hålls hemliga och är inte observerbara för andra involverade budgivare under tiden som auktionen pågår.

Denna studie redogör för utgångsprisers inverkan på det slutliga försäljningspriset samt försäljningstiden i isländska bostadstransaktioner. Vi undersöker även hur utgångspriser vanligen sätts bland isländska fastighetsmäklare och hur deras prissättningsstrategier påverkar utfallet i försäljningarna. Följande två hypoteser formulerades: (1) Ett utgångspris lägre än marknadsvärdet leder till ett lägre försäljningspris och (2) Ett utgångspris lägre än marknadsvärdet leder till en kortare tid-på-marknaden. Dessa formulerades med hänsyn till resultat från tidigare studier avseende dessa relationer samt teoretiska resonemang.

Utifrån våra hypoteser genomfördes en regressionsanalys baserat på två olika empiriska tillvägagångssätt, genom att använda ett omfattande dataset erhållen från HMS, Island. Datasetet innehöll 56 818 transaktioner av lägenheter och småhus (parhus samt fristående hus) sålda i Islands huvudstadsregion under perioden januari 2014 och augusti 2020. En enkät skickades även ut till medlemmar av the Association of Real Estate Agents på Island för att få en djupare förståelse för hur isländska mäklare bestämmer utgångspriser.

Resultaten visar stöd för både hypotes 1 och 2 och vi finner således att ett utgångspris lägre än marknadsvärdet bidrar till ett lägre försäljningspris respektive en kortare tid på marknaden. Resultatet indikerar på att det finns en ”trade-off” mellan försäljningspriset och tiden på marknaden. Motsatsvis finner vi att högre utgångspriser är positivt korrelerade med höga försäljningspriser och längre tid på marknaden. Resultaten från enkäten visar att mäklarna vanligtvis sätter utgångspriser ovanför eller intill marknadsvärdet. Vi kan således dra slutsatsen om att isländska fastighetsmäklare anammar en strategi som resulterar i högre försäljningspriser på bekostnad av försäljningstiden, som blir längre.

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Alexandra Hansson Felicia Johansson

Lund, January 6th 2021

Innehållsförteckning

1 Introduction

1.1 Background

In recent years, Iceland has experienced a growing demand for residential housing due to a stable rise in population and the number of tourists. The demand is further encouraged by historically low interest rates and slow adjustments in the supply of newly built residences. As a result, there has been an increased number of properties transacted as well as an increase in housing prices. For instance, the average square-meter price for apartments, detached and semi-detached houses in the Capital Region[1] has almost doubled between 2010 and 2019 (Registers Iceland, 2019).

Sales of residential properties in Iceland stand in contrast to other Nordic countries, whose sales format are predominantly based on a procedure with public bids[2], e.g., Sweden (Hungria-Gunnelin et al., 2019) and Norway (Olaussen et. al., 2018). In Iceland, buyers are placing their bids without necessarily having any information about the temporary highest bid, the number of bidders involved and the strategies of his or her competitors. Hence, the procedure of selling or purchasing real estate in Iceland resembles a type of sealed-bid auction[3], in which offers remain secret and are unobservable to one another as the auction progresses.

When a house is sold through an auction based on sealed bids, the announced *list price* becomes a particularly important piece of information. According to findings in previous empirical research, list prices are argued to impact the number of bidders, selling price, buyers' perception of quality, duration on market, etc. List prices have also been found to serve varying functions depending on the auction format. Moreover, since real estate agents usually facilitate property sales, the strategic aspects of list prices are also emphasized. For instance, real estate brokers might desire to attract a broad field of buyers, increase the potential for a higher return and close deals quickly, where list prices have received attention as an area of research in regard to these desired outcomes.

Against this background, our thesis addresses the impact of list prices on the sales price and the time-on-market in the context of a sealed-bid system, with the Icelandic residential housing market serving as example. We also study the standard practice of list price determination among Icelandic brokers to evaluate the strategic aspects of list prices in regard to sales price and the length of time a property is on the market. The impact of list prices will primarily be examined through regression analysis, based on two different hypotheses and empirical approaches. The first hypothesis concerns the

[1] The Capital Region of Iceland, also referred to as the Greater Reykjavík, comprises of the national capital Reykjavík and the six surrounding municipalities *Kópavogur, Hafnafjörður, Garðabær, Mosfellsbær, Seltjarnarnes* and *Kjósarhreppur.*

[2] Auctions with publicly announced bids.

[3] Auctions with secret, or non-observable, bids. A common type is the *first-price-sealed bid auction.*

impact of list price on the sales price and the second hypothesis its impact on time-on-market. Based on discussions as well as findings in previous empirical studies, we believe that list prices will affect the buyers' perception of the property's value. For instance, low list prices may signalize poor quality and lead to lower transaction prices. Also, we believe the likelihood of faster sales are greater as a larger pool of buyers will be captured and participate in the bidding stage. The source of the data is *Húsnæðis- og mannvirkjastofnun*, HMS, Iceland, and the data contains 56 918 residential housing transactions in the Capital Region[2] between January 2014 and August 2020. We use both a hedonic modelling framework and survival analysis to test our hypotheses. In addition, a survey was sent out to real estate agents in Iceland with questions particularly addressing the function of list prices.

Similar to several other studies, our study addresses the impact of list price in regard to sales price and time-on-market. However, only a few other studies (Asabere & Huffman, 1993; Hungria-Gunnelin et al., 2019; Björklund et al., 2006), have adopted the measure degree-of-overpricing (DOP) to be able to estimate the effect on sales price and TOM. Furthermore, the existing research examines list prices in an auction setting different to the one practiced in Iceland, that are characterized by sealed bids and, to our knowledge, this is the first study examining list prices in the Icelandic housing market.

1.2 Aim

This thesis aims to investigate the impact list prices have on the final sales price as well as the length of sale in Icelandic housing transactions. Also, we study the standard practice of list price determination among Icelandic real estate brokers to evaluate whether their pricing strategy leads to an optimal sales outcome from the brokers' perspective.

1.3 Hypotheses

To evaluate the impact of list-price on the two transaction outcomes *sales price* as well as *time-on-market,* the following two hypotheses are tested:

(1) A list price below market value leads to a lower sales price
(2) A list price below market value leads to a shorter time-on-market

1.4 Disposition

The disposition of the thesis is as follows:

2. Institutional background
Chapter 2 provides an introduction to the Icelandic housing market, including descriptions of residential price developments (Section 2.1), real estate brokerage (Section 2.2), and the common sales format of residential property sales in Iceland (Section 2.3).

3. Theoretical foundation
Chapter 3 describes theoretical concepts based on economic theory that are relevant to our area of study; *search markets*, *reservation prices*, *principal-agent problem*, *anchoring effect*, and *common and private values*.

4. Previous studies and Hypotheses
Chapter 4 provides a review of previous research and its empirical findings, with the intention to contribute an understanding of list prices in various aspects and provide the foundation on which the hypotheses are based. We also situate our topic within the existing framework.

5. Methodological framework
Chapter 5 presents the methodological framework and empirical strategies used to investigate the hypotheses. Moreover, the survey targeted at Icelandic real estate brokers is described in this section.

6. Data
Chapter 6 describes the data and variables included in the models as well as descriptive statistics.

7. Results
Chapter 7 presents the results of the conducted analysis for each of the hypotheses together with an analysis and discussion of the results.

8. Discussion & Conclusion
Chapter 8 includes concluding remarks of the results obtained from our empirical study as well as recommendations for further research.

1.5 Definitions

Degree-of-overpricing (DOP) – the amount by which the list price exceeds (positive DOP) or falls below (negative DOP) the expected market value in a given period, expressed as a percentage deviation, see page 19.

List price – list price, or asking price, refers to the price at which the property for sale is advertised in the market and before any reductions are made, e.g., through negotiations between buyer and seller.

Market value – "the most likely price a property would bring in a competitive and open market under all condition's requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably and assuming the price is not affected by undue stimulus." (Sanders, 2018).

Reservation price - the maximum price buyers are willing to pay and, conversely, the minimum price sellers are willing to accept for a product or service.

Sales price – the final price at which a property is transacted.

Time-on-market (TOM) - the number of days passed between the date a property is listed to the specific contract date.

2 Institutional background

In the following chapter, we provide a brief introduction to the Icelandic housing market (Section 2.1) as well as real estate brokerage and the process of broker-assisted property sales (Section 2.2). Section 2.2 is based in large on an interview with an Icelandic real estate broker, Páll Pálsson, conducted on 30th of October 2020.

2.1 The Icelandic housing market

Iceland has experienced significant fluctuations in financial stability over time, mainly due to shifts in inflation, interest rates and currency value (Icelandic króna, ISK). Another contributing factor is its heavy reliance on tourism, with the largest annual increase in 2016 at 40 % (Sæþórsdóttir et al., 2020). These factors have together contributed to large variations in demand and supply of Iceland's housing sector and, in turn, caused fluctuations in housing prices.

Price changes in the housing sector from the early 1990s
From the early 1990s until 2007, Iceland's financial market was thriving. The privatization of banks and their rapid expansion into international markets was the main contributor, resulting in decreased costs of capital. The most dramatic upswing in house prices took place from 2004 to 2007, when the prices increased by approximately 85 percent. The increase got triggered by the reformation of mortgage rules by the Housing Financing Fund (HFF), a state-owned mortgage lender. In 2004, they offered a loan-to-value ratio of 90 % (Helgason & Kopsch, 2020), allowing easier access to credit, an increased number of loans, lower lending rates, and higher demand for housing (Tulip, 2007; Helgason & Kopsch, 2020).

Iceland was greatly affected by the financial crisis in 2008, which resulted in the collapse of the country's three major banks in October 2008. The depreciation of the Icelandic króna led to higher prices on imported goods, increased inflation and increased household debts. The combination led to a fall in housing prices from their highest level in 2007 to the lowest point in 2009, a fall of 34 percent in real terms (Bengtsson et al., 2013). The aftermath of the crisis was a lack of investment in new housing for several years (HMS, 2020) and also a rise in the rental share. An explanation is the increased difficulties in selling real estate, leading to homeowners, banks, and the HFF renting out their properties (Helgason & Kopsch, 2020).

In 2011, a financial turning point took place, mainly due to expansive national politics and booming tourism industry. Iceland became an attractive tourist destination when flight tickets became cheaper (Svd, 2018). The eruption of the Eyjafjallajökull volcano also caused an increase in the arrival of international visitors (Sæþórsdóttir et al., 2020). In 2008, the number of tourists was 470 000, and it amounted to 2 300 000 in 2018. The rise in tourism opened up more jobs in the service sector. Also, households received higher income along with foreign investments in the country as it rapidly increased in popularity (Iceland Chamber of Commerce, 2019).

Figure 2.1 depicts the annual percentage change in housing prices divided across apartments and single-family houses (detached and semi-detached) in the Capital Region area between 2004 and 2020. As shown, prices of apartments and single-family homes have followed a similar price pattern over the period. There was a sharp decline in the following two years after the crisis (2009-2010). Eventually, as the market gradually has recovered, there has been an upward trend in housing prices.

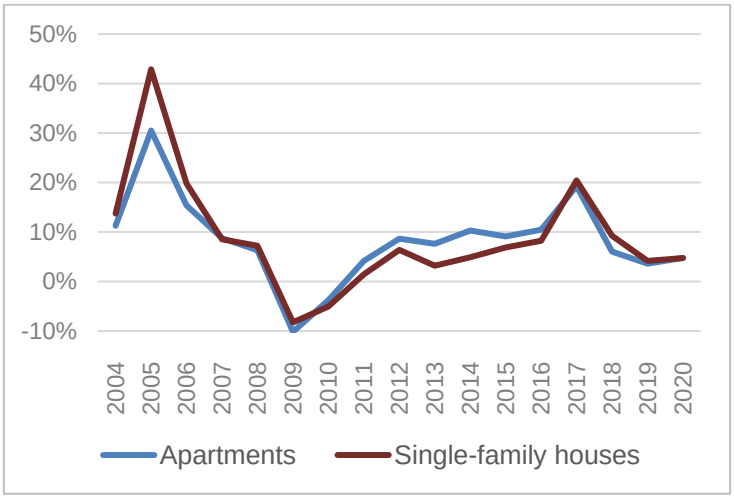


Figure 2.1: The annual average change (%) in prices for apartments and single-family houses in the Capital Region. Source: Statistics Iceland

Figure 2.2. show the number of residential dwellings that has been completed as well as constructed in Iceland, together with the average population growth annually between 2010 and 2019:

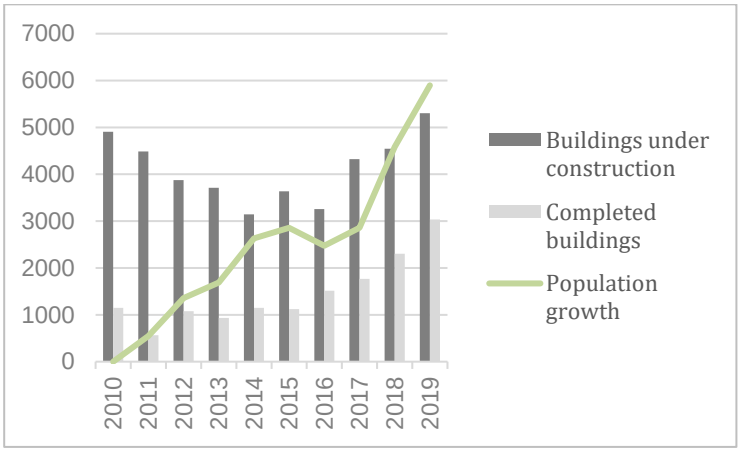


Figure 2.2: The number of dwellings completed as well as constructed in the end of each year, together the population growth in Iceland during 2010-2019. Source: Statistics Iceland

The annual increase in the population insinuates a rising demand for housing. However, the supply side of the housing market is adjusting in a slower pace, causing an upward pressure on the prices. The recent surge in demand in Iceland is though largely due to the Central Bank's lowering of interest rates, causing the mortgage rates to drop. The lowering of interest rates was initially caused by the bankruptcy of two of Iceland's major airlines in 2019. A further reduction was then made due to the Corona pandemic affecting the number of tourists traveling to Iceland the following year (HMS, 2020). In November 2020, the interest rate was at historically low levels at an annual rate of 0,75 % (Central Bank of Iceland, n.d).

As a result of the lowering in mortgages rates, the share of people in the rental market is reducing as more people can afford to buy their home. For instance, the number of properties transacted has increased on an annual basis over the last decade and reached its highest number in 2020 since the financial crisis (Figure 2.3, panel (a)). Moreover, the first-time buyer purchase activity peaked in the third quarter of 2020, depicted in Figure 2.3, panel (b).

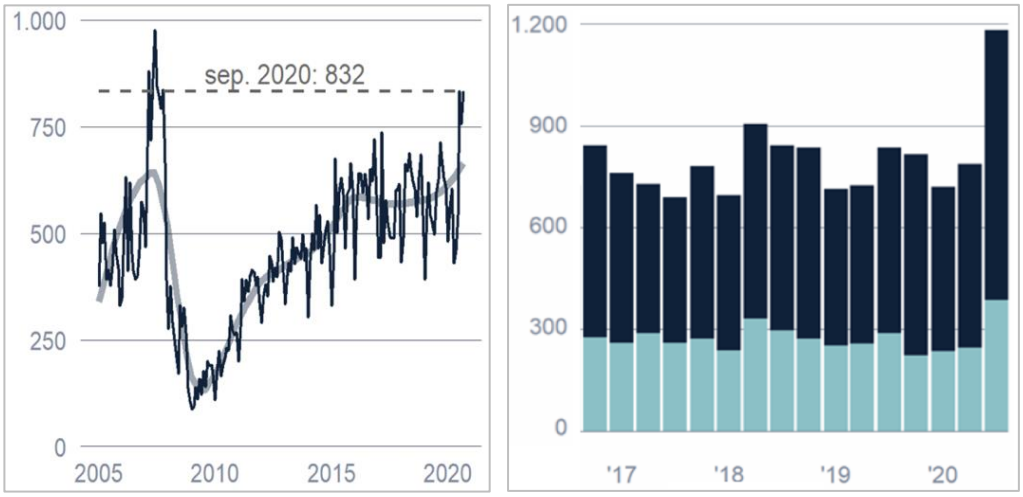


Figure 2.3: The number of issued purchase agreements, panel A, and the number of first-time buyers on a quarterly basis during 2017 and 2020, panel B, in the Capital Region (HMS, 2020).

2.2 Icelandic real estate brokerage

Sales of residential properties in Iceland are commonly intermediated by real estate brokers, that works on behalf of both sides of a transaction. The dual agency means that Icelandic brokers must act in the best interests of both parties. Moreover, they are obliged by law to represent sellers and buyers equally in their work.

The process of broker-assisted property sales in Iceland follows the standard procedure of listing, marketing, viewing, negotiation, contract signing, etc. The initial process

includes counseling the seller in determining an appropriate asking price for his or her client's property before placing it on the market. Brokers usually use different property websites as their main sale channels and the online advertisements typically include pictures and a basic description of the property, accompanying costs such as community fees and property taxes, and information about any other condition on the property as well as any necessary maintenance (if the property is part of an apartment block), etc. An open-house viewing is typically arranged a few days after listing when the interest among buyers usually is at its highest, which normally is the initial three to five days after listing.

Eventually, when the seller is matched with a buyer and both parties have agreed, a contract is signed. Thereby, the bid becomes binding. Some agreements are also conditional on certain prerequisites, e.g., a bank loan that must be granted, or buyers have to sell their current house, which has to become fulfilled before the purchase can go through. Usually, it takes around 4-8 weeks from when an offer initially is placed until a contract is signed, then additionally 1-2 months until the actual handover of the housing unit. Around 30 to 60 days after this, title deeds and the final payment will be made.

There are several costs associated with a property transaction intermediated by a broker. A broker's service typically includes a commission fee, that commonly is based on a percentage rate between 1,5 and 3% of the transaction price, which has to be paid by the seller. Also, a cost of capital gain tax at 20 % if he or she has owned the property for less than 2 years, otherwise, the seller will be exempted from paying tax (Skatturinn, n.d) and normally a contract fee. Sellers also sometimes pay additional costs for boosting the marketing of their listing, for example, the hiring of a professional photographer or additional advertisement by the agent through social media. In addition to the transaction price, the buyer bears the cost of the authorization of the documents and the stamp duty at 0,8 % of the total estimated value of the property (0,4% for first-time buyers), and a fixed fee in brokerage service at around 50 000 ISK.

2.2.1 The bidding process

A distinctive feature of residential property sales in Iceland is the sales format, where prospective buyers place *sealed bids*. As the name suggests, this sales format is characterized by bids that are unrevealed to other bidders involved. Brokers are not allowed to directly reveal the counteroffers. Instead, buyers involved in a bidding process will only receive information about whether their bid is enough and matches the reservation price of the seller. If these prices do not correspond, they will be asked by the real estate broker if they have placed their final and best offer, and the seller eventually decides which offers he is willing to accept. The final offers must be written in order to become legally binding. This stands in contrast to "public auctions", in which information about bidders offers are continuously revealed to other bidders by the broker as the bidding activity progresses. Well-established auctions of open formats are the *open ascending-bid auction*, also called an *"English auction"* which is adopted in e.g., Swedish housing sales, and the *open descending-bid auction* ("*Dutch auction"*).

3 Theoretical foundation

In the following chapter, theoretical concepts based on economic theory are presented that are relevant to our field of study and connects to our proposed hypotheses.

3.1 Search markets and Reservation prices

In housing markets, buyers' and sellers' behavior are characterized by imperfect information. For instance, they are not perfectly informed about each other's location, reservation price, preferences and motivation to trade. The heterogeneity of homes also means that one has to search across different options to find a home in line with his or her preferences. Consequently, the chances of finding an instantaneous match is reduced and a search is necessary to find a suitable trading partner. Such markets are known as *search markets* (Yavas, 1994).

The idea of finding the best alternative among a range of choices is a key-driver of individuals' engagement in search (Frank, 2008). There is, however, a constraint in the amount of effort an individual would put in the process. For instance, a buyer searching for an apartment would not investigate the entire range of available homes and wait for the best option as this incur additional *search costs*, for instance, costs for visiting the house (Qiu & Zhao, 2018; Wilhelmsson, 2008). Standard economic theory suggests that a rational price-searcher will compare the *expected benefits* of additional search with the *costs* (Frank 2008). Each available decision option is assigned a "utility value", which is a product of: 1. the probability that the new offer exceeds the current offer and 2. the expected price increase if it does (Frank, 2008).

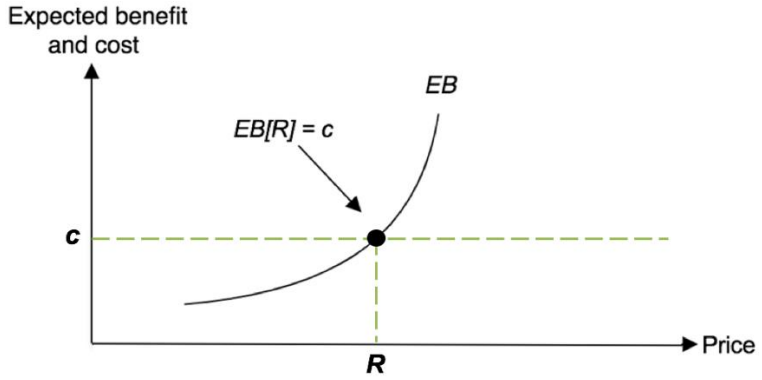


Figure 3.1: An individual's search will proceed as long as the expected benefit of additional search exceeds the costs of additional search.

An individual's search will continue as long as the expected benefits of additional search exceeds the costs of additional search. The optimal decision for a risk-neutral searcher will be to accept an offer when the expected gain equals the cost (Frank, 2008), represented as the intersection EB[R] = c in Figure 3.1. At that point, the individual is

indifferent between the decision of stopping his or her search or continue to search, corresponding to his or her *reservation price,* R. Prices located at the left of a buyer's reservation price corresponds to the prices a rational buyer would accept. Conversely, the seller would only accept prices at or higher than his or reservation price. Figure 3.2 illustrates the case when the reservation price of a buyer (RP_B) exceeds the seller's (RP_S), which gives rise to a zone in which the parties can reach a possible agreement. A surplus will occur for both parties if the agreed price, *SP*, is above the reservation price of the seller and below the reservation price of the buyer.

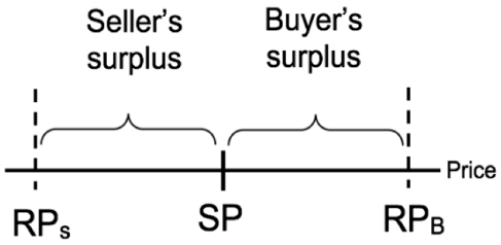


Figure 3.2: A zone of negotiation arising if the buyer's reservation price exceeds the seller's. An agreed price between RP_S and RP_B will create a surplus for both parties.

Reservation prices of buyers and sellers depend on several different factors. One factor is different strength in their *motivation* to trade. For instance, sellers that are motivated to sell quickly are shown to have a lower reservation price (see Glower et. al., 1998). Moreover, reservation prices will depend on *individual beliefs* of the value of a house, as people have different sources and amount of information. Other contributing factors could be differences in disponible income and expectations about what will happen to the price in the future (Frank, 2008). Also, observations of others' estimates might also influence the reservation price. For instance, a home seller might discover or adjust his or her reservation price as observing the interests among potential buyers from viewings of the house or incoming offers (Khezr & Menezes, 2018).

In search markets, the search can be *directed,* which is defined as a setting in which a seller commits to a price and announce it. Buyers are then able to direct their search toward sellers that offers better prices and decide with whom they want to trade. Posted prices that are low are accompanied with a higher chance of sale, as more people will become interested (Chade, 2017). Analogous reasoning can be applied in the context of housing sales. A real estate broker will post a price (list price) for the property that the seller has agreed to, which will serve as a device for the buyers in order to determine whether the price of the property falls within his or her reservation price range. Lower prices will attract a broader field of competing buyers, as it will match the reservation prices of more buyers. Also, it might raise the expectations of making a bargain among buyer's with higher reservation prices, which adds to the group. This will have an impact on the competition in the bidding process and, in turn, the duration of sale.

3.2 Anchoring effect

The anchoring effect is a behavioural phenomenon that describes the human habit of relying too strongly on the initial piece of information offered, known as the anchor, when making decisions (Staff, 2019a). An example of the anchoring effect was made in a study by Jacowitz and Kahneman (1995), when a group of students were assigned to estimate quantities for different questions given an anchor value. For instance, when the students were asked about the height of Mount Everest they were first asked if the height is greater or less than the given anchor, followed by estimating the height of the mountain. As can be seen in table 3.1, the results showed that the students provided estimates that matched the size of the anchor. Thus, depending on whether they were first asked if the mountain is greater or less than an either low or high anchor (2000 or 45500 feet), their estimate ended up close to the size of the anchor (median estimates 8000 or 42550 feet).

Table 3.2: The given anchors and the medians of the estimations provided by the students (Jacovitz & Kahneman, 1995, page 1163)

	Anchors		**Medians**	
Question	*Low*	*High*	*Low*	*High*
Height of Mount Everest (feet)	2 000	45 500	8 000	42 550

Thus, revealing information about lowest bid or highest price in negotiation can have an anchoring effect and works as a bargaining strategy (Staff, 2019b). This bargaining strategy is applicable to residential real estate transactions where list prices work as anchors (Sergio, 2019). Kahneman (2011) claim that people are influenced by the property's list price when considering their reservation price. He argues that the value of the same property will appear higher if the list price is high compared to if it is low (Kahneman, 2011). The assertion of a positive relationship between list prices and sale prices is supported by several studies including a paper written by Bucchianeri and Minson (2013). By investigating a large and diverse data set of residential market transactions, they found that higher list prices are correlated with higher selling prices. Their result showed that establishing a list price of an average property in their sample between 10 to 20% above the *market price* for this same property leads to a sales price increase of $117–$163. Hence, the theory implies that list prices serve as a point that buyers refer to when estimating a house' worth. Thus, anchors are linked to price expectations since high anchors (list prices) generate higher estimates (bids).

3.3 Principal-agent problem

The existence of an agency relationship arises whenever a person acts in account of another person (Connolly & Munro, 1999). A typical example of an agency relationship is between the seller of a property and the real estate agent. In this situation the home-seller creates a role for the agent to use their superior knowledge in this field to find prospective buyers and propose an ideal asking price (Rutherford et al., 2005). The knowledge gap between the buyer and seller is a case of asymmetric information which

is the result of one party to an economic transaction having knowledge of something that the other party does not (Connolly & Munro, 1999). This forms an issue in the agency relationship known as the *principal-agent problem*, where the home-seller is the principal, and the real estate broker is the agent.

Asymmetric information can be divided into two types (Brown & Eng, 2001), where the principal-agent problem can be applied in a real estate setting for each kind in the following examples. The first type of asymmetric information is called *moral hazard* and is described by Conolly and Munro (2005) as "when *information about actions* is hidden from one party to a transaction". A form of moral hazard is the principal's inability to completely observe the actions undertaken by the agent that will affect the principal's outcome (Anglin & Arnott, 1991).

The problem arises from the incentive differences between the agent and the principal they represent. For example, brokers may be more interested in closing a deal quickly to reduce their costs for marketing and home viewings rather than waiting for higher bids (Wilson, 2013). Furthermore, since the agents' amount of profit depends on the number of closed deals, one can assume that brokers prefer to increase the number of sold objects within the shortest time as possible. Enegren (2017) highlights the principal-agent problem occurring when the agent significantly underprices listings with the intent to attract more buyers, and in turn increases the chance of selling the property quickly.

Carroll (1989) suggests that moral hazard in principal-agent contexts to some extent can be minimized by giving the agent fixed-percentage commissions. When investigating how real estate agents distribute their selling effort among clients in relation to the amount of commission they are paid, Carroll (1989) found that the more commission the agent is paid the more effort is put into the sale. Thus, by adopting a fixed-percentage commission, the incentive of selling the property at the highest price possible is shared between the home-seller and the agent. This means that moral hazard in principal-agent problems can get a milder effect if the principal and agent share the same incentives (Carroll, 1989).

The second kind of asymmetric information is referred to as *adverse selection* and means, in contrast to moral hazard, that "*knowledge about characteristics* is hidden from one party to a transaction" (Connolly & Munro, 1999). In other words, the agent has more information compared to the principal and can in turn hide this knowledge from him or her (Darraough, 1996). A principal-agent problem of adverse selection is for instance that the principal is unable to know what level the agent possesses skill or knowledge when it comes to advertising the property or analyzing the market (Anglin & Arnott, 1991).

3.4 Common and private value auctions

Auctions are typically divided into the two different categories, depending on the information of the good being revealed: *private value auctions* and *common value* auctions (Hungria-Gunnelin, 2015). In pure *private value auctions*, bidders know their own valuations but there is an uncertainty regarding others' valuations (Goeree & Offerman, 2002). Hence, a bidder's value would be unaffected by learning about an item's worth by the other bidder's information. One key feature of *common value auctions* is that the item for sale is valued identically amongst all bidders, but bidders possess their individual signals, or information, about the value during the auction (Ahlberg, 2012). This implies that a bidder would take other bidders' signal into account and change his or her estimate of the value. If ignoring these signals or if wrong judgements about the common value is made, it may result in a situation known as "*winner's curse*". It refers to the situation when bids differ from rational ones by being superior due to the different private values (Goeree & Offerman, 2002).

However, *pure private* or *pure common* values refer to the most "extreme" cases and are more of theoretical concepts. In practice, auctions usually involve values with both private and common elements and the behaviour of one bidder is not isolated from the behaviour of other bidders. Ones valuation of an object or item will comprise of both a common-value element (his or her own perception of the value) and a private value element (signals) (Milgrom & Wilson, 2020). For instance, auctions of paintings exhibit private values, due to differences in individuals' taste of the painting. A common value component is added by the time the painting is resold and the sales price then become the same for all bidders (Goeree & Offerman, 1999).

In auctions, the presence of private and common values elements varies depending on the auction format. For instance, in an "English auction", where bids are public and starts low, information will be revealed about other's signal or information as bidders drop out as the temporary highest placed bid rises. In contrast, less private information is revealed in a "sealed-bid auction", where bids are unknown to other bidders.

In the context of housing, residential dwellings have a common value. For instance, if the home is sold through sealed bids, a (uninformed) buyer might rely on the list price in his or her valuation of the property to a greater extent than in the case of public bids. Presumably, the sales price will end up closer to this announced price, as no other information regarding the common value is intermediated through direct observations of other bidders' estimates. If the bids are public, there might be less focus on the list price and more on the estimates of his or her competitors. Also, the sales price might tend to end up more far above the initial list price, as the observation of other bids might raise the individual buyer's reservation price.

4 Previous studies & Hypotheses

This section provides a review of previous studies and research findings to provide an understanding of list prices in various aspects and the foundation on which the hypotheses are based. We also situate our topic within the existing framework.

The concept of list prices in housing markets have been subject to numerous studies since the early 1990s, where the relationship between list price, sales price and TOM is central. A major part of these studies is examining the role of list prices in the U.S housing markets, where private negotiations are the common sales mechanism and the list price typically serves as an upper limit of the sales price (Haurin et al., 2010). The literature in this area of research has extended over time and additional studies have been made, investigating list prices in other countries and with different auction formats. Since real estate brokers typically are involved in house sales, many existing empirical and theoretical models often consider the potential effects on transaction outcomes when housing sales are facilitated by the brokers, primarily on the variables TOM and sales price.

Bucchianeri and Minson (2013) investigated the effect of list prices on sales price. They found a positive relationship between list prices in relation to market value and selling prices, which is consistent with the theory of anchoring in real estate transactions. Björklund et. al (2006) found a similar relationship based on data in the county of Stockholm. Enegren (2017) and Hungria-Gunnelin et al. (2019) analysed whether a low list price would lead to a higher sales price, based on the assumption that low list prices would attract more potential buyers. They both found a positive relationship between list price and sales price, i.e., a low list price generated a low transaction price.

Other studies address the issues of agents' informational advantages and its effects on prices and the transaction process. Real estate agents will sometimes counsel sellers to set a low price in the hope of attracting multiple bidders (Han & Strange 2014; Hungria-Gunnelin, 2013). Enegren (2017) highlights the issues of the principal-agent problem in terms of agents' incentive to significantly under-price listings in relation to a property's' market value, with the aim of attracting more speculators and increasing the potential of a higher transaction price. He argues that this strategy is advantageous for a commission-paid agent as higher commission fees are achieved. Under-pricing, that enhance the potential of multiple bidders, have also been argued to reflect a brokers' incentive to earn a quick commission, as the higher competition might shorten the length of sale. According to Chen & Rosenthal (1996), low list prices increases the willingness among buyers to incur the costs of visiting a particular house. Han & Strange (2014) argues that low prices tend to lead to "bidding wars" due to its potential of engaging more bidders, especially during housing booms.

Another study that concerns the presence of a principal-agent problem when the sale is broker-assisted is Levitt and Syverson (2008), who examine the difference in sales price when homes for sale are non-broker-owned and broker-owned respectively. They

found an increase in both the sales price (3,7 %) and TOM (9,5 days longer**)** when brokers sell their own homes, due to the informational advantage held by the broker. The effect increases as the discrepancy in information between the broker and the seller increases. Similarly, Turnbull and Dombrow (2007) found that broker's gain from her or his informational advantage derived from specializing in geographic market segments and acquiring localized market knowledge, as they manage to sell houses at higher prices and shorter selling time. Furthermore, Yavas and Yang (1995) examine agents' search effort in relation to list price, showing that higher search effort is attached to higher list prices, due to the potential higher return. This shows how the presence of moral hazard can influence the agents' behaviour and actions.

A major concern from the seller's point of view in establishing a list price is its impact on TOM and sales price. Selling at the highest possible price and as quickly as possible are considered as two incompatible "attributes" and thus, the seller faces a trade-off, which is suggested in Miller (1978), and Björklund et. al (2006). A high list price compared to the property's market value may lead to an extended TOM, due to difficulties in finding buyers that are willing to pay the higher price (Genesove & Mayer, 2001; Stevenson & Young, 2015). The chances of maintaining a flow of buyers will decrease as the price is set at a higher level (Haurin et al., 2013; Haurin et al., 2010). Conversely, low list prices might shorten the length the property is out for sale at the expense of lower sales price, due to the "shortened" market exposure (Anglin et al. 2003).

Miller (1978) found a positive relationship between sales price and TOM. He argues that a seller is more likely to capture a relatively superior selling price, the longer a property stays on the market. Jud et al. (1996), Hungria-Gunnelin (2019) found a similar correlation. In contrast, Cubbins (1978) found an inverse relationship (higher sales price - shorter TOM and vice versa). Another inverse relationship between TOM and list price was found by Tucker et. al (2013). They compared the difference in sales price before and after the introduction of a policy that prohibited sellers to relist their houses and hence manipulate the total length of TOM. The results showed that when exposing the total TOM of a relisted property, the sales price significantly decreased (USD$16000).

Taylor (1999) offers a possible explanation for an inverse relationship between TOM and sale price or list price. He argues that a reason for buyers being cautious to elongated listings of properties is that they may signal poor quality due to flaws detected by earlier prospective buyers. Hence, stigmatization is built up among speculators when a property has been listed for too long (Taylor, 1999). Haurin et. al (2010) found that a longer TOM might be advantageous for properties with unusual attributes, "atypical properties", in order to find a match between buyer and seller. Several papers have studied the effects between list price and TOM by considering the number of bidders which in turn, affects the length of TOM. The chances of maintaining a flow of buyers will decrease as the price is set at a higher level is found in Haurin et al. (2013) and Haurin et al. (2010). Thus, lower list prices will improve agents' chances of a quicker transaction relative to a comparable property priced above

market value (Turnbull et al, 2019). According to Genesove and Mayer (2001) and, Stevenson and Young (2015), a high list price compared to the property's market value leads to an extended TOM due to difficulties in finding buyers that are willing to pay the higher price.

The degree-of-overpricing (DOP) has emerged in the literature as a measure for studying how list prices that deviates from market prices will affect the sales duration. Hungria-Gunnelin et al. (2019) studied this relationship in regard to the number of days an apartment stays on the market. They found a positive correlation, indicating that the lower DOP, the lower TOM. Thus, a high list price in relation to a property's market value reduces the arrival rate of bids and in turn, lengthens TOM. The lower DOP, the quicker sale is also confirmed in Anglin et al. (2003).

Knight (2002) studied the causes and effects of changes in list prices. The result indicates that mispricing is costly both in money and in time. Houses with large list price changes have both a longer TOM and sell at lower prices. Setting the correct list price is argued to be of crucial importance as a revision of it has been shown to negatively affect the final sales price of the property (Knight, 2002). Asabere and Huffman (1993) show how a list price (both low and high relative to the property's market value) lead to deviations from optimal TOM and mispricing. Xiaolong and Arno (2019) found that a revise in homeowners' list price is more likely to occur when they expect to make a loss when selling their home. They will change the list price downward and in a more aggressively manner than other home sellers.

Hoeberichts et al. (2013) address list price dynamics in boom-and-bust markets. They analyse the interaction between initial price setting by the seller, list price reductions and the probability of sale in the Dutch housing market. They found that the impact of overpricing differs over the housing cycle. In boom periods, overpricing tends to extend the sales period and increase the probability of a list price reduction, suggesting a "start high-reduce quickly" pricing strategy. In contrast, the opposite effect is true during busts, where overpriced homes are least likely to result in list price adjustments downwards (Hoeberichts et al., 2013).

In summary, there are a handful empirical studies related to list prices in different manners and with somewhat varying findings. Nonetheless, several of the studies show a positive correlation between list prices and sales price as well as between list prices and TOM. Based on these findings and with inspiration from the study by Hungria-Gunnelin et. al (2019), we have formulated the following two hypotheses:

Hypothesis 1:

A list price below a property's market value leads to lower sale prices

Hypothesis 2:

A list price below a property's market value leads to shorter time-on-market

5 Methodological framework

This section provides the methodological approach and empirical strategy for investigating and testing the hypotheses of our study. Relevant statistical concepts are presented in Appendix 2.

5.1 Regression model

Regression analysis is a common statistical method used to examine the relationship between a dependent variable Y and one or more independent variables X. For instance, one can estimate how a one-unit increase of the variable square meter correlates with price, on average. By using the least-square method (Ordinary Least Square, OLS), one can adopt a straight line, a regression line, to a data material consisting of *n* pairs of observations *(xi, yi)* that best fits the data set. The best fit is obtained by a minimization of the sum of squared residuals (the vertical deviations) for every individual point in the data set (Arkes, 2019).

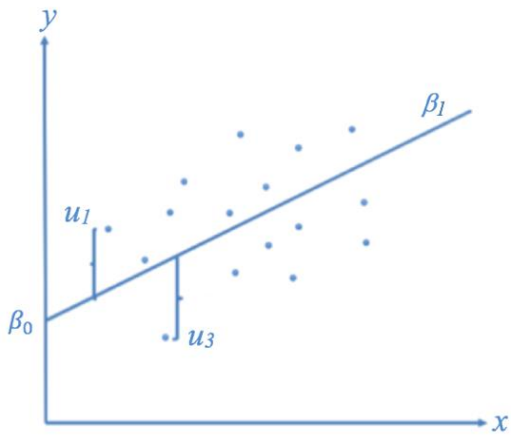


Figure 5.1: OLS estimates a linear function by minimizing the sum of the squared distances between the points in a given set of data and those predicted by the linear function.

The estimation of a regression line, shown in Figure 5.1, is represented by the following equation, which defines the simple regression model:

$$Y = \beta 0 + \beta 1 * X + u \qquad (1)$$

Y is the dependent variable, which is generated by summarizing the intercept term β0, the coefficient of the independent variable β1 multiplied with the independent variable X, and lastly the error term u. In statistical modeling contexts, Y is explained by X. Thus, the outcome of Y strictly depends on the independent variable X, and not the other way around (Arkes, 2019). The error term indicates the deviation between an individual point and the "true regression line", which occurs when the model does not

perfectly represent the actual relationship between the independent and dependent variable. The intercept term β0 is also known as the constant term which represents the expected value of Y when X equals 0. The coefficient β1 demonstrates how the value of Y change with respect to a one-unit increase in X (all other factors held constant). For instance, a working individual with 0 years of education (X = 0) and a salary of B0, can expect to get an additional income of B1 for each year of studies.

Generally, a dependent variable is dependent on several independent variables simultaneously. For instance, the price of an apartment depends on a set of different attributes such as size, location, number of rooms, etc. Hence, a multiple regression model is more appropriate, expressed as follows:

$$Y = \beta_0 + \beta_1 * X_1 + \cdots + \beta_n * X_n + u \quad (2)$$

By adding more independent variables into the model, a higher coefficient of determination, R2, can be achieved. However, this only applies when the optimal combination of explanatory variables is found, which is obtained by choosing both essential and an appropriate amount of additional explanatory variables (Körner & Wahlgren, 2015).

5.1.1 Hedonic pricing model

Rosen (1974) provided an early contribution to the regression analysis theory known as the hedonic pricing model. This framework allows for an estimation of implicit prices of certain attributes related to an object, and how they individually contribute to an object's value or price. The hedonic pricing model is commonly used for estimating a property's market value. As illustrated in equation (3), a property can be described as a vector of coordinates where each coordinate contains a set of property characteristics (Rosen, 1974). Examples of such characteristics are *house specific attributes* (square meters, age, housing type), *community attributes* (average income, education) and *local regulation* (land use regulation, air quality, etc).

Property = *(z1, z2, …, zn)* (3)

Just as we can consider a home as comprised of a set of attributes founding its value such as floor level, size, age of the building, distance to city center, etc. (3), its price can be considered as the sum of the prices of all individual attributes (4). The function p(Property) illustrates the hedonic pricing model where a property's market value is obtained by summarizing the estimated *implicit prices* of its characteristics (Rosen, 1974):

p(Property) = *p(z1) + (z2) + … + p(zn)* (4)

The characteristics of a housing unit can have positive as well as negative effect on the market price, which is indicated by the sign of the β-coefficients of the estimated characteristics. For instance, the β-coefficient of the size variable is generally positive, which means that an increase in square meters leads to an increase of β of the property's

value. Another example is the typically negative β-coefficient of monthly fee, which makes the property value decrease as the monthly fee increases.

Any variables in a regression model (dependent as well as independent) can also be expressed in its natural logarithm. The β-coefficient of a log-transformed variable is then interpreted as a percentage change rather than an absolute change (Arkes, 2019). For instance, a β1-coefficient of 0.02 in the regression model $\log(price) = \beta 0 + \beta 1\ x\ size$ will be interpreted as a 2 % change by a one-unit increase in square meters.

5.1.2 Methodological approach for hypothesis 1

The first hypothesis includes an estimation of prices and hence, the hedonic pricing model is an appropriate framework. To test the first hypothesis, we use the hedonic model on the standard form (see equation (2)) and include DOP, TOM, and other control variables for location and time as our independent variables, as follows:

$$\ln(P_T) = \beta_0 + \beta_1 DOP + \sum_{j=2}^{n} \beta j Xj + \varepsilon \qquad (5)$$

$\ln(P_T)$ = the natural logarithm of sales price of the home
$\beta 0$ = constant term
DOP = degree-of-overpricing
Xj = a matrix of covariates, controlling for time and location
ε = error term

The natural logarithm of sales price, ln(PT), constitutes our dependent variable and is interpreted as a semi-elasticity due to its logarithmic form. DOP is the variable of interest for investigating hypothesis 1. DOP as an independent variable of a hedonic model has been applied in studies by Asabere and Huffman (1993), Björklund et. al. (2006) and Hungria-Gunnelin et. al. (2019)). Asabere and Huffman (1993) calculated DOP by substituting sales price from list price and then divide by sales price, giving the list price percentage deviation from sales price. However, estimating the sales price using this equation is causing an endogeneity problem as sales price appear on both sides of the equation. Hence, Björklund et al. (2006) developed Asabere's and Huffman's (1993) model, by exchanging sales price in the expression of DOP, to an estimate of the market value, P_E. In our study, we adopt this definition of DOP, formulated as follows:

$$DOP = \frac{P_0 - P_E}{P_E} \qquad (6)$$

P_0 = list price
P_E = estimate of the market value

To be able to calculate DOP, one of the components of the hedonic pricing model in equation (5), we need to estimate P_E. We estimate P_E by following a similar procedure found in Hungria-Gunnelin et al. (2019) and is done in two steps:

The first step is to use a mass appraisal method where we estimate market prices continuously for each month based on the sales prices of transactions made in the previous 12 months. The first estimation will be the market price for January 2015, where we use all previous transactions made between January 2014 and December 2014. To obtain the market price for the next period, February 2015, we use the transactions between February 2014 and January 2015, and so on, until the latest transaction in August 2020.

The mass appraisal model has the following equation:

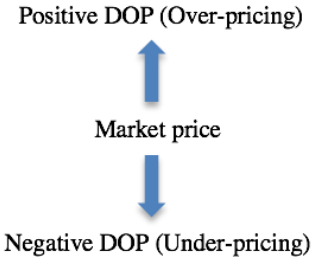
$$\ln(P_T) = \sum_{j=1}^{n} \gamma j X j + \mu \qquad (7)$$

As a result, we estimate 68 mass appraisal models that all are identical and obtain estimates of market prices for each month in our data sample. The remaining observations, after excluding observations of the first year, will be the data we use to estimate our hedonic model. Consequently, market prices of the first year cannot be computed and will become excluded. These observations are only used for market value estimations.

The second step is to use the regression results from (7) to estimate market prices for every observation, P_E, obtained by standard transformation of the logarithmic value of P_T:

$$\ln(P_E) = \ln(\widehat{P_T}) = \sum_{k=1}^{n} \widehat{\gamma_k} X_k \qquad (8)$$

where $\widehat{\gamma j}$ are the estimated coefficients from equation (7). We are then able to calculate DOP for each of the observations. Lastly, we estimate a regression using our hedonic model in equation (5). The sign and magnitude of the DOP coefficient, β1, is of primary interest. It will indicate the percentage change in the sales price (due to the log-transformation) by a one-unit (1 %) change in DOP. This increase indicates a larger deviation from market value, either in a negative direction (larger underpricing) or positive direction (larger overpricing).



Our first hypothesis, "*a lower list price relative to the market value leads to a lower sale price*", will receive support if the sign of the coefficient is positive.

5.2 Duration models

Duration models, also known as *survival models* or *hazard models*, are commonly used to model the length of time spent in a given state or the time elapsed until a particular event of interest occurs. For instance, it has been employed for modeling durability of unemployment, machine functioning, etc. (Arkes, 2019) and also the duration of rental vacancies (see Sternberg (1994)) and houses' duration on market (see Zuehlke (1987), Yang & Yavas (1995), and Hungria-Gunnelin et al. (2019)).

The survival function, S(t), is used to model the probability of a duration variable of interest, T, surviving *past* time *t*, or alternatively explained as the probability of an event of interest *not yet occurred* by duration *t* (Arkes, 2019). The function can be expressed as:

$$S(t) = \Pr(T > t) = 1 - F(t) = 1 - \int_0^1 f(s)\, ds \qquad (9)$$

T has a *cumulative distribution function (cdf)* and a *probability density function (pdf).* F(t) represents the probability that that the value of T is *less than* or *equal to* time *t*. *f*(s) represents the probability that the value of T is in the interval [0, t], given by the integral of the variable's *pdf* over the time range 0 and t (Arkes, 2019).

Alternative ways of representing the distribution of T is by the *hazard function*, $h(t)$, and *probability density function, f(t),* of which both can be derived from the survival function. The hazard function describes the probability of exit or fail conditional on that it has not been sold yet. The hazard function is expressed as follows:

$$h(t) = \frac{f(t)}{S(t)} = \frac{f(t)}{1-F(t)} \qquad (10)$$

The *hazard ratio* is part of the hazard function and is defined as the risk of occurrence of a certain event per time unit (t). A hazard ratio > 1 means that the probability of exit a state increases over time. Conversely, a hazard ratio < 1 means that the probability of exit decreases over time. A hazard ratio of 1 means no association between time and the probability of an exit.

5.2.1 The Weibull distribution

The distribution of survival times can be approximated by different functions. A widely used distribution for modeling survival statistics of various types of engineering applications, e.g., failure rates of mechanical components, is the *Weibull distribution* (Lai, 2014).

The Weibull distribution has the survival function:

$$S(t) = \exp\left[(-\lambda t^{\alpha})\right] \qquad (12)$$

and hazard function:

$$h(t) = \alpha\lambda(\lambda t)^{\alpha - t} \quad (13)$$

for scale parameter $\lambda > 0$ and shape parameter $\alpha > 0$. t represents time. Different specifications of the two parameters will result in varying appearances of the survival functions (see figure 5.3, panel a) and hazard functions (see figure 5.3, panel b).

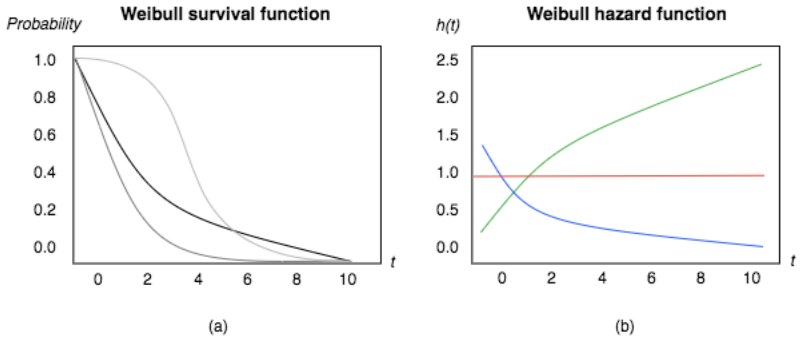


Figure 5.3: Panel A: Examples of Weibull survival functions and Panel B: Weibull hazard functions, with different values of the parameters λ and α.

Parameter α in the hazard function will indicate whether the hazard ratio is increasing, decreasing or constant, depicted in Figure 5.3, panel b.

The Weibull distribution is a generalized form of the exponential distribution; it reduces to an exponential distribution if $\alpha = 1$. An α value equal to 1 indicates no time dependence, or a hazard rate that remains constant over time (Lai, 2006), represented by a straight line in the hazard function, see figure 5.3, panel B). However, this assumption might be inappropriate in cases when the impact on the hazard rate changes over time. The Weibull distribution has the advantage of allowing for such changes as time progresses (Arkes, 2019). For instance, the chances of a house sale might increase from time zero and up to some point, followed by a decline in probability the longer the property stays on the market (see Björklund et al., 2006).

5.2.2 Methodological approach for hypothesis 2

To investigate our second hypothesis, we estimate the TOM model by specifying the hazard function based on the Weibull distribution, which has been done in several previous studies (see Jud. et al. (1996), Anglin et al. (1993), Hungria-Gunnelin et al. (2019), Yang and Yavaş (1995). As mentioned, the Weibull specification allows for varying probability of sale or "exit of the market", and hence, it provides more accurate parameter estimates and a better fit to our data set than an exponential distribution would do. The survival probability, S(t), as a function of TOM is provided in Appendix 2.

Our duration random variable of interest for this hypothesis, T, is the TOM variable. The survival function, *S(t)*, will in this context be defined as the probability of TOM exceeding some time *t* (Jud et al., 1996; Hungria-Gunnelin et al., 2019).

$$S(t) = 1 - F(t) = \Pr\,(TOM \geq t) \tag{14}$$

The hazard rate will be the conditional probability of a unit getting sold on a particular day, given that it "survived" on the market until then. For instance, it is more likely that a property become sold the longer it stays on the market, due to exposure to a larger number of potential buyers.

To model the relationship between duration time and our set of explanatory variables, we express the hazard function as conditional on these variables as follows (Arkes, 2019):

$$h(t \mid X, DOP) = \lambda(t) * \exp\,(\beta X + \delta DOP) \tag{15}$$

The explanatory variables are the same covariates used in hypothesis 1 (presented in section *5.1.2*). β is the vector of regression coefficients representing the effects of the units' characteristics on TOM at time *t*. Parameter δ represents the effect of DOP and is of main interest for investigating hypothesis 2. It will tell how list price (measured in DOP), affects the probability of sale, and in turn, the duration of sale (TOM). A value of $\delta < 1$ will support our second hypothesis. This will indicate that the higher DOP, the less likely it is for the property to exit the market and, in turn, increase TOM. Conversely and in line with hypothesis 2, a decrease in DOP will lead to a decrease in expected TOM (a smaller number of days on the market).

5.3 Survey

In addition to the quantitative analysis (*5.2 Hedonic pricing model* and *5.3 Duration model*), an online survey has been conducted with Icelandic real estate brokers as the target group. The survey provides complementary information that cannot be captured by the other methods used in the study, such as subjective experiences and opinions. It provides deeper insights by including respondents with varying experiences, years in the profession and backgrounds in the field of real estate brokerage. The survey was forwarded to *Iceland's Association of Real Estate Agents* which is an organization including members of 304 licensed Icelandic real estate brokers. The survey consisted of 12 questions and was formulated with the intent to capture real estate brokers' subjective view of list prices and their reasoning when determining list prices in residential housing sales. Each question was formulated in both English and Icelandic language. The complete survey is presented in Appendix 1.

Quantitative and qualitative research
The survey study is a combination of both quantitative and qualitative research methods. *Quantitative research* is characterized by statistical analysis of numerical measurements. For instance, the majority of the survey questions have a closed set of multiple-choice answers that will be statistically evaluated (King et. al, 1994). In contrast, *qualitative research* involves descriptions of events that are not statistically measurable (Thomas, 2003). For instance, some of the survey questions enable open answers which let the participants answer freely, hence, these questions are not statistically measurable or comparable to each other.

Potential benefits and risks
A survey as a research method has the advantage of allowing a large selection of participants in relation to time and costs compared to e.g., interviews. Also, the survey method enables efficient interpretation and analysis of structured data. It also provides a width in the data material due to varying information from several participants, but limited insights of the participants thoughts can be considered as a weakness of the method. Even open questions only partly enable in-depth answers with no further possibility for the researcher to explain the questions or ask supplementary questions. Also, there is a risk of loss of participants compared to methods such as interviews and a risk of respondents completing the survey quickly and provide answers with their initial thoughts rather than well-thought-out answers (Jansdotter & Svensson, 2002).

Choice of questions
Three of the twelve questions were formulated as open-ended questions, to capture information that is not statistically measurable, such as brokers subjective views regarding list prices. The remaining nine questions was multi-choice questions. Five of twelve questions were formulated with special regard to list prices such as the information conveyed through list prices, the importance as well as the optimal choice of list prices from an agent's point of view. The remaining questions refer to the sales process in general and brokers' personal beliefs about their influence as a broker.

6 Data

The following chapter describes the data and variables included in the models as well as descriptive statistics.

6.1 Variables

The transaction data used in this study has been provided by HMS in Iceland, collected from members of *the Association of Real Estate Agents* in Iceland. The data contains transactions of residential houses (apartments, detached and semi-detached houses) in the Capital Region during the period January 2014 to August 2020 and covers a total of 56 918 transactions. The regression analysis was performed using the statistical software STATA. Each transaction in the data set includes variables depicted in Table 6.1. Price variables are represented in Icelandic króna (ISK). Descriptive statistics of the variables included in both the hedonic model and the duration model are presented in *Table 6.3*.

The full sample of 56 918 transactions was examined for observations with missing values, observations that significantly diverged from an overall pattern (outliers) or seemed unreliable. Such observations were removed before conducting the analysis to prevent it from skewing the analysis. These include observations with missing values of list price and sales price, as these values are necessary components for deriving the DOP variable. Furthermore, properties at a size < 10 m^2 and > 350 m^2 as well as a time-on-market exceeding 365 days were removed. The remaining number of transactions after correcting for outliers was 36 314.

Table 6.1. Variables included in the data set

Property characteristics	1. *Size (in square meters)**
	2. *Number of rooms**
	3. *Floor level (between -1 and 16)*
	4. *Housing type:* Detached, semi-detached or apartment
Location characteristics	5. *Assessment area**
	6. *Postal code*
	7. *Street*
Price-related variables	8. *List price**:* The price at which the property was listed
	9. *Sales price**:* The price at which the property was sold
Time-related variables	10. *Date of listing**:* The date the property was publicly announced
	11. *Date of contract**:* The date the property was sold by signing an agreement

** given variables directly applied in the model*
*** variables used to generate new variables applied in the model*

6.2 Choice of variables

Out of the given variables presented in the previous section (6.1), five of them were included in the hedonic model and four of them in the duration model, see Table 6.2. In the hedonic model, the dependent variable is the natural logarithm of sales price, lnPT, and TOM is the dependent variable of interest for the duration analysis. The variables *DOP*, *nr of rooms*, *sq meters*, *loc* and *time* were used in both regression models as independent variables.

Three of the variables controlling for location (assessment area), size and number of rooms were included since they are considered as fundamental price determinants and thus, entails a higher R-squared of the regression models. The remaining variables had to be created by combining variables or conversion into dummy variables[4] before being applied in the model. *DOP* was obtained by a combination of variables (list price and sales price). Furthermore, dummy variables controlling for time were created. The variables are explained in the following.

Table 6.2. Variables included in the regression models

Variable	Description
ln(PT)* (%)	Sales price of the home, dependent variable of the hedonic model
TOM* (in days)	Time on the market (date of contract – date of listing), dependent variable of the duration model
DOP* (%)	Degree of overpricing $[(P_L-P_E)/P_E)]$, percentage ratio (%)
DOP2*	The quadratic term of DOP
nr of rooms	Number of rooms
sq meters	Size of the property in square meters
loc* (dummy)	(0,1) Dummy variable for location
time* (dummy)	(0,1) Dummy variable used for estimation of P_E

* *Variables that have been modified or generated*

Location

The location of a property is usually considered as the most important component of a property's value (SFF, 2015). An attractive location is associated to accessibility to the labour market, social and commercial service, and recreation, which has a positive price effect on properties (Bengtsson, 2018). Thus, variables related to location in pricing models have a very strong influence on the price (McGreal & Taltavull, 2012).

[4] Dummy variables are binary variables that are defined by assigning the events of the variable either 0 or 1.

Size
The variable of size indicates a house's number of square meters which is one of the most prominent characteristics of a property. A large sized house increases the ability of changing floor plan. Also, a larger house has a greater potential to fit the activities a household usually approaches such as kitchen, hobby room and storage (Bengtsson, 2018). Hence, we expect this variable to have a positive effect on the price.

Number of rooms
Comparably to the principle of large sized homes, a house or apartment with several rooms has greater potential of fitting different activities and attributes into the home. Thus, the coefficient of the variable number of rooms is also expected to be positive.

Dummies
The transaction data included three different variables controlling for geographical location: postal code, street and assessment area. Assessment area refers to different geographical areas in the Capital Region defined for real estate valuation purposes where properties are considered comparable. These areas are divided into smaller areas and are greater in number than postal code areas and therefore describes variations in price to a larger extent. A dummy variable for each of the assessment areas was created, resulting in a total of 80 location dummies (*loc*). Furthermore, a total of 80 time dummies (*time*) were created by subtracting *date-of-contract* with *date-of-listing* on the format *YYYY-MM*.

DOP
The DOP variable is obtained by combining the given variable *listing price* with an *estimated market price*. See chapter *5.1.2 Hypothesis 1* for a detailed description. Since we expect the relationship between DOP and sales price (hypothesis 1) to be non-linear, a quadratic variable of DOP is added to the regression model, DOP2. We expect a positive effect of DOP on sales price, but only up to a certain point due to the decrease in interest among buyers when the degree-of-overpricing is too high. Hence, we expect the coefficient of DOP2 to be negative.

6.3 Descriptive statistics

Table 6.3 shows descriptive statistics of variables included in the regression models with mean, standard deviation and the maximum and minimum values.

Table 6.3: Descriptive statistics of variables

Variable	Mean	St. deviation	Min	Max	No. obs
P_T (ISK)	44 400 000	18 100 000	4 700 000	192 000 000	36,314
P_L (ISK)	45 500 000	18 800 000	5 500 000	218 000 000	36,314
P_E (ISK)	37 400 000	14 300 000	13 000 000	62 100 000	31,671*
DOP (%)	0,257	0,235	-0,865	3,370	31,671*
TOM (days)	71,979	60,233	0	365	36,314
nr of rooms	3,734	1,513	1	25	36,314
sq meters	111,517	47,803	16,4	350	36,314

** The number of observations for P_E and DOP differ from the full sample of 36 314, as the transactions in 2014 was excluded in the estimations of P_E, see 5.1.2 Hypothesis 1.*

The average property in our data sample is 112 m^2 divided on 3 rooms and takes roughly 72 days from initial listing until the property is transacted. The transaction price and list price are close in value, yet the listing price exceeds the sales price. The estimated market price falls below both the transaction price and the list price. The mean value of DOP is 0.257 with a standard deviation of 0.235 which indicates that the property, on average, is over-priced in relation to the estimated market value. The standard deviations for all variables are considerably large which naturally follows by the wide range of values for each variable in our data.

7 Results & Analysis

The following chapter reviews the empirical results of our study as well as analysis of the results divided into three different sections: 7.1 Hypothesis 1, 7.2 Hypothesis 2 and 7.3 Survey.

Table 7.1 displays different relations between list price and sales based on our transaction data over the studied period (January 2014-August 2020). The first row shows the percentage share of properties transacted below, at or above the list price. The second and third row shows the average list price and sales price, respectively, divided across the three different price relations. The last row displays different price relations impact on TOM.

Table 7.1. Different sales price-list price relations

Relation	Lp < Sp	Lp = Sp	Lp > Sp	Full sample
Frequency (%)	11,4	16,1	72,5	100,0
List price (m.ISK)	43,9	46,1	45,7	45,5
Sales price (m.ISK)	45,1	46,1	43,9	44,4
TOM (days)	50,8	78,6	74,0	73,0

As shown in Table 7.1, 11,4 percent of the properties were sold at a price exceeding the list price, with an average price difference of 1,2 million ISK. These properties had a shorter sales duration (around 50 days) than properties sold at a price equal to or above the listed price. Nearly 16 percent of the transactions were sold to the same price as it was listed and was also on the market for a longer time (approximately 79 days). A majority of the properties, 73 percent, were sold at price below the list price, corresponding to an average price difference at 1,8 million ISK. Thus, there is evidence of a predominantly share of properties become listed at a price above the actual transaction price in Iceland. The average TOM of our full sample is approximately 73 days.

7.1 Hypothesis 1

Table 7.2 depicts the results from the analysis based on the hedonic price model, estimated by a total of 31 671 sales transactions.

Table 7.2. Results of the hedonic model

Explanatory variable	Coefficient	p-value	Std. Dev.
DOP	0.978*	0.000	0.002288
DOP2	-0.275*	0.000	0.001886
Sq meters	0.005*	0.000	0.000014
Nr of rooms	0.018*	0.000	0.000413
Constant	16.34307	0.000	0.032114
Location dummies	Yes	-	-
Time dummies	Yes	-	-
No. observations	31 671		
R-squared	0.9763		

"" denotes a significance level at 1 %.*

The R-squared of the model is at 0.9706, indicating that 97 % of the variation in the logarithm of sales price is explained by the independent variables included in our model. All variables show significance on a 1 % level for explaining variations in sales price.

The regression coefficients of the variables *size* and *number of rooms* behave as expected; an increase in these variables have a positive influence on sales price. Thus, larger houses are more expensive compared to smaller houses. The same applies regarding the number of rooms. The coefficient of size is at 0.005, which means that for every additional square meter, the selling price will increase with 0.5 percent, on average. Comparatively, the coefficient of number of rooms is slightly larger at 0.018, indicating that for every additional room, the selling price will increase with at an average of 1.8 percent.

As Table 7.2 depicts, the regression coefficient of DOP is 0.978, indicating that for each percent increase in DOP, the sales price increases by 0.978 percent. Conversely, for each percent of under-pricing (negative DOP), the sales price decreases by -0.978 percent. For instance, a property under-priced with 10 percent will result in a sales price reduction of 9,78 percent. Hence, we have received support for our hypothesis (i.e., larger "under-pricing" in relation to the market value leads to a lower sales price). The negative value of DOP2 at -0.238, however, indicates a non-linear relationship between DOP and sales price. This can be interpreted as the effect of DOP will be positive up to a certain point, then reach an "optimum" and the price then starts to decline, which

similarly is found in Björklund et. al. (2006). An explanation is the lack of interest among buyers as the price increases as well as the constraint in buyers' willingness to pay a price that largely exceeds the market value.

The findings of a positive relationship between DOP and sales price are similarly found in recent empirical research examining the Stockholm and Gothenburg housing market (see Björklund et al., (2006) and Hungria-Gunnelin et al., (2019)) and the U.S housing market (Bucchianeri & Minson (2013)). A possible explanation of this relationship could be the state of market, that has been rising during the observed period and hence, it has been more of a "seller's market". A high demand and low interest rates are suggesting an increased willingness-to-pay among households. Thus, properties are likely to sell even though the DOP would be substantially high, and the properties then would be "overpriced".

Our findings are strongly related to the theory of anchoring. The anchoring effect can be considered as particularly applicable to the Icelandic housing market. Due to the sealed bids system, buyers are inhibited from price information revealed through other bidders' behavior which prevents the individual buyer from getting an idea of the market value of the unit. Hence, the list price is the only accessible piece of price information and the anchoring theory implies that bids likely will be placed close to the list price. Consequently, if the list price is set high relative to the market price, bidders' offer will also tend to be high. However, too high list prices might scare off buyers.

Sources of error

It should be taken into account that the results may be affected by different sources of error. A potential issue with the model concerns the estimation of expected market value through the mass appraisal models for obtaining DOP. Systemic errors in data arise from a lack of value-bearing factors. This might lead to either overestimations or underestimations of the properties' market value and in turn, affect the DOP and the estimation of the model. Another possible error is a lack of independent variables controlling for quality. Quality has a major effect on house prices as it, for instance, reflects the construction of a house which includes architecture, materials, standard and condition (Bengtsson, 2018).

7.2 Hypothesis 2

Table 7.6 shows the results from the duration model based on a Weibull distribution. The effect of one unit increase in each independent variable on the probability of sale is implied by the value of the hazard ratio. A hazard ratio greater than 1 is interpreted as the explanatory variable having a positive effect on the chance of a sale. Conversely, a ratio less than 1 suggests a negative effect on the probability. A ratio equal to 1 indicates a lack of impact. The hazard ratio of DOP is of main interest for hypothesis 2.

Table 7.6. Results of the duration model

	Hazard ratio	**z-value**	**p-value**	
DOP	0.824* (0.3309)	-4.82	0.000	
DOP2	0.867* (0.3339)	-3.72	0.000	
Sq meters	0.994* (0.0002)	-26.73	0.000	
Nr of rooms	1.070* (0.0072)	10.11	0.000	
Location dummies	Yes	-	-	
Time dummies	Yes	-	-	
	No. observations	**α**	**Log-likelihood**	**Constant**
	31 663	1.437	-36384.912	0.0019666

"" denotes a significance level at 1 %.*
**Numbers in parentheses are standard errors.*

As depicted in Table 7.6, the variables *Sq meters* and *Nr of rooms* are both relatively close to 1. Hence, the effect of these variables on TOM can be considered as nearly constant over time. That is, the impact of the size and number of rooms have a negligible effect on the probability of sale per time unit and, in turn, the sales speed.

Most relevant to hypothesis 2 is the hazard ratio of *DOP*, that has an estimated value of 0.824. The hazard ratio of DOP can be interpreted as the more a property is overpriced in relation to its market value, the less likely it is for the property to be sold, which is related to longer TOM. Conversely, list prices set low relative to the market price (underpricing), are associated with a higher probability of sale (shorter TOM). Hence, our second hypothesis, stating that "a list price below market value leads to a shorter time-on-market" receives support (hazard ratio<1).

The shape parameter α has a positive value of 1.437, which indicates an increasing hazard as time progresses. Figure 7.1 depicts the hazard function of TOM. An $\alpha > 1$ corresponds to a greater chance of the duration to end the more days a property has been out for sale, which logically is explained by the extended exposure on the market as time passes.

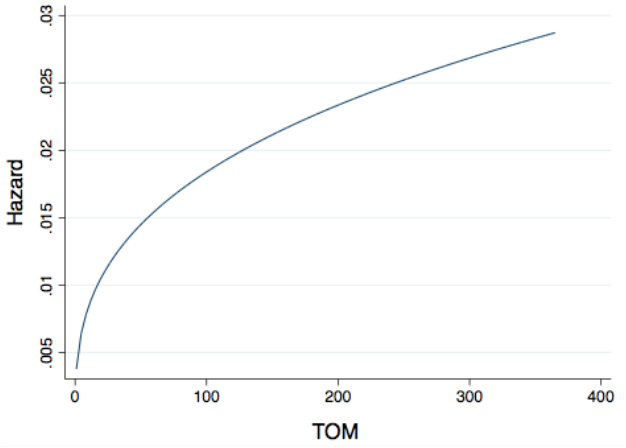


Figure 7.1: The hazard function of TOM

A possible explanation of the result regarding the relationship between DOP and TOM is an increased interest among buyers of properties listed at lower price levels. The number of potential buyers will rise because the interval of matching reservation prices of buyers increases. Also, buyers might see a chance of making a bargain, which further adds to the crowd of speculators. A large number of bidders will raise the competition, which in turn may trigger the sales speed. A reason for higher list prices leading to an extended TOM could be the increased difficulties of finding a buyer who is willing to pay a higher price which, in turn, leads to a longer time on the market. In general, more expensive properties takes longer time to sell. As discussed in Taylor (1999), a longer duration means a higher risk of a stigma effect building up among potential buyers, as properties that have been marketed for too long may signal "poor" quality.

7.3 Survey

The online survey of 12 questions was forwarded to the *Association of Real Estate Agents* in Iceland, including a total of 304 Icelandic real estate brokers. 57 out of 304 of the members participated in the survey; a response rate of nearly 19 percent. This response rate can be considered adequate as the questions in general gained relatively homogeneous answers. We assume that these brokers work according to similar principles, which we believe contributes to a representative group of participants. Reasons for the high rate of absent participants might be the requirement of time, effort, and the reluctance of sharing the information that this survey aims to gather.

The introductory questions concerned general information about the real estate brokers; years in the profession; type of properties they mainly sell and their compensation. The fourth question concerned the general sales duration. More than half of the respondents (52.6 percent) stated that they have been working more than 10 years. Almost 50 percent mainly sell condominium apartments. Around 60 percent stated that the general length of time between the listing and transaction of a property is 1-3 months. The most common compensation was a commission-based salary (90 percent).

In the following, we will present the remaining questions (see Table 7.7) that specifically concerns list prices and hence, are in line with the purpose of our thesis. The complete survey is presented in Appendix 1.

Table 7.7: Questions

Q1	Do you believe the list price is important in a sale?
Q2	Why, or in what way is the list price important?
Q3	What function does the list price serve, according to you?
Q4	What is the optimal choice of list price from a broker's point of view?
Q5	Based on your answer in question Q4: Why is this the most optimal choice?
Q6	Which of the following outcomes do you want to achieve as a broker?
Q7	What aspects of your work is the most important towards a successful sale?

1. Importance of list price (Q1, Q2)

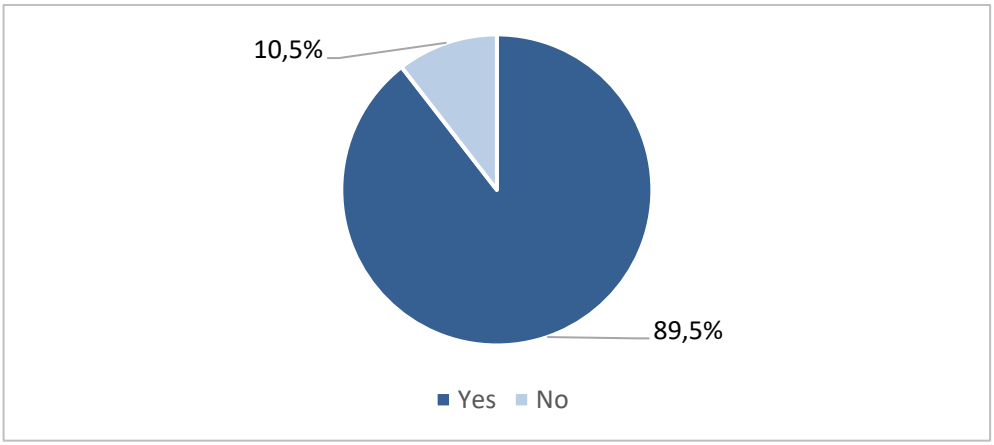


Figure 7.2: Do you believe the list price is important in a sale?

A vast majority (89,5%) of the respondents agree to the statement that the list price is important in a sale. The question was followed by an open-ended question (Q2), allowing explanations of why they considered list prices as important or not important. There was a large variety of answers, but a certain pattern could be distinguished. Answers that appeared repeatedly was the function of list prices as a signal of the market value of a property. Other repeated answers concerned the seller's price expectations and optimization of buyers' search. One of the respondents stated:

> *"People are then more aware of the price range in which they can buy, they are not looking at properties that they cannot afford to buy..."*

This implies that, by determining a list price, buyer's with reservation prices in a certain range are "captured" and those buyers' whose reservation prices are dissimilar to the advertised price will not spend any time or search costs on the property in question. The respondents whose answers were related to the price expectations of a seller, claimed that the list price is important because it represents what offer a seller is ready to accept from prospective buyers. For instance, one respondent argues that the list price "gives an indication of what price ideas the sellers have" which in turn reveals the seller's reservation price. On the other hand, another respondent highlights the importance of reasonable price expectations among sellers in order to achieve an optimal sale. If the expectations are too high, the respondent mentions that it usually takes longer to sell and it is not a given that a higher price is obtained for the property. Other respondents point out the importance of list price as people are hesitant to make inquiries and offers if no price is specified. Other statements are:

> *"The right price matters, shortens sales time and maximizes prices"*

> *"To get rid of unrealistic offers and queries".*

The first citation is very relevant to the thesis as it points out that the list price plays a role in sales in regard to both sale price and time on market, which the two hypothesis of this study aims to answer. The second citation states that the usage of list prices prevents unrealistic offers, which can be linked to the anchoring effect. By setting a list price, a signal of the property's worth is communicated and, most likely, buyers with matching reservation prices are the ones participating in the bidding.

2: Function of list price (Q3)

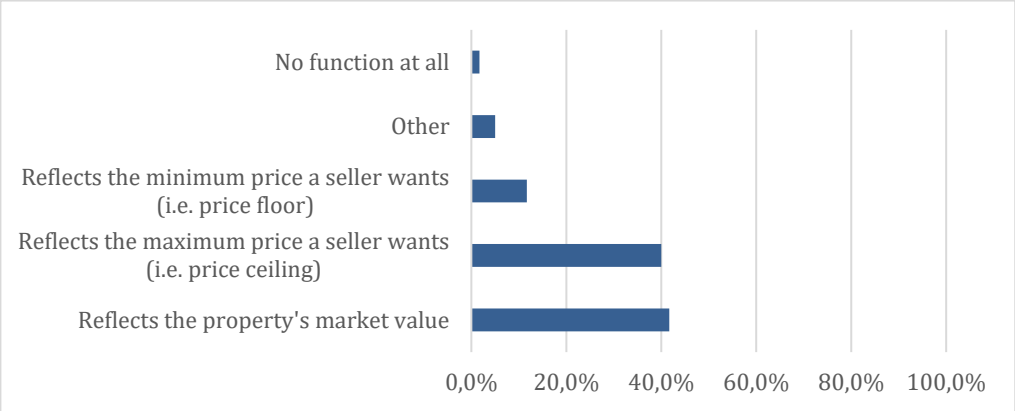


Figure 7.3: What function does the list price serve, according to you?

Figure 7.3 present the response rates of the question related to a list price' function (Q3) with multiple-choice answers. The distribution of the responses indicate that most real estate agents agrees to that the list price serves a function. Most respondents claim that the list price is a reflection of the property's market value. One respondent stated:

> *"List prices are best used as indicator of price based on market value. Sellers like to think of it as price sticker."*

We believe that the mentioned "price sticker" can be thought of as a *price anchor*. More specifically, setting a list price equal to the market value can have an anchoring effect, as potential buyers will be influenced by this piece of price information when considering their reservation price. Furthermore, an anchor at market value will presumably promote bidders to bid at or around this price level which is more beneficial compared to a lower anchor.

An almost equal share considered list prices to be a signal of the *maximum price* a seller wants, and hence, the price that the seller would accept immediately ("accepted price"). A small proportion stated that it reflects the *minimum price* a seller wants. A few respondents provided their own answers (*other*), one respondent stated:

> *"Otherwise, there is no starting point for buyers."*

3. Optimal choice of list price (Q4, Q5)

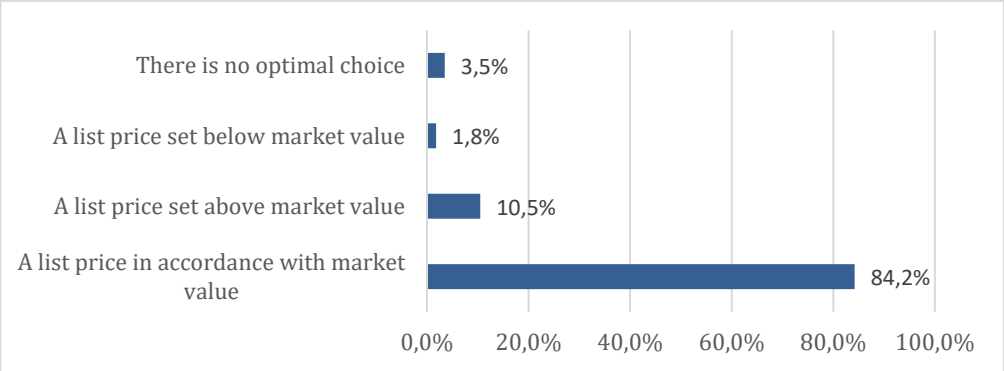


Figure 7.4: What is the most optimal choice of list price from a broker's point of view?

A remarkable share of brokers (84 percent, see Figure 7.4) considered the optimal choice of list price is set in accordance with the property's market value. Many respondents claim that this will increase the probability of a sale and speeds up the selling time. One respondent argues that a list price equal to the market value attracts more potential buyers, which stands in contrast to many studies where rather low list prices is suggested to have this effect on buyer's interest. Another one argues that when prices are too high, nothing happens, and the seller becomes impatient. Also, when the price is too low, buyers flock to it and sellers get all sorts of offers below the market value. Two of the statements are:

> *"It attracts buyers, too high price reduces interest. A price that is below market value can in some cases be suitable and the property then put up for sale with the intention that the market corrects the price to increase."*

> *"The market controls the price; unnecessary delusions arise if it is not respected."*

Several respondents also claim that a list price corresponding to the market value is fair and beneficial for both sellers and buyers, and according to law, a real estate agent is required to represent both parties. Also, some respondents claim that a list price in accordance with market price is important since they believe buyers have a good price perception:

> *"People who see that the list price is far above the sale price loose interest in the property, because they themselves have looked at the prices carefully and become good experts of the sale price of the property that they are looking for".*

"In my opinion, buyers are well informed and therefore it is always best to set price at market value."

About a tenth of the respondents, 6 persons, answered that list prices set *above* market price is the most optimal choice. Half of this group returns to the concept of market price, by claiming that choosing a list price above market price leads to an achievement of reaching the market price. As noted earlier, this strategy can be attributed to the anchoring effect; a higher set price may lead to a higher sales price as buyers perceive the property more valuable.

The responses from this question confirm the perception of market price as a target in sales. One of the respondents argues that this list price choice makes it more likely to get the highest price. Another one claims that it gives scope for agreements, i.e., gives space for downwards going negotiation. Only one of the respondents selected the option that the most optimal list price is the one set *below* the market value:

"It gets as many people as possible to come and see the property and generate excitement".

The significantly low response rate to a list price set below market value indicates that this strategy is not used in Iceland. However, interestingly, the associated statement highlights one of the main motives of the sales strategy in Sweden, where there is an ongoing debate of brokers setting low list prices relative to market to generate "bidding wars" (Enegren, 2017). The fact that only one participant claimed that the optimal list price is the one set below market value, combined with the fact that the Icelandic sales system is entirely different to the Swedish one, we can conclude that this is not an established strategy in Iceland. Furthermore, one respondent stated that a price *below market* value in some cases can be suitable, based on the argument that the market corrects the price. Two respondents believe an optimal choice does not exist. One person also added that it depends on market conditions.

4. Desired sales outcomes of a real estate broker (Q6)

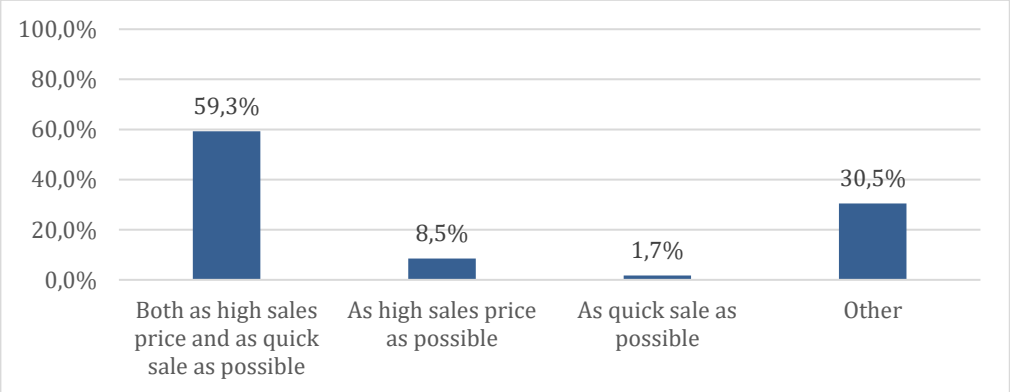


Figure 7.5: Which of the following outcomes do you want to achieve as a broker?

As depicted in Figure 7.5, most of the respondents prefer to sell both at the highest possible price and as quick as possible, which is considered as two contradictive incentives in the literature (see literature review, chapter 4). A significant smaller share of the respondents chose the options "high sales price" and "quick sales" separately. About a third of the respondents provided their own answers, where almost everyone stated that they want to sell at a "reasonable" or "realistic" price that is fair for both the seller and buyer.

5. Important features of a successful sale (Q7)

Based on the free text answers to the optional question 7, it appears that the key aspects of the work towards a successful sale can be categorized into building a *trustful relationship* with both the seller and the buyer as well as appropriate *marketing* of the property. A significant number of the respondents points out trust and honesty as important aspects when selling a property, and one of them clarified this by stating:

"Brokerage should be about the fairness and benefit of both sellers and buyers."

Several respondents point out the importance of marketing the property in order to reach a successful sale. The most essential aspects of marketing of the property included adverts with clear descriptions and professional photographs as well as viewing. Two of the respondents stated:

"Access to show the property is one of the most important and the marketing to reach the right target audience."

"Advertisements, clear sales descriptions and that as much information as possible accompanies each property as possible"

7.3.1 Survey analysis

To summarize, important remarks of the survey is that almost all participants consider list prices as an essential feature of transactions (Q1) and 84 percent argue that the *optimal choice* of list price is the one matching the market price (Q3). A share of 40 percent claims that its function (Q2) is to reveal the maximum price a seller wants, and an almost equal share answered that it reveals the property's market value.

Regarding the question of list prices' function (Q2), we assume that the responses of question Q2 also reflects how brokers actually establish list prices in practice. Thus, a share of 40 % sets a list price in accordance with the maximum price the seller would accept. Hence, it serves as a "price ceiling" of the transaction price. This approach opens up for downward negotiations and bids equal to the list price will most probably be accepted straightaway. The almost equal share of 40% answering that the list price reveals the market price, can comparably be interpreted as this proportion of brokers sets list prices in accordance with an estimated market price.

Based on the assumption that sellers behave rationally, the highest possible selling price for their property is desirable, *ceteris paribus*. It is then reasonable to think that sellers will prefer offers exceeding the market value due to high price expectations or an overestimation of the property's worth. A possible explanation of the relatively high ratio of the sample group setting a list price in accordance with the seller's desired price, could be that they expect the market itself to correct the pricing.

According to several respondents, setting a list price aligned with such preferences is undesirable for some brokers; too high price expectations is an issue because it risks very low interest among buyers or an elongated sales process. Consequently, many brokers prefer list prices in accordance with the market value as this can result in a greater interest among buyers and speed up the selling process. Since brokers have superior expertise in the field of real estate and the local market, sellers most likely put their trust in the brokers as professionals. In turn, we believe that brokers can influence sellers price expectations if they are unreasonably high. By setting the list price in line with the market demand, some argue, it can result in a greater interest among buyers and speed up the selling process. We believe that this approach will be favorable for both buyers and sellers, as the search will become more efficient and in turn, the search costs will be reduced.

These two ways of establishing list prices can be linked to the theory of anchoring. Setting a list price close to or above the market price, might serve as a strategy to achieve higher sales prices. Higher list prices will, according to the theory, reduce the risk of prospective buyer's perceiving the property as deficient or worth less. In turn, the risk of receiving too low bids is reduced, which can be considered as more likely to occur when the list prices are set too low.

One should also keep in mind that brokers do not always share the same outcome goal as their client, which leads to the principal-agent problem. The major proportion of brokers stated that they prefer to achieve both high selling prices and fast sales. These

desired outcomes are mentioned as a “trade-off” and contradictive to each other according to the literature. Since brokers earn more money the greater quantity of properties they sell, brokers may have incentives to list properties at a price that speeds up the sale rather than selling it to the highest price possible. Thus, this strategy stands in contrast to the incentives of the seller, who aims to achieve the highest possible price for his or her property, even though the sales duration risks to be elongated. On the other hand, agents also earn high commission if the property in question is sold at a high selling price, which is in line with the seller’s incentive. However, this requires more effort and time by the agent. One of the questions in the interview (Appendix 1, question 3) concerned the broker' salary format, where most of the brokers are payed through commissions based on a percentage of the final sales price. To lower the sellers price expectations by listing the property equal to its market value can be an incentive for earning more commission and also make the seller satisfied by achieving a higher sales price than expected.

On the other hand, the brokers are obliged by law to represent both buyers and sellers in a sale. When asking the survey participants what the most important aspect in their work is towards a successful sale, several respondents stressed the importance of honesty and representation of both buyer and seller. This can be interpreted as being as transparent as possible and, in turn, reducing the asymmetric information between the parties. The aspect of honesty can be considered as a particularly important part of the agents work as the Icelandic auction procedure is based on sealed bids. We believe this type of auction format puts a larger pressure on brokers to price the listings "correctly", due to the large asymmetric information that prevails in comparison with auctions with public bids. The asymmetric information can in this case be referred to as the issue of buyers not being able to change or "improve" their perception of a property's value through the signals given through observations of competitors' bids (linked to the theory of common and private values). By listing a house to its market value, the agent eliminates the risk of taking advantage of the buyers’ eventual lack of knowledge and selling over-priced properties. Brokers that announce properties at too high list prices can consequently risk his or her reputation and trust among buyers. Also, a list price that equals the market price leads to a greater chance of matching seller’s and buyer’s price expectations. This can in turn lead to reduced search costs and a more effective sales process for both parties.

Sources of error

Since the provided data is reported from real estate agencies being part of Iceland’s Association of Real Estate Agents, it is dependent on the accuracy and honesty of the brokers’ portrayal and description of the dwellings. It is uncertain whether such values actually reflect a situation (e.g., no parking) or are explained by wrong or inadequate reporting. Other sources of error could be misunderstanding of the questions leading to distorted answers that does not reflect the respondents’ intentions. Also, there is a risk of biased answers as the participating group is representing an association which advocates a certain brokerage practice or policy. The majority of answers were formulated in Icelandic which makes the process of translation subject to an additional source of error.

8 Discussion & Conclusion

In this study, we have examined the impact list prices have on the final sales price as well as the length of sale in Icelandic housing transactions. We have also studied the standard practice of list price determination among Icelandic brokers, to evaluate whether their pricing strategy leads to an optimal outcome from the broker's perspective. Our two hypotheses are based on previous findings and are formulated as: (1) A list price below a property's market value leads to lower sale prices, (2) A list price below a property's market value leads to shorter time-on-market. In addition to the regression analysis, we sent a survey to members of the *Association of Real Estate Agents* in Iceland, to acquire a deeper knowledge regarding list price determination.

By using a comprehensive set of residential transaction data sold in the Capital Region of Iceland from January 2014 to August 2020, we have estimated both a hedonic model and a duration model to test our proposed hypotheses. Our findings suggest that a *low list price decreases the sales price*, which gives support to our first hypothesis (1). Our second hypothesis (2) also received support, stating that *low list prices lead to a shorter time-on-market*. Thus, according to our findings, a list price below market value is linked to a lower sales price and shorter time on the market, respectively.

Our results from the regression analysis confirm that a *trade-off* between sales price and TOM exists; low list prices shorten the TOM but at the expense of the sales price, which becomes lower. Contrariwise, higher list prices are related to an extended duration on the market, but the extended exposure enables sellers to capture more superior selling prices (Anglin et al., 2003). These findings are similar to other studies including Miller (1978), Björklund et. al (2006) and Hungria-Gunnelin et al. (2019).

The trade-off implies that both the broker and seller face a dilemma of either selling within a shorter time or selling at a higher price. The brokers' choice of pricing strategy might strongly depend on the type of brokerage fee they charge. By fixed fees, there are higher incentives of selling at a higher speed (rather than maximize the sales price) as they will only charge a set amount per sold unit. Brokers will be aware of the final payoff in advance and will not benefit from putting more effort into increasing the potential of higher sales prices and hence, their incentives are lowered.

The survey results showed that the most common type of brokerage fee the participating brokers charge is commission-based. In contrast to fixed fees, this compensation type gives greater incentives to strive for higher sales prices. Likewise, sellers are facing the same trade-off of either selling quickly or selling at a higher price. If the seller is in the process of buying a new home, he or she might prefer a quicker sale. However, under the assumption that they behave rationally, they will prefer to receive the highest possible offer. The responses also implied that list prices commonly are set slightly above, or close to, the market price rather than low. The mentioned standard practice of list price determination was additionally confirmed by a well-established Icelandic real estate agent, Páll Pállsson. Moreover, our descriptive statistics also indicated that list prices usually are set relatively high; 72.5 percent (see

chapter 7) of the transactions end up at a price below the list price. However, it does not tell the sales price relation to the market price. Yet, it tells us that list prices form an upper limit of the sales price.

Against this background, it can be concluded that Icelandic real estate brokers' standard pricing strategy generally leads to higher sales prices. Under the assumption that this strategy is consciously used, the incentive of realizing the highest possible sales price is shared between seller and broker. Consequently, the effect of an eventual principal-agent problem between the parties is reduced (Carroll, 1989). Hence, it can also be concluded that brokers do not seek quick sales through low list prices. A possible explanation is that selling at lower prices within a shorter time is not as profitable for the brokers compared to getting higher commissions at the expense of longer sales durations. Another reason could be the broker's higher chance of matching sellers' reservation prices when listing at higher levels which in turn, gains satisfied customers and a good reputation.

Our findings show clear evidence of *price anchoring*. We believe the anchoring theory to be particularly applicable in the context of list prices in a sealed-bid system as in Iceland. This is due to individual buyers' inability to receive any signals about the true value of a property through estimates of their bidding opponents. Instead, his or her judgment will only be dependent on his or her own valuation (private value) of the property in question. Hence, the list price serving as the major reference of buyers' offers. In contrast, in the case of public bids, one can get an idea of the "common value" both by observing the list price and, maybe most important, the bids of his or her competitors. Thus, a selling procedure with sealed bids puts a larger pressure on the broker of listing properties at a representative price, that is fair both to both buyers and sellers.

A possible explanation for a low-pricing strategy being related to a higher probability of sale and, hence, a reduced number of days on the market is quicker matching between seller and buyer. Lower prices evoke a quicker buyer response and a more vigorous bidding activity, since more buyers will engage in the bidding process. This will, in turn, shorten the time proceeded until sale. Also, expensive houses generally take longer time to sell. An explanation of high list prices causing high sale prices is the rising state of the housing market, which means a larger likelihood of selling even though list prices are set at a high level compared to the market demand. The lowering of interest rates, causing drops in the mortgage lending rates, means that more people can finance their housing investments and buy properties even at higher price levels. The positive price trends for both apartments and single-family homes that have been on a stable rise the last decade also tend to higher the expectations of prospective buyers. They will expect the prices to continue to increase and might tend to buy even overpriced properties. Noteworthy is that our findings are applicable to a rising market but would perhaps have been different if observing a falling state of the market.

This study has offered some new insights to the developing research investigating list prices in housing markets. We aspire that our study will serve as a starting point for

future investigations of list prices on the Icelandic housing market. Our study is only part of a larger body of empirical research and there is room for further investigations. A suggestion is to distinguish apartments and houses to see if there are any major differences of the studied relationships depending on housing type. It would also be interesting to study the effect across different geographical areas, for instance, the municipalities in the Capital Region, to see whether the findings of a positive relationship are consistent.

Appendix 1: Survey questions

1. For how long have you been working as a real estate agent?
   A. < 1 year
   B. 1-3 years
   C. 3-5 years
   D. 5-10 years
   E. > 10 years

2. What type of properties do you mainly sell?
   A. Condominium apartments
   B. Single-family detached or semi-detached houses
   C. Other (please specify)

3. How do you as a broker get paid?
   A. Fixed compensation
   B. Fixed compensation plus commission based on the property's transaction price
   C. Commission based on a percentage on the property's transaction price
   D. Other (please specify)

4. How long, in general, are the process between the listing of a property and the sale of a property?
   A. 0-3 weeks
   B. 1-3 months
   C. 3-6 months
   D. 6-12 months
   E. > 12 months

5. What function does the list price serve, according to you?
   A. It reveals information about what maximum price a seller wants (i.e price ceiling)
   B. It reveals information about what minimum price a seller wants (i.e. price floor)
   C. It reveals a property's market value
   D. It serves no function at all
   E. Other (please specify)

6. Do you think the choice of list price is important in a sale?
   A. Yes
   B. No

7. If you answered "yes" in question 6: Why or in what way is it important?

8. Which of the following outcome of a transaction do you want to achieve in a sale?
   A. As high sales price as possible
   B. As quick sale as possible
   C. Both as high sales price and as quick sale as possible
   D. Other (please specify)

9. What is the most optimal choice of list price, from an agent's point of view?

A. A list price set in accordance with the property's market value
B. A list price set above the property's market value
C. A list price set below the property's market value
D. There is no optimal choice of list price

10. Based on your answer in question 9: Why is this the most optimal choice?

11. To what extent do you believe you can affect the sales price as a broker?
A. To a great extent
B. To a moderate extent
C. To a small extent
D. Not at all

12. What aspects of your work is most important toward a successful sale?

Appendix 2: Statistical concepts

Correlation (R)
Correlation measures how strongly two variables are associated with each other in a range between -1 and 1. This association means that the variables move together either positively or negatively. If the correlation is equal to 0 there is no correlation between the variables (Arkes, 2019).

R-squared (R2)
The coefficient of determination, or R-squared, refers to the percentage variation in the dependent variable (y) that is explained by the independent variable (x). The R-squared ranges between 0 and 1, where a higher R2 means that the variation in y is explained to a greater extent. For instance, if R2 equals 0.3 in a regression model where a house price is explained by the number of rooms, a ratio of 30% of the price is explained by the rooms. The coefficient of determination is calculated by the square of correlation as follows:

$$R^2 = 1 - \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \overline{y})^2}$$

Adjusted R-squared
When adding independent variables to a (regression) model, the R2 consistently increases even though no logic pattern exists between the added X and the Y. The reason for this increase is that there practically always is a certain degree of correlation between two variables. To correct the incidental correlation, the adjusted R2 is commonly used. In contrast to the R2, the adjusted R2 only increases when the added independent variable explains the dependent variable more than what a random variable is expected to do (Arkes, 2019).

$$Adjusted\ R^2 = 1 - \frac{(1 - R^2)(N - 1)}{N - p - 1}$$

Multicollinearity
In multiple regression models, multicollinearity denotes the occurrence of linear relationships between the independent variables (Wooldridge, 2006 – s101). If the independent variables are highly correlated, the R2 between them will approach 1 and, in turn, the model would have issues with differentiating between the effects of the independent variables (Arkes, 2019).

Endogeneity and Omitted variable bias
Endogeneity is a problem in statistical models which occurs when there is a correlation between the error term (e) and an independent variable (x). This means that the independent variable is correlated with unexplained factors, that in turn explain the dependent variable (Arkes, 2019, s.114). A common cause for endogeneity is o*mitted variable bias,* which arises when a statistical model leaves out one or more relevant

variables. Consequently, this makes the model apply the effect of the missing variables to the existing independent variables making it biased (Antonakis, 2014). The contrary to endogeneity is called exogeneity, which means that there is no correlation between the independent variable and the error term, and in turn leads to "good variation" when estimating causal effects (Arkes, 2019).

Omitted variable bias
Omitted variable bias arises when a statistical model leaves out one or more relevant variables, which consequently makes the model apply the effect of the missing variables to the existing independent variables.

Ordinary least squares (OLS)
There are various methods for estimating the best-fitting regression line. By far, the most common one is the Ordinary Least Squares (OLS) method. The "Least Squares" part refers to minimizing the sum of the squared residuals across all observations.

Dummy variables
Qualitative factors like whether a building contains an elevator or not, is incorporated into regression models like binary variables called dummy variables. Thus, dummy variables are defined by assigning the events of the variable either 1 or 0 (Wooldridge, 2006). For example, when studying the existence of elevators in buildings, dummy variables are an appropriate option in the regression model.

Outliers
Points in a data set that significantly differ from the rest of the observations are called outliers (Dougherty, 2016, page 269). In property context, these remarkably large residuals can be caused by distinctive attributes like unusually large size in square meters, basement floor location or very low prices due to sale within families. Detecting outliers and deleting them from the data of analysis can contribute to an enhancement of a regression model (Dougherty, 2016).

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