A STUDY OF THE BRF 2.0 CONCEPT

THE IMPACT OF RADICALLY INCREASED LEVERAGE IN SWEDISH HOUSING COOPERATIVES

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Abstract:

The dysfunctionality of the housing market in Sweden has attracted substantial interest from media, researchers, and politicians the past decades. Young adults that fail to meet the credit restrictions are unable to purchase an apartment, and long queues often keep them out of the rental market. This is a market problem of large proportions in the Swedish society. This paper analyses the yet unlaunched concept of BRF 2.0, which seeks to solve this problem. The BRF 2.0 takes on a higher amount of debt than regular BRFs, which results in a lower purchase price and a higher monthly fee for buyers. In particular, this paper aims to explore how the concept will be priced on the open market, with special focus on consumer pricing of the increased fees. Through the use of the Hedonic Price Model, almost 12,000 transactions from the municipalities of Järfälla and Sollentuna are analysed in order to understand how apartments are currently priced. The study shows that buyers currently undervalue the present value of fees at 88% of their fair value, according to the Hedonic Price Model. In terms of the BRF 2.0 concept, this indicates that the market could pay a premium of up to 72% compared to the apartments' fair value. Lastly, while the BRF 2.0 seems to partially solve the identified market problem, its effect may be reduced if companies start charging buyers according to the market value suggested by this paper.

Keywords:

BRF 2.0, Hedonic Price Model, Leverage, BRF, the Swedish Housing Market

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Contents

1. Introduction

The dysfunctionality of the Swedish housing market has been in the centre of attention of the media as well as for politicians for years, and is often described by individuals as one of the main issues in Swedish society today[1]. As demand for housing has long been increasing at a faster rate than supply, apartment and house prices have soared and the length of queues for rental apartments have become remarkably large (SvD, 2019). This results in that large groups consider it difficult to find housing, especially those that are new to the housing market, most notably young adults (Swedbank 2019). The major market offerings are typically unavailable for this group, as they often lack the possibility to purchase their own apartment, and have not yet accumulated enough years in the queue to be able to find a rental apartment. The situation is dire: a third of young adults are unsure of whether they will ever be able to own their own apartment (Bostadsrätterna, 2018), while 83% of Swedish municipalities report having a housing shortage for young adults. Those young adults who are unable to find an apartment in the regular markets are often forced to keep living with their parents: the share of young adults living with their parents increased by 60% 1997-2017. Alternatively, they might try their luck in the expensive sublease market[2], where living costs can be as much as 94% higher than other housing tenures (Hyresgästföreningen, 2017).

In an attempt to solve the problem outlined above, a variety of new solutions are appearing on the market. One such solution is the so-called BRF 2.0, Swedish for "Housing Cooperative 2.0", to be introduced by the Stockholm-based real estate company Well Fastigheter. Formally, the concept takes the form of a housing cooperative, but it is remarkably more indebted than traditional housing cooperatives. The consequences of this financing solution are twofold: a dramatically lower purchase price, and higher fees to the cooperative, in order to cover increased interest in the cooperative. Therefore, this kind of housing combines aspects of a classic housing cooperative apartment with those of a rental apartment.

This thesis aims to explore how the market would price apartments sold within the BRF 2.0 concept. As the solution is untested in the Swedish market, it is unknown how

[1] Please refer to e.g. Novus, 2019.
[2] "Andrahandsmarknaden" in Swedish.

it will be priced by consumers. The current pricing is made by Well Fastigheter according to their economic models, which does not necessarily need to correspond with how the market will price these apartments. Indeed, there are reasons to question whether the market will price the apartments according to what is rational and in line with economic theory. Prior work has shown that purchasers of apartments do not correctly price in the leverage of the housing cooperatives, nor do they discount the future payments to the cooperative correctly (Almenberg and Karapetyan, 2011; Hjalmarsson and Hjalmarsson, 2008; etc.). Specifically, consumers have been found to price apartments with high leverage and high fees at a premium. If that would be the case when buyers price the BRF 2.0 apartments, the implications would be significant. As BRF 2.0 has a remarkably high leverage, any mispricing of fees will have a larger price impact on BRF 2.0 apartments than on regular BRF apartments.

In short, this paper's aim can be summarised in the research question below:

- According to empirical data and pricing theory, will apartments in the BRFs 2.0 be rationally priced in the market?

In order to answer the research question above, this thesis will focus on two areas. Primarily, the thesis will base the understanding on BRF 2.0's pricing on how individuals currently price regularly leveraged apartments according to data from Svensk Mäklarstatistik. For this purpose, a regression will be run according to the Hedonic Price Model. Secondly, the thesis will also offer a more qualitative approach to the concept, analysing its market impact and individual borrowing constraints – factors that also should affect the pricing of the concept. Central to the second part will be to analyse if BRF 2.0 solves a market problem. If it does, it will increase the perceived value and therefore price customers are willing to pay. Specifically, it will explore if the BRF 2.0 concept would make housing available for groups that currently have difficulties entering the market, in particular young adults, e.g. through the lower initial investment.

This thesis differs from other studies in the sense that it aims to investigate a previously unexplored concept. Since BRF 2.0 is a new phenomenon, neither its impact on the housing market nor its pricing have been researched before. Nonetheless, this

study will share certain similarities with other studies, in particular those that have aimed to identify how consumers price fees and debt in housing cooperatives. However, to our knowledge no study has been made in such limited geographic areas as two municipalities, and certainly no studies have been done in the specific municipalities analysed in this thesis. Furthermore, the finding of this thesis supports prior research indicating that consumers underestimate the vale of the capitalised fees, but differ from prior research in regards to what extent consumers do so.

The regression analyses the coefficient γ, which determines how buyers value the future cash flows associated with the BRF (specifically, the future fees). The result from the regression shows that γ equals to -0.88. In other words, buyers are willing to pay 0.88 SEK less per 1 SEK of the capitalised fee. According to the Hedonic Price Model and common Net Present Value (NPV) theory, the coefficient should be -1 if consumers were rational. Thus, our study suggests that consumers are undervaluing the fee, which is in line with earlier research. However, our findings indicate that the buyers are better at valuing the fee than research has found earlier. The differences are significant: 0.88 SEK per 1 SEK of capitalised fee, compared to 0.54-0.75 SEK identified in prior research. Applying the insight that buyers are valuing the capitalised fee at 88% of its fair value on the data set provided by Well Fastigheter, indicates that the buyers could be willing to pay a premium of 46%-72% compared to the prices set by the company. These results should, however, be approached with caution, as the regression is highly sensitive to certain assumptions, in particular the choice of discount rate used.

The study indicates that individuals that are unable to purchase a regular apartment due to borrowing constraints are able to purchase a BRF 2.0 apartment to a large extent with current BRF 2.0 pricing, implying that the concept may indeed help solve the identified market problem, which supports the regression results indicating high valuations. This finds support in Well Fastigheter's own data: most of the individuals who have booked the available BRF 2.0 apartments are in fact young adults. However, the study also finds that the effect might be reduced would companies start charging the buyers in accordance to the market price implied by the regression. In reality, the willingness to pay the identified premium identified in the regression might be hindered by borrowing constraints. If the prices should be raised, the concept is likely not to help young adults to enter the housing market to the same extent.

2. Background

The Swedish housing tenures[3], as well as the BRF 2.0 concept, are somewhat complicated. As such, before exploring the data and the analyses it might be beneficial to provide a background and an introduction to the housing market and the BRF 2.0 concept. In this section, we will first explore the Swedish housing market in general, then explore the traditional housing cooperatives, and last introduce the BRF 2.0 concept in more detail.

2.1. The Swedish housing market

In this section, the essentials of the Swedish housing market are introduced. Firstly, an introduction to the four types of housing tenure in Sweden will be presented, followed by a historical background of the development of the three housing tenures that are relevant to the scope of this thesis. Lastly, the implications of said developments on young adults will be discussed.

2.1.1. The Swedish housing tenures

According to Boverket (2009), there are four types of housing tenures in Sweden: rental apartments, housing cooperatives, cooperative rental apartments, and home ownership.[4] However, the cooperative rental apartments have a market penetration of below 1%. Instead, the market is dominated by the other three tenures: home ownership constitutes 39% of the market, rental apartments 38%, and housing cooperatives 23% (Boverket, 2019). Therefore, the cooperative rental apartments will not be described further in this thesis. A short description of the other three is provided below.

2.1.1.1 Rental apartments

There are two kinds of renting: renting from a company and from individuals. The market for renting apartment from housing companies is highly regulated, especially in

[3] Housing tenure refers to the legal status under which someone has the right to occupy a house or an apartment.
[4] Known in Swedish as *hyresrätt*, *bostadsrätt*, *kooperativ hyresrätt*, and *äganderätt*, respectively.

terms of rents. Companies are moderately free to set rents when first renting out newly built apartments, but any future increase in fees is subject to high regulation. The rents are usually set in collective negotiations between landlords and the tenant organisation, resulting in that they are often simply indexed with little regard to market pricing. According to Boverket, "the rents in the existing stock tend to be below the market rent at least in attractive areas, whereas rents in new production are often market-oriented" (Boverket, 2019). As rent levels cannot be used to determine who will gain a rental lease, a queueing system is used instead, where individuals gain access to rental apartments based on the numbers of years in the queues (Bostadsförmedlingen, 2019).

However, individuals are free to set the rent according to the market when renting out their own apartments.[5] When renting out home classified as home ownership or in a housing cooperative, individuals are virtually free to set the rent. Per contra, when renting out an apartment they themselves are renting from a company, the rent is regulated, but still is allowed to be higher than regular rental apartments (Boupplysningen, 2019). Even so, you are only free to rent out your apartment in a housing cooperative if there are specific reasons, such as studies abroad, to justify the apartment being rented out. The board of the housing cooperative must approve the rental, and is free to decline applications if the individual renting out is thought to be doing so purely for the profit of renting out the apartment, which limits the supply of these kinds of rental apartments with market rents (Svensk Fastighetsförmedling, 2019). The differences in principles for setting the rent, as well as the limitation of supply of market rate rental apartments, creates large discrepancies between rental levels, as identified by Boverket in the previous section.

2.1.1.2 Home Ownership

Home ownership is the direct ownership of the home, house or apartment, in which the individual lives. While it is permitted to directly own a house as well as an apartment, owning your own apartment in the form of a condominium is extremely rare: only 0.5% of home ownership refers to apartments, the rest refers to houses (Boverket, 2009). As the characteristics of home ownership are similar to those of housing cooperatives,

[5] In Swedish known as "andrahandsuthyrning".

home ownership will be analysed together with housing cooperatives apartments in the scope of this thesis.

2.1.1.3 Housing cooperatives

Housing cooperatives work similarly to home ownership, but with the distinction that an individual does not own his or hers apartment directly. Instead, he or she owns a share in the cooperative, which in turn owns the apartment (Boverket, 2019). It is within this housing tenure that BRF 2.0 will be launched.

In order to cover for the association's running costs, the members of the cooperative pay a monthly fee to the association, covering e.g. interest expenses, amortisation and depreciation. Furthermore, the association acts as a legal person and may therefore make agreements and have assets and liabilities. This indicates that the members of the association are not legally liable for its debt. It is the board of the BRF that makes sure that the association has enough funds to pay for maintenance of the property and pay for its running costs (Riksbanken, 2018).

In some cases, the BRF might have to increase the monthly fees; e.g. if the interest rates should rise. If the BRF faces bankruptcy, it will be liquidated and the assets will be sold off. The private mortgages of the members in the association will remain, even though the collateral no longer exist. Thereby, there is a risk of members not being able to pay their mortgage and consequently becoming insolvent themselves (Riksbanken, 2018).

The report "The Swedish Market for Mortgage Loans"[6] by Finansinspektionen (2019), states that the debts of the BRFs are increasing. The existing BRFs had an average debt of 5 800 SEK/m² and the new BRFs had an average of 13 900 SEK/m² during 2018. Furthermore, the average lending from banks to BRFs increased by 5.5% 2017-2018.

2.1.2. Accessibility of the housing tenures over time

As we will see in this section, several developments in the housing market in Sweden have had troublesome implications for the accessibility of housing for young adults.

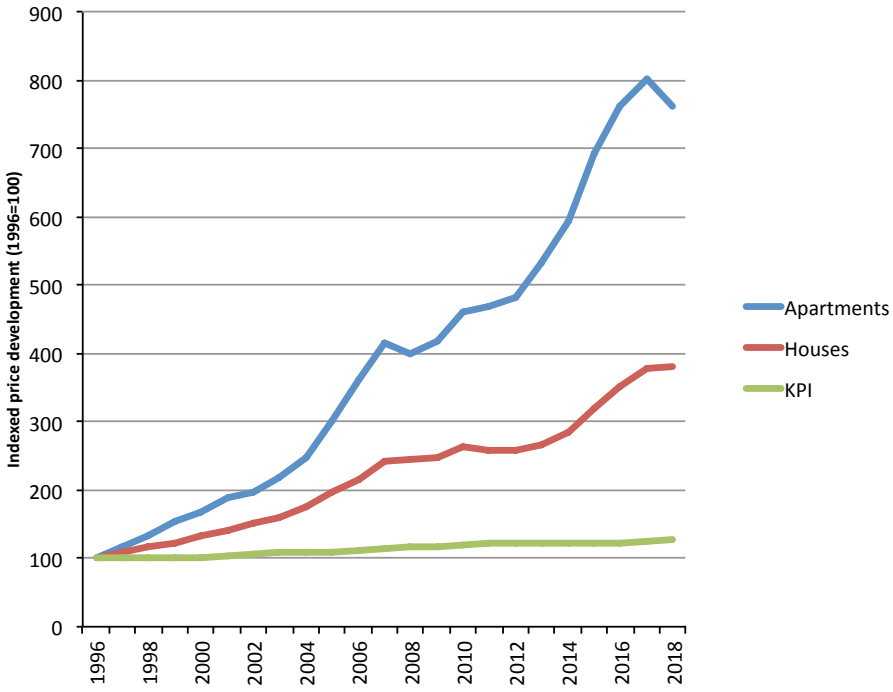
[6] Original title: *Den svenska bolånemarknaden*.

First, the development of housing cooperatives and home ownership will be described, with special focus on price development. Afterwards, the development of rental apartments will then be described, with special focus on queues.

2.1.2.1 Development of purchasable homes

The prices of apartments and houses bought and sold on the open market, in home ownership and housing cooperatives, have developed dramatically during the last two decades. On average in Sweden, prices for apartments have increased by 475% since 1998, while the prices for houses have increased by 228% during the same period (Svensk Mäklarstatistik, 2019). These developments should be compared with the general price development in Sweden, which has been 28% 1998-2018 (SCB, 2019). The development of these prices can be summarised in the graph below.

Figure 1. Indexed development of housing prices compared to KPI[7]



Source: Svensk Mäklarstatistik and SCB

It should be noted that the figures above refer to Sweden as a whole, and that the price increase for housing in the large cities has been even steeper. Apartment prices in

[7] Abbreviation for Konsumentprisindex, the general price development in Sweden.

Malmö and Gothenburg, for instance, have increased by 763% and 906%, respectively, in the time period 1998-2018 (Svensk Mäklarstatistik, 2019).

This development has resulted in remarkably high housing prices, which has put large demands on those wanting to loan to purchase an apartment. An individual wanting to borrow has to take into account that a maximum of 85% of the apartment's value can be borrowed.[8] Often, banks are unwilling to borrow more than 5x-6x of an individual's gross income (Låneguiden, 2019). For an average 30 m^2 apartment in Stockholm, with a purchase price of 2,800,000 SEK, this results in the individual having to put in about 420,000 SEK in equity and have a monthly gross wage of roughly 36,500 SEK (SBAB, 2018).

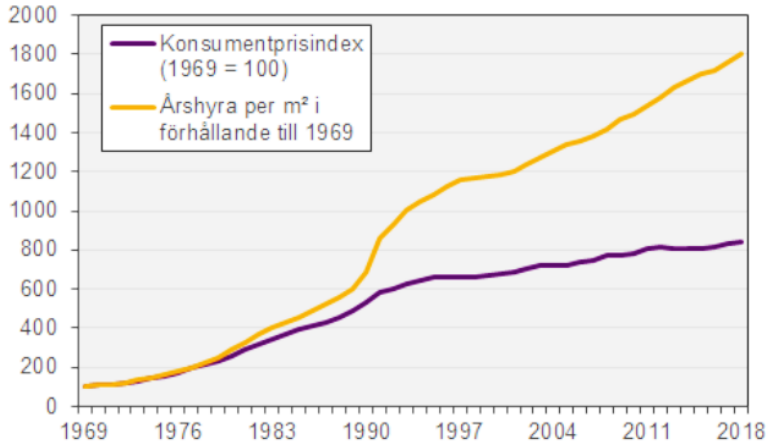
In addition, the Swedish government introduced the amortisation requirements in 2016[9], which in essence are regulations hardening the demands on amortisations. The new regulations requires new loan-takers to amortise 1% yearly if their loan exceeds 4.5x of their net salary, an additional 1% if the loan exceeds 50% of the apartments value, and an additional 1% if the loan still exceeds 70% of the apartments value (SBAB). The new amortisation requirements result in further difficulty to gaining a loan and being able to pay the monthly payments. Preliminary results show that this regulation may have hit small apartments the hardest, and therefore young adults (SVT, 2018).

2.1.2.2 Development of rental apartments

In January 2019, the housing queue in Stockholm reached a record high, with 636 000 people in the queue. Between 2010 and 2018, the housing queues doubled in the three largest cities in Sweden: from one half to one million people. The average amount of time spent in the housing queues before getting a contract in Stockholm was 5.7 years in 2010. In 2014, it had increased to 7.7 years, and in 2018, 10.3 years (SvD, 2019). In other words, both the queues and the number of people in the queues have escalated rapidly.

[8] A rule introduced 2010 by the Swedish government.
[9] "Amorteringskraven" in Swedish.

Figure 2. Indexed development of rents in Sweden compared to KPI



Source: SCB

According to SCB, the average rent has increased with 20.5 % between 2010 and 2018 while the consumer price index increased by 7.8 %. In Metropolitan Stockholm[10], the average monthly rent of a three-room apartment was 7,705 SEK in 2018 (SCB, 2019). Additionally, more than 9 out 10 apartments that are rented out privately in Stockholm have rents that are considered unfairly high, so-called *ockerhyror*[11]. On average, the tenant is required to pay more than the double of the actual monthly payment the renter has to pay (Mitti, 2018).

2.1.2.3 Effect on the housing market

The combination of high purchase prices for apartments and long queues for rental apartments, have dire implications for young adults. In 2017, 213 000 young adults[12] were living at home with their parents against their will. The increasing queues, rents and purchase prices have contributed to keeping young adults from moving out from their parents' home. In 2017, 43% of young adults still lived with their parents, which is the highest share ever measured in Sweden (Hyresgästföreningen, 2017).

Moreover, between 50% and 90% of young first-time buyers would not be able to buy a newly built apartment (SVT, 2018). During 2018, SBAB analysed the housing market in the 20 largest municipalities in Sweden. They investigated if young people

[10] "Storstockholm" in Swedish.
[11] The concept of economic rent in the housing market.
[12] People between 20-27 years old.

between 25 and 29 years old could afford to buy an apartment, when earning the average salary for women and men in the age group. With the average income of 25-29 years old men, it was possible to afford to buy an apartment in only three of the 20 municipalities: Borås, Sundsvall, and Västerås. For women, the situation was even worse: with the average salary of 25-29 years old women, it was impossible to purchase an apartment in any municipalities. The study showed that even for young adults who have saved the necessary amount of capital for the down payment, it is still hard to enter the housing market (SBAB, 2018). The report stated that a major reason to why young people are unable to buy an apartment is credit restrictions. The mortgage cap and amortisation requirement affected young people substantially (SVT, 2018).

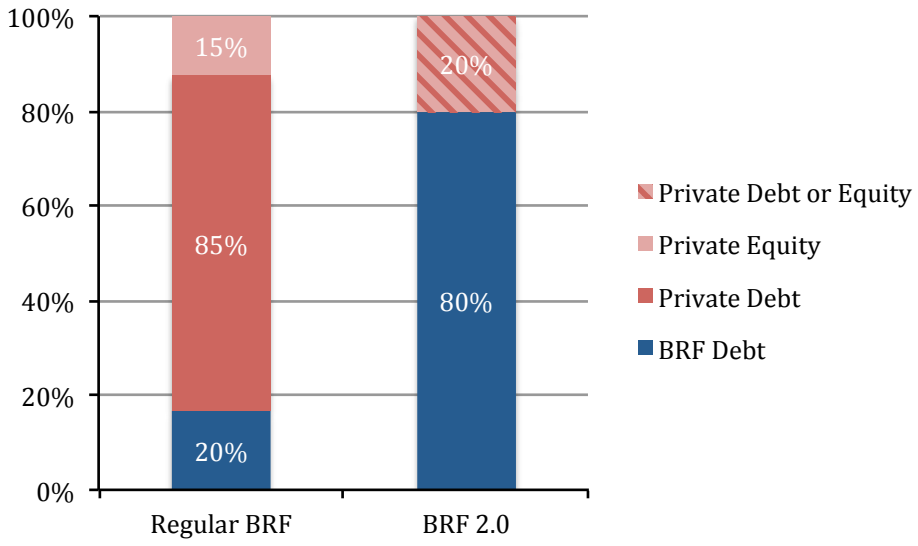
As there are young adults with possibility to save up for the down payment, whose major part of the problem is credit restrictions, there seems to be a need for an alternative financing solution. It is within this area that the BRF 2.0 concept could fit in.

2.2. The BRF 2.0 concept

The BRF 2.0 is a new concept developed by the real estate-company Well Fastigheter, yet to be launched. The central idea of the BRF 2.0 concept is increased leverage compared to traditional housing cooperatives. While a traditional housing cooperative usually has a debt level corresponding to about 20% of the property's enterprise value[13], the Housing Cooperative 2.0 has a leverage of 80% of the enterprise value of the property (Gunnarsson, 2019). The remaining 20% of the property value is financed by the individual. Due to the high leverage of the association, individuals will be unable to use their stake in the BRF as collateral when taking on private debt, thus excluding the possibilities of regular housing loans.[14] However, it might be possible for the buyer to take on private debt in order to pay the purchase price, through for instance so-called *Blancolån*[15] (Gunnarsson, 2019). A comparison of the two financing solutions can be seen in the diagram below.

[13] Defined here as market value plus debt in the cooperative.
[14] Bostadslån in Swedish.
[15] This kind of loans, and the possibilities for buyers of BRF 2.0 to take on private debt in general, will be described in further detail in **Section 6.4**.

Figure 3. The financing structure of BRF 2.0 and a typical regular BRF



Note: The "regular BRF" is an example of how a regular BRF's and individuals' financing structure might look like, and is based on information from Well Fastigheter. BRFs and individuals in the market today might have higher or lower leverage.

The implications of this financing solution are two: the purchase price will be lower for the buyer while the monthly fee will be higher. According to Well Fastigheter, an apartment that would have cost 1,400,000 SEK to purchase with traditional financing would cost 250,000 SEK with this solution, while requiring monthly fees of 5,995 SEK instead of 2,995 SEK.

The company has not yet completed any project within the BRF 2.0 concept, but currently has two on-going BRF 2.0-projects in Järfälla and Sollentuna: *Urban Park* and *The Block*. Construction has not started in any of these projects, and no apartments have yet been sold. However, in *The Block*, the majority of the apartments are already booked (Gunnarsson, 2019). The booking data will be used in this thesis as an indication of future demand, and is particularly useful since it provides some insight despite the project being entirely new.

According to Well Fastigheter, the BRF 2.0 will increase the possibility for homeownership at affordable financing and reduce interest rate risk compared to an average BRF. The BRF loan is expected to be set to 20 years at a 2.5% fixed rate and be

amortised by 1% annually. Therefore, the monthly fees will fall gradually as the debt decreases (Gunnarsson, 2019).

3. Literature review

This section provides an outline to previous literature relevant to this thesis. At first, literature concerning the leverage in BRFs is presented, second literature concerning the Hedonic Price Model, and third literature concerning the BRF 2.0 concept.

3.1. Leverage in BRFs

A plethora of literature can be found within the subject of leverage in BRFs and consumer pricing of fees and leverage. However, only a minority attempt to quantify by which degree consumer misprice these. One example of such a study is "Efficiency in Housing Markets: Do Home Buyers Know how to Discount?", written by professors Erik and Randi Hjalmarsson in 2006 and revised in 2008. It specifically aims to quantify consumers mispricing of capitalised BRF fees. Their analysis is based on a dataset of more than 30,000 BRF transactions in Stockholm, Gothenburg and Malmö. Hjalmarsson and Hjalmarsson find that the capitalised fee decreases the perceived value of properties, as predicted by economic theory. However, the buyers did not price it correctly. Instead, they find that an increase in the discounted fees of 100 SEK only leads to a decrease in the purchase price of approximately 75 SEK. Generally, BRFs with higher fees are thus over-priced. Furthermore, they find that BRF transactions seem to be more correctly priced in the higher end of the housing market and in more educated regions. Socio-economic factors, such as net wealth and education, seem to play a part in assessing the price. This is in line with Campbell (2006); households that are more educated and wealthier are subsequently more likely to satisfy the predictions of standard financial models.

Another study aiming to quantify these characteristics is "A ticking bomb? Leverage in Swedish Housing cooperatives" (2018). In this paper, Wilhelm Meyer and Max Ulmgren explore the impact on leverage and fees on the market valuation. Their findings are similar: buyers valued the capitalised fees at around 55% of their fair value. Their findings therefore strengthen the findings of Hjalmarsson and Hjalmarsson. Furthermore, they find that the buyers did not price the leverage of the BRF correctly. They state that "consumers prefer leverage in the BRF and only value this debt at 32%".

According to Meyer and Ulmgren, this could be due to the fact that the debt of a BRF is less salient.

Other papers have identified the mispricing without quantifying it. One such study is "The hidden costs of hidden debt" by Johan Almenberg and Artashes Karapetyan (2011) which also explores the impact of fees on apartment pricing. The paper discusses the fact that many households pay higher mortgage interest rates than they have to and overpay their brokers for mortgage origination. In addition, they found that when "buying co-op apartments, a co-op loan associated with an apartment is far from fully capitalised in the price". While conducting a survey at the main train station in Stockholm, they found that most respondents were well aware of the size of their personal mortgage loan and the associated interest rate, but not even slightly aware of their BRF loan. Their findings indicated that many apartment owners pay little attention to BRF loans, consistent with their view that BRF loans are less salient.

Apart from the three studies mentioned above, there have been many reports concerning the leverage in the BRFs in Sweden. While there are too many to provide an exhaustive list, some examples are "Koll på bostadsrättsföreningarnas skuldsättning viktigare än någonsin" (2017) and "Fyra av tio bostadsrättsköpare tar inte hänsyn till föreningens ekonomi" (2019) by Swedbank. Both reports note the fact that buyers in Sweden in general do not fully consider the debt of the BRF when buying a apartment. Additionally, both reports discuss the fact that the monthly fee may increase rapidly if the interest rates would increase. They do not view debt in a BRF as something positive, but on the contrary, a negative factor that increases the risk. The main reason for why debt is viewed as negative, is due to the fact that the interest rates will fluctuate erratically. The applicability of this conclusion on the BRF 2.0 concept is likely to be limited, as the BRF 2.0 concept is based on the fact that the debt in the BRF is being fixed for 20 years after the BRF has been founded. However, since the concept is new, there is unfortunately no available literature on the leverage of BRFs when the interest rate is fixed for a long time.

3.2. The Hedonic Price Model

The subject of pricing housing has been researched intensely by economists for decades, which has resulted in a rich stream of papers concerning this subject. Early

work was done by urban and property economics professor Michael Ball in his work "Recent empirical work of the determinants of relative house prices" in 1973. The paper consists of summaries and examinations of different studies of housing prices and housing attributes made in UK and USA during the early 1970s.

Within this field, the Hedonic Price Model is often cited as the most used model when determining the price of the home. The model is derived from Kelvin J. Lancaster's consumer theory (1966), which Sherwin Rosen (1974) modified and developed to fit the housing market. Since then, a plethora of research has been made using this model, testing its applicability in a variety of ways. In "A Critical Review of Literature on the Hedonic Price Model", Chin and Chau (2003) provide an extensive review of the past literature available regarding the Hedonic Price Model and its application.

The Hedonic Price Model has been applied to test a large variety of aspects to housing pricing. Actually, it has been used in all the first three papers introduced in 3.1[16]. Another such empirical application of the model can be found in Myers' "Are Home Buyers Myopic? Evidence from Capitalization of Energy Costs" (2017). By applying the model on transactional data from Massachusetts, she explores how consumers price discounted energy costs. While this paper does not specifically investigate the pricing of fees or leverage, it is still of interest to this thesis as the discounting methodology is similar.

3.3. The BRF 2.0 concept

As the BRF 2.0 concept is untested, there is no academic literature on the subject. In order to understand the BRF 2.0 concept and its financial implications, this study has relied entirely on information provided by Well Fastigheter. This paper is based mainly on a meeting with Erik Gunnarsson, one of the employees of Well Fastigheter, on 26 February 2019. Gunnarsson provided a presentation of the company as a whole and explained the concept of BRF 2.0, and provided a copy of the 22 pages-presentation. The interview and the presentation have formed the basis of the knowledge we have of BRF 2.0.

[16] See Hjalmarsson and Hjalmarsson (2006), Meyer and Ulmgren (2018), and Almenberg and Karapetyan (2011).

The main advantage of using information directly from Well is that it is a primary source. Since the information comes from Well directly, the risk of misunderstandings and obsolete information should be reduced. However, using only a primary source could be a disadvantage as well. We lack any comments on the BRF 2.0 project from individuals or parties outside the company.

3.4. Our contribution

This thesis will provide an analysis on a completely new market solution and how the apartments will be priced when they are sold on the open market. Since the BRF 2.0 is a new form of BRF, it will provide a new approach to the subject of leverage in BRFs. Prior to this thesis, there have been no academic studies about this concept. Therefore, its main contribution is to analyse a concept that has previously been unexplored in an academically environment.

While the market pricing of debt and fees has been explored in previous literature, these studies have typically analysed the pricing in a much larger area. For instance, Meyer and Ulmgren investigated 150,000 apartment transactions all over Sweden, while Hjalmarsson and Hjalmarsson's paper is based on more than 30,000 transactions, in Stockholm, Gothenburg and Malmö. In contrast, this thesis focuses on 11,954 transactions in Sollentuna and Järfälla. Thus, the geographical scope is substantially narrower, providing new insights. The consumer behaviour should differ substantially between Järfälla and Sollentuna and overall Sweden, especially when it comes to socioeconomic factors such as income, education and occupation. This is in line with Hjalmarsson and Hjalmarsson's (2008) conclusion regarding socio-economic factors affecting pricing, and Campbell's (2006) paper stating that the poorer and less well educated group are more likely to make significant investment mistakes.

Lastly, this paper also provides an analysis and discussion of the problem with the housing market. It is highly relevant in the society of Sweden, and is yet to be solved despite attracting large attention from a variety of parts of the society. Our hope, therefore, is that this paper can also contribute with a new perspective on potential solutions qualitative to this market problem.

4. Data and methodology

In this section, the method of determining how the market currently prices apartments in Sollentuna and Järfälla is explained in detail. The central aim of this section is to describe the reasoning behind and application of the regression that this thesis bases its conclusions on. Firstly, a theoretical background to the Hedonic Price Model is provided, since it is the model used in the regression. Secondly, the two datasets used in this thesis are presented. Thirdly, we explore the methodology by which we apply the Hedonic Price Model on the data. Lastly, the limitations of the data and the chosen methodology will be discussed in detail.

4.1. Theoretical background

As mentioned, the Hedonic Price Model is the base for the regression of the data from Svensk Mäklarstatistik. According to the model, the characteristics of the properties are often divided into three different categories: *neighbourhood*, *locational* and *structural characteristics* (Chau and Chin, 2003). Therefore, the prices of the housing products can be expressed as a function of these three types of variables. The characteristics' inherent prices can hence be derived from the coefficients in the regression. All else being equal, it allows an estimation of each individual characteristics' effect on the prices of the properties. A prediction made by Chau and Chin on a selection of these characteristics can be found in the table below.

Table 1. List of commonly used housing attributes in Hedonic Price Models

Attribute		Expected effect on housing price
Locational	Distance from CBD	-ve
	View of the sea, lakes or rivers	+ve
	View of hills/valley/golf course	+ve
	Obstructed view	-ve
	Length of land lease	+ve
Structural	Number of rooms, bedrooms, bathrooms	+ve
	Floor area	+ve
	Basement, garage, and patio	+ve
	Building services (e.g. lift, air conditional system etc)	+ve
	Floor level (multi-storey buildings only)	+ve
	Structural quality (e.g., design, materials, fixtures)	+ve
	Facilities (e.g., swimming pool, gymnasium, tennis court)	+ve
	Age of the building	-ve
Neighbourhood	Income of residents	+ve
	Proximity to good schools	+ve
	Proximity to Hospitals	?
	Proximity to Places of worship (e.g., mosques, churches, temples)	+ve
	Crime rate	-ve
	Traffic/airport noise	-ve
	Proximity to Shopping centers	?
	Proximity to Forest	?
	Environmental quality (e.g., landscape, garden, playground)	+ve

Note: +ve – increases housing prices; -ve – decreases housing prices; ? – varies from place to place, the actual effect is an empirical question.

One major advantage with the Hedonic Price Model is that the only information needed is the price of the housing products, housing characteristics and a specification regarding the functional relationships between these. When estimating the parameters in the function, the marginal characteristic prices are found. No information regarding personal taste and or individual traits are necessary. When researching and investigating the housing market, there are no laboratory experiments. Therefore, The Hedonic Price model a welcomed method when investigating characteristics effect on housing prices.

4.2. Data

In this section, the data used in the analysis of this thesis is presented. This thesis is based on two datasets: one from Svensk Mäklarstatistik, and one from Well Fastigheter. First, the dataset from Svensk Mäklarstatistik will be explained in detail, followed by an introduction to the dataset from Well Fastigheter.

4.2.1. Data from Svensk Mäklarstatistik

Svensk Mäklarstatistik is the largest supplier of transactional data for property and apartment transactions in Sweden. Virtually all realtors report their transactions to Svensk Mäklarstatistik, who can thus provide a database with a comprehensive covering of the Swedish housing market since Svensk Mäklarstatistik's inception in 2005. Furthermore, their data is quality checked by Statistiska Centralbyrån, the government agency responsible for statistics in Sweden (Svensk Mäklarstatistik, 2019).

The dataset supplied by Svensk Mäklarstatistik includes transactional data from Sollentuna and Järfälla municipalities from the last five years, 2014-2019[17], a total of 11,954 transactions. The dataset includes the following data points: contract date (recoded to contract year), purchase price of the apartment, municipality, postal code, apartment size in m^2, apartment floor, number of rooms, construction year (recoded to building age), and monthly fee. Summary statistics of the dataset can be found in the table below.

Table 2: Summary statistics of the Svensk Mäklarstatistik dataset

Variables	Mean	Std. Dev.	Min	Max
Contract price	2,405,726	883,943	190,000	9,100,000
Monthly fee	3,855	1,226	545	8,698
ϕ	925,271	294,223	130,800	2,087,520
Living area	69.9	24.3	13	169
Apartment floor	2.49	1.98	-2	23
Number of rooms	2.67	1.14	1	7
Building age	35.4	23.5	1	319
Contract year	2016.09	1.46	2014	2019
Postal code (4 dig.)	1,829	74.7	1,644	1,946

The data will be used to study how buyers value apartments in the municipalities of Järfälla and Sollentuna today, in order to gain an understanding of how buyers might price the apartments within the BRF 2.0 concept in the future. On this dataset, the Hedonic Price Model will be applied.

[17] From 2014-01-01 to 2019-03-01.

4.2.2. Data from Well Fastigheter

Well has provided us with a comprehensive set of data from their BRF 2.0 project in Sollentuna. The dataset includes all the data points also present in the dataset from Mäklarstatistik, including the following: purchase price of the apartment, municipality, postal code, apartment size (m^2), apartment floor, number of rooms, and monthly fee. Contract date and building age are, however, not applicable since the apartments have not yet been constructed or sold. Summary statistics of the dataset can be found in the table below.

Table 3: Summary statistics of the Well Fastigheter dataset

Variables	Mean	Std. Dev.	Min	Max
Contract price	641,552	229,164	250,000	995,000
Monthly fee	12,580	4,604	5,995	24,995
ϕ	3,019,126	1,104,972	1,438,800	5,998,800
Living area	51.57	19.77	20	96
Apartment floor	2.93	1.34	1	5
Number of rooms	2.31	0.96	1	4

The Hedonic Price model will not be applied on this dataset. Instead, the findings from the regression of the data from Svensk Mäklarstatistik, regarding how consumers price the discounted fees of regular BRF apartments today, will be applied on the Well dataset, in order to draw conclusions of how the market could price the BRF 2.0 concept in the future. For the scope of this thesis, it will be assumed that the pricing of the discounting fees in this dataset have been made correctly, that is, according to economic theory.

Furthermore, we have also received additional, more general, information and data. The information mainly includes financing structure and the type of individuals that have booked the apartments.

4.2.3. Correcting data points

When analysing the data from Svensk Mäklarstatistik, we also found inconsistencies in the way that the data had been entered, and corrected for these. For instance, when

designating the bottom floor in the variable "apartment floor" several different designations had been used: 0, Bottenvåning, BV[18], Markvåning, MV[19], etc. All these were changed to "0". Another example is that the variable "construction year" could include ranges, which we interpreted as the period in which the building was being constructed. Here, we opted for the last year in the range, which should be equivalent to the year in which the building was actually completed.

4.3. Methodology

The transactional data gathered by Svensk Mäklarstatistik will be used to provide an understanding of how the housing market currently works in the municipalities in which Well Fastigheter are planning on launching the first BRF 2.0 associations. Specifically, the data will be used to determine how individuals price apartments, through a regression according to the Hedonic Price Model. The focus of the regression will be on the monthly fees' impact on the valuation, but other variables will be analysed as well, as described in the section "4.2.2.2 Variables".

The assessed buyer valuation of the discounted fee will then be applied on the dataset from Well Fastigheter, in order to gain an understanding of how the BRF 2.0 apartments could be priced in the open market. As the aim of this paper is to determine how consumers price apartments within the BRF 2.0 concept in relation to apartments in regular BRFs, and the main difference between the two is leverage and the level of fees, only the market valuation of the capitalised fee will be applied on the Well dataset. In other words, we have assumed that the other characteristics that also are important in the pricing model, e.g. size, amount of rooms, etc, do not differ remarkably between the BRF 2.0 concept and regular apartments.

4.3.1. Hedonic Price Model

In this section, the method of applying the Hedonic Price Model on the dataset from Svensk Mäklarstatistik will be detailed, as well as the variables included in the analysis.

[18] Short for "bottenvåning", the Swedish word for bottom floor.
[19] Short for "markvåning", the Swedish word for ground floor.

4.3.1.1 Empirical strategy

According to the Hedonic Price Model, a multivariate regression will be conducted on the data from Svensk Mäklarstatistik to predict the market value of a property in relation to others in the sample. The fundamental theory for the regression can be illustrated with the following formula (Hjalmarsson & Hjalmarsson, 2006; Myers, 2017; Meyer & Ulmgren, 2018):

$$P = \gamma\phi + \boldsymbol{X}'\beta + \lambda + \varepsilon$$

Where P is the price of the individual apartment, ϕ is the present value of cash flows associated with the apartment (fees), and X refers to different characteristics of the apartment: size, amount of floors, etc. λ is a geographic fixed effect, and ε is the error term, capturing non-observable attributes. The main focus of this thesis is testing γ, which is how buyers value the future cash flows[20]. In case they value it rationally, prior research suggests that the price buyers are willing to pay should decrease by one unit for each unit of ϕ. In other words γ should equal to, or be close to, -1 (Hjalmarsson & Hjalmarsson, 2006; Myers, 2017; Meyer & Ulmgren, 2018).

4.3.2.2 Variables

In the regression, a total of eight variables will be used, of which one is dependent and seven are independent variables. All variables are based the dataset from Svensk Mäklarstatistik; however, some of them have been grouped and modified. A detailed description of each variable can be found below.

4.3.2.2.1 Dependent variable

Contract Price

Actual transaction prices to which the apartments have been bought, used as the dependent variable in the regression. This variable, as well as all other variables where currency is applicable, is denoted in the Swedish Krona (SEK).

[20] In this case: the fees.

4.3.2.2.2 Independent variables

In accordance to the Hedonic Price Model, the independent variables have been split into three groups: locational attributes, structural attributes, and neighbourhood attributes.

Structural attributes

Living Area

The living area of the apartment, counted in square metres. In the Hedonic Price Model, the size of the apartment is usually the characteristic of the apartment that has the single highest impact on the apartment's price (Ball, 1973). Prior research has found that the size of the apartment should have a positive impact on the apartment's price, as buyers value and are willing to pay more for more space, especially functional space (Chin & Chau, 2003).

Apartment Floor

Another attribute that has been found to be of large impact on apartment value is the building floor in which the apartment is situated (Ball, 1973). Lower floors typically result in increased noise levels and risk of burglary, while higher floors typically result in a better view, and thus, each added floor should affect the price positively (Chin & Chau, 2003).

The linearity of this variable can be questioned, however, as there should be a larger difference in perceived living condition between the first and second floor than the fifth and the sixth floor (Chin & Chau, 2003). To take this effect into consideration, two variations of the apartment floor variable have been tested in the regression. The first disregards the possible of decreasing marginal utility of each floor added, by simply using apartment floors linearly. The second alternative groups together several floors into four groups: all basement floors, ground floor, floors 2-4, and floors from 5 and above. The second option aims to capture the diminishing effect mentioned above, with focus on the special effects of living below, on or above the ground floor. An analysis of both alternatives will be presented in the Results section.

Number of Rooms

Along with apartment floors and living area, the number of rooms has been found to have the largest impact on apartment value (Ball, 1973). The number of rooms is correlated with how many individuals that can live in the apartment, and could be interpreted as how efficiently the size of the apartment is used. For instance, an apartment of 80 m^2 may have three or four rooms, depending on its planning. The apartment with only three rooms is likely to have poorer planning, perhaps having a larger portion of space being of lower functionality, such as hallways. As such, the number of rooms should affect the price positively.

Again, the linearity of the variable can be questioned. As with the apartment floors, the marginal utility of another room should be decreasing for each added room. Thus, two different approaches towards the amount of rooms have been tested. Once again, a linear approach has been used, and grouping the number of rooms together. In the latter approach, apartments with 5 or more rooms have been grouped together. This approach is based on the assumption that while every additional room up until 5 rooms may have large implications on the amount of people that can live in the same apartment, homes with 5 or more rooms have little such incremental value, since few families are this large. Instead, the added rooms are more likely to be used as studies, libraries etc.

Building age

Numerous studies have shown that building age is negatively correlated with the value of the apartment (Clark & Herrin, 2000; Kain & Quigley, 1970; Rodriguez & Sirmans, 1994; Straszheim 1975). Older buildings usually require higher costs associated with repair and maintenance, may also have a old-fashioned design or planning, and have outdated electrical and mechanical systems due to technological advances (Clapp & Giaccotto 1998).

Discounted Fee

Discounted fees refer to the present value of all future monthly fees, which are the fees that the residents pay to the BRF every month. This variable will be the main focus for this thesis, and requires detailed theoretical background and description of how it has

been constructed. Due to the importance of this variable, it is explained in its own section. Please refer to section **4.3.2 Fee estimation**.

Contract year

Since the housing market is volatile, the purchase date is an important explanatory factor to the price of housing. Indeed, the importance of this variable increases further when analysing Swedish housing prices, as prices have increased greatly over the last couple of decades: on average, the Swedish housing prices have increased by 8% YoY[21] 2008-2018 according to data from Svensk Mäklarstatistik. The housing prices increased in all years relevant to the data in this thesis (2014-2019 YTD) except for 2018 and 2019 YTD, when they decreased slightly (Svensk Mäklarstatistik, 2019). Consequently, the purchase date should affect the price positively. In order to take this effect into account, time fixed effects have been introduced in the regression, based on the year of purchase.

Location and neighbourhood attributes

Geographic fixed effects

The specific location of an apartment or house has been found to have a significant impact on the price of the home (Chin & Chau, 2002). Structurally identical homes can show large variation in selling prices to due external factors such as closeness to public transport, parks, and water, as well as due to an area's crime rate or the socio-economic background of its inhabitants (Hjalmarsson & Hjalmarsson, 2006).

As mentioned before, the variables related to the geographic location of the home can be divided into two groups: Locational attributes and Neighbourhood attributes. The closeness to water (a locational attribute), for instance, can more than double the value of a home: relative to no view, ocean frontage has been found to add 147% to a property's selling price, an ocean view 32%, and a partial ocean view 10% (Benson, et al., 1996). Neighbourhood attributes have been found to typically explain 15-50% of the standardised variation of a property, up to 100% for structurally identical sites

[21] Year-over-year.

(Linneman 1980). It is therefore crucial to incorporate the geographic location component into a regression model for determining housing prices.

The dataset provided by Svensk Mäklarstatistik does not provide specific locational or neighbourhood attributes, such as crime rate, closeness to public transport, etc. Instead, this paper has assumed that the locational attributes and neighbourhood attributes can be indirectly observed through the postal code characteristic, using it as a proxy in the regression.

The postal codes have been introduced as geographic fixed effects in the regression model. The original variable was constructed as a five-digit code, but due to the low amount of observations in many of these postal codes, a new variable was introduced, taking the form of a four-digit code (the first four digits of the original five digit code). In essence, this means that the geographic areas that each postal code denotes have been grouped into larger geographic areas to which each postal code belongs. This has decreased the amount of codes from over a hundred to 23. In the new variable, no code includes less than 100 observations.

4.3.2. Fee estimation

Central to the model and this thesis is the discounted fee variable, which is the main variable tested in this study. When discounting the fee, major assumptions have to be made, primarily concerning time horizon and discount rate. As we will see in the results section, the impact of these assumptions is crucial for the results of this study.[22] Arguably, picking the right discount rate is the single most essential part of the analysis in this paper.

4.3.2.1 Empirical strategy

In essence, the capitalised fee is the current or present value of all future fees to be paid to the association, and can thus be constructed through a regular present value calculation (Hjalmarsson & Hjalmarsson 2006; Meyer & Ulmgren, 2018). Using the NPV formula, the capitalised fee ϕ is therefore a function of: T, the chosen time horizon; δ, the discount factor; and F, the observable yearly fees.[23] The basic formula

[22] Please refer to section 5.2.2 Sensitivity of assumptions.
[23] In order to attain the yearly fees, the monthly fees in the dataset have simply multiplied by 12.

for constructing the capitalised fee variable can be summarised below:

$$\phi = \sum_{i=t}^{T} \delta_i * F$$

The discount factor, in turn, can be derived from the standard annuity formula shown below:

$$\sum_{i=t}^{T} \delta_i = \frac{1 - (1 + r)^{-T}}{r}$$

Where *r* is the discount rate. Asymptotically, δ_i approaches $\frac{1}{r}$ as $T \rightarrow \infty$.[24] If an infinite time horizon can be assumed, a simplified version of the original NPV formula can be used:

$$\phi = \frac{F}{r}$$

4.3.2.2 Assumptions

As mentioned, *F* refers to actual yearly fees and is observable in the dataset. When constructing this variable, two major assumptions thus have to be made: over which *time horizon* the cash flows (fees) are discounted, *T*, and which *discount rate* that is applied when discounting the fees, *r*. As we will see, the assumption made have significant impact on the results of the study.

Assumption 1: The buyer of a property takes all future fees into consideration.

As for the first assumption, we have assumed that the buyer takes all future cash flows into consideration, i.e. calculates the NPV of fees based on perpetuity. This is in line with prior research. Hjalmarsson and Hjalmarsson (2006), Myers (2017), as well as Meyer and Ulmgren (2018) use an infinite time horizon when constructing the capitalised fee variable in their papers. Myers argues that housing is a highly long-lived

[24] For a background to this relationship, please refer to Appendix 3.

asset, and that consumers should consider the full lifetime of the property. Even if an individual sells the apartment after a certain period of time, the future fees should be taken into account, as they then should be taken into consideration when determining the selling price.

Assumption 2: Consumers discount fees at a discount rate of 5%.

In this paper, a discount rate of 5% has been assumed. Prior research indicates that buyers usually use a discount rate of between 5% and 10% when pricing cash flows associated to the home (Hjalmarsson & Hjalmarsson, 2006; Myers, 2017; Meyer and Ulmgren, 2018). Myers study indicates that homebuyers use a discount rate of between 8% and 10%. As her paper relates to US specific data, this assumption is based on the macroeconomic situation of this specific market. The Swedish market and the US market differ substantially, e.g. in terms of risk-free rate: risk-free rate in the US at the time of the paper was roughly 2.5% (US. Department of the Treasury), while the current risk-free rate in Sweden is currently about 0.8% (PWC, 2018).[25] This difference in interest rate environment suggests that the discount rate in Sweden should be *lower* than the discount rate Myers identified in her paper.

An additional argument to why a lower discount rate should be used compared to the 8% to 10% identified by Myers, is that the study does not analyse fee related cash flows directly, but instead analyses cash flows concerned with energy costs, which are correlated with fuel prices (Myers, 2017). While both types of cash flows are related with housing and should share some similarities, there are also large differences in terms of *risk profile*. As fuel prices are highly volatile, the volatility of the cash flows studies by Myers should also be moderately high. In contrast, cash flows related to the fees to an association are somewhat stable on average. This is due to the fact that changes mainly occur when the associations have been poorly managed, extensive renovations have to be made, or when the interest rate changes.

As mentioned before, individuals have been found to show little understanding of the volatility risk of the interest rates, and typically have little understanding of the quality of the management of the association (Almenberg & Karapetyan, 2011).

[25] Risk-free rate is here defined as a 10Y government bond.

Therefore, these two volatility risks should not be taken into account when identifying the discount rate used by purchasers in the market. Ultimately, the perceived risk when discounting fees should be lower than when discounting energy costs.

Because of Sweden's current low interest rate environment, as well as the perceived stability of fee levels, our assessment is that it is most fitting to use a figure in the low end of the range, 5%, in line with research conducted in Sweden (Hjalmarsson & Hjalmarsson, 2006; Meyer & Ulmgren, 2018).

4.4. Potential issues

4.4.1. Limitations of the Hedonic Price Model

It is important to keep in mind that the Hedonic Price Model relies on three assumptions when applied to the housing market: *homogeneity*, *perfect competition* and *market equilibrium*. Since housing differ greatly, the products should be approximately heterogeneous. Furthermore, the validity of the perfect competition is questionable, especially considering that the housing market is often described as an oligopoly (SVD, 2003; GP, 2017). At last, there must be market equilibrium and no interrelationships between the inherent characteristics prices. As there are imperfections in the housing market, the assumption that the price will respond at once to every small change in supply and demand is dubious. Furthermore, the assumption that the inherent price of a characteristic should not vary with different areas and types of housing products is highly unlikely. Nevertheless, the model has been widely used in housing market research. "As astutely observed by Freeman, the data may be inadequate; variables are measured with error; and the definitions of empirical variables are seldom precise, but these do not render the technique invalid for empirical purposes." (Chau and Chin, 2002).

4.4.2. Limitations of the data

The main limitation of the data from Svensk Mäklarstatistik is that the set does not provide the leverage of the different BRFs. As a consequence, this study is unable to explore the direct impact of the increased leverage of the associations within the BRF 2.0 concept on the market valuation of the apartments. The datasets do, however,

include the monthly fees, which are a direct consequence of the increased leverage and can thus act as a proxy for leverage. Additionally, the fees are also more visible than the leverage in traditional BRFs. This is due to the fact that it is not required by law to inform the buyers of the leverage of the BRF when selling an apartment; few realtors show the leverage in the BRFs in their marketing materials (Swedbank, 2017).

What is missed when not analysing the leverage of the BRFs is how buyers price in the risk of high leverage. For instance, how they price in the possibility of interest rates increasing, the increased interests rate's impact on the economy of the BRF, and the risk of increased monthly fees as a consequence. However, it should be noted that including this risk could be somewhat misleading when analysing the BRF 2.0, as the interest rates are fixed for 20 years. The risk that could be interesting to analyse, would instead be the future interest rate risk, which comes when the fixed rates expire. However, such an analysis has little comparability with the analysis of the leverage risk of regular BRFs. Because of this, and the reasons explained in the prior paragraph, it can be argued that fees are indeed the most appropriate characteristic to analyse.

4.4.3. Potential data bias and sample selection biases

A major possible bias in the regression analysis is the presence of heteroscedasticity, which occurs when there is correlation between the error term and the explanatory variables. Plotting the purchase prices against the discounted fee showed signs of heteroscedasticity[26], so a Breusch-Pagan/Cook-Weisberg test was conducted in order to assess if the data did suffer from it (Breusch & Pagan 1979; Cook & Weisberg 1983).[27] The test indicated that the data of the Svensk Mäklarstatistik data set indeed suffered from heteroscedasticity on a significant level. In order to correct for this, robust standard errors were used when conducting the regression analysis.

There could also be the risk of sample selection bias. The most relevant selection bias for the data from Svensk Mäklarstatistik is that the sample is geographically limited, and may therefore not be applicable to larger Sweden. However, within the municipalities, there the data should be representative for these markets, as virtually all transactions for the period are included in the dataset. While the data includes almost all

[26] Please refer to Appendix 1.
[27] Please refer to Appendix 2 for the results of the test.

transactions, it does however include a certain degree incomplete information, as some transactions lack values for one or several variables. In case the data is not missing completely at random, the missing values could lead to biased estimates (Allison, 2002). Removing missing values from the dataset is the most commonly used method for solving this problem, but as these transactions do have values for other variables, removing transactions entirely could in turn create bias for other variables. Because of this, we have chosen to not remove transactions with incomplete values, but are aware of potential bias.

As for sample selection bias for the data from Well Fastigheter, the main issue is that it only includes data to how one company applies the BRF 2.0 concept. Would the concept be launched in a wider scale, by other companies as well, the way the concept is applied by Well might not be representative to how it would be applied at large. There is, however, no way to account for this sample selection bias as Well is currently the only company engaged in this concept.

4.4.4. Capitalised fee assumptions

The assumptions made when constructing the capitalised fee are far from unproblematic: the assumptions made are of crucial impact to the results of the study. Of the two, the regression is by far more sensitive to the assumptions regarding the discount rate, as we will see in the results section. Each of the two assumptions will be discussed in detail below.

As for the *time horizon*, it is far from certain that individuals act rationally according to financial theory. For further discussion, please refer to the Keynesian Beauty Contest (Keynes, 1936). It is in other words entirely possible that individuals apply other time horizons, regardless of what economic theory suggests is rational. Logically, it could be argued that individuals should instead take into consideration their own expected lifetime, as the cash flows from the apartment have no economic implications for them past this point. The time horizon would then differ from transaction to transaction, depending on the age of the purchaser. However, the dataset from Svensk Mäklarstatistik completely lacks information about the purchasers of the apartments,

and therefore, this thesis is unable to use or even test this alternative time horizon when constructing the capitalised fee. Furthermore, there is no empirical support for this solution.

For the reasons outlined above, the infinite time horizon therefore seems to be the most plausible assumption. Therefore, the simplified formula described will be used when constructing the discounted fee variable. However, to test this assumption, a sensitivity analysis of different time horizons will be presented in the results section.

As for the *discount rate*, it could be argued that it is unlikely that the current macroeconomic situation, with extraordinarily low interest rates, will endure in the future. Indeed, interest rates are expected to rise in the coming years (SBAB, 2019). Since buyers should take into consideration a longer perspective than merely the current economic situation, it could be reasoned that 5% is low. However, the main arguments to why 5% has been chosen nonetheless are two: the lack of consumer understanding for the interest rate risk inherent in the BRF, and the fixed interest rates in BRF 2.0.

Still, it should be mentioned that while the interest rates are fixed for 20 years, they are subject for renegotiations after this period. This increases uncertainty, since it is difficult to estimate what those interest rates will be. If the macroeconomic situation is more dire than the current, it is likely that the BRF will have to face higher interest rates in 20 years, which would increase the fees dramatically and instantly. We are aware of this possibility but have not taken it into consideration when constructing the capitalised fee.

In this thesis, the same discount rate is used for all transactions. It could be argued that the discount rate should differ between transactions made in 2014 and transactions made in 2019. However, the fluctuations in interest rates have been relatively small the past couple of years. Therefore, the discount rate of 5% will be used on all transactions.

4.4.5. Difficulty observing locational and neighbourhood characteristics

A large limitation of the model is that it fails to directly capture many important factors for determining apartment prices, such as socio-economic related attractiveness of the area, closeness to transportation, and the view of the specific apartment. These factors

have, as mentioned, a large impact on pricing of housing, but are difficult to observe and are therefore not included in our dataset. While the geographic effect is likely to partly capture many of these effects, it probably fails to capture these effects fully. For instance, the postal codes are likely to capture major aspects such as closeness to nature and to public transportation, but are almost completely unable to capture the effect of an ocean view.

5. Results

In this section, the result of the regression is first presented – with a particular focus on the coefficient of the discounted fee – as well as sensitivity analyses on said variable. Secondly, the implications of these results are applied on the BRF 2.0 dataset. Lastly, the limitations of the results are discussed.

5.1. Basic regression

After discounting the fee, a linear regression analysis was run according to the OLS method, using robust standard errors to account for the heteroscedasticity problem identified. Four separate regressions were made, in order to analyse the effects of grouping the floor and room variables. However, running the model using these four different combinations of grouped variables showed little differences stemming from the grouping of the room and floor variables. Indeed, the R^2 values were almost identical between the different approaches, as are the coefficients for the variables.[28]

In other words, it seems that considerations about the possible non-linearity of these variables is not essential for the results of this study. Since the results for the grouped variables are equally valid as the others, and as theory supports nonlinearity of these variables, the study uses these variables going forward. The results can be seen in the table below:

[28] Please refer to Appendix 4.

Table 4. Results of the main regression

Variables	Coefficient
ϕ	-0.8849***
	(0.0397)
Living area	27,157***
	(823.9)
Apartment floor	37,067**
	(10,819)
Number of rooms	91,430***
	(14,823)
Building age	-8,289***
	(493.6)
Constant	1,295,194***
	(34,859)
Time fixed effect	Yes
Geographic fixed effect	Yes
R2	0.745

Note: Floor and apartment variables are grouped. The model includes time and geographic fixed effects. Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

The most interesting result from the regression is that the coefficient of the capitalised fee, γ, is not -1. In other words, the regression indicates that consumers indeed do not price the capitalised fee as is rational according to the Hedonic Price Model. As the coefficient is the main focus of the regression, the results and implications of the findings will be discussed in their own section, please refer to 5.2 Capitalised fee.

The coefficients for the remaining variables follow the predictions made by the Hedonic Price Model and described in the variable summary from Chau and Chin presented under Literature.[29] The model shows that the size of the apartment increases the value of the apartment, as does every room and apartment floor added. Apartment age is the only non-fixed effect coefficient that is negative in this model, indicating that newer apartments are valued higher than older.

It can be observed that all variables show a P value of 0.00, which gives the model a high explanatory value. The model also shows a satisfactory R2 value of 0.75, which means that it can explain roughly three fourths of the variance in the dependent values. A possible explanation to the fact that a fourth of the variance is left unexplained can be that the model fails to directly capture locational and neighbourhood characteristics. Please refer to 4.4.5. for further discussion of this problem.

[29] Please refer to 4.1 Theoretical background.

5.2. Capitalised fee

In this section, the results of the capitalised fee will be analysed, as well as the robustness of the assumptions made when constructing the variables regarding the time horizon and the discount rate.

5.2.1. Buyer pricing of the capitalised fee

The regression shows that the studied coefficient, γ, is roughly -0.88. This can be interpreted as that buyers are willing to pay 0.88 SEK less per 1 SEK increase of capitalised fee. Overall, this diminishing effect of the capitalised fee on the total price of the apartment is in line with economic theory. However, the coefficient is higher than -1, indicating that apartment buyers are mispricing the capitalised fee, valuing it under its fair value. This is in line with prior research, but the results of this regression indicate that buyers price better than predicted before. Prior research has shown that buyers value the capitalised fees at 0.54-0.75 SEK per 1 SEK of capitalised fee, compared to 0.88 SEK as seen in our regression, which is a remarkable difference. A reason for this could be that prior work has focused on Sweden as a whole, while our sample set is for the municipalities of Järfälla and Sollentuna exclusively.

5.2.2. Sensitivity of assumptions

As discussed under 4.2.2.3 in the Methodology section, the capitalised fee is subject to large assumptions regarding the time horizon and the discount rate used when discounting the fee. As will be shown in these sections, the implications of these assumptions on the analysed coefficient, γ, are significant. In order to illustrate this impact, two sensitivity analysis has been conducted, one for each assumption.

5.2.2.1 Sensitivity of the discount rate assumption

The table below shows the impact on γ when the discount rate is changed, while keeping other factors constant:

Table 5. Different discount rates' impact on the coefficient γ.

	Discount rate				
Variables	r = 3%	r = 4%	r = 5%	r = 6%	r = 7%
γ	-0.53	-0.71	-0.88	-1.06	-1.33

As can be seen in the table above, the studied NPV fee coefficient γ follows the discount rate: as the discount rate increases, so does γ. Furthermore, it can be noted that moderately small changes in the discount factor have large implication on γ. Indeed, the coefficient becomes lower than -1 already at a 1 percentage point increase in the discount rate. This implies that individuals might in fact price the capitalised fee correctly, and instead have a lower preference for money than this thesis has assumed.

5.2.2.2 Sensitivity of the time horizon assumption

The table below shows the impact on γ when the time horizon is changed, while keeping other factors constant:

Table 6. Different time horizons' impact on the coefficient γ.

	Time horizon			
Variables	25 years	50 years	75 years	Infinite
γ	-1.26	-0.97	-0.91	-0.88

As can be seen in the table above, the studied NPV fee coefficient γ decreases as the assumed time horizon decreases. Unlike the discount rate assumption, however, the sensitivity is moderately low. Unless the time horizon takes on relatively extreme proportions, the coefficient stays above -1 and the conclusion holds.

5.3. Impact on pricing of the BRF 2.0 apartments

The regression run on the data from Svensk Mäklarstatistik indicates that consumers currently fail to price capitalised fees in regular BRFs. In this section, we will explore the implications of these findings on the pricing of BRF 2.0, by calculating how the market would price the BRF 2.0 apartments if they were to misprice the capitalised fee to the same extent as they do in regular BRFs.

Specifically, these results are applied on the data received from Well Fastigheter. Since the primary aim of this paper is to investigate the impact of consumers' inability to price the discounted fees correctly, this analysis does explore the pricing of other factors. Instead, the following analysis assumes that Well's pricing of all other variables are identical with the market pricing of said variables, in order to isolate the effect of the capitalised fee. The analysis also assumes Well has properly priced the capitalised fee - that is, it assumes that the coefficient of the capitalised fee is -1 in Well's price list.

Since the regression indicates that customers underestimate the fair value of the capitalised fee by valuing it at 88% of its fair value, an additional 12 percentage points of the capitalised fee have to be added on Well's prices in order to find the suggested market price. The formula that underlies the analysis can be found below: [30]

$$P_m = P_w + 0.12\phi$$

Where P_m is the market price and P_w is Well's list price. In order to apply the observed ϕ of -0.88 on the price list supplied by Well, the capitalised fee of Well's apartments will first have to be calculated. This calculation follows the same procedure as when constructing the capitalised fee variable for the regression:

$$\phi = \frac{F}{r}$$

Where F is the yearly fees and r is the discount rate, which has been assumed to be 5%.

When applying this formula on the price list from Well, we found that an 12% mispricing on the fee implied an average premium for Well's apartments of 57%; with the lowest implying mispricing being 46% and the highest 72%. The application of this formula on a selection of apartments from Well's price list can be found below.[31]

[30] For the deriving of this formula, please refer to Appendix 5.
[31] For a full list, see Appendix 6.

Table 7. Impact of $\gamma = 0.88$ on the pricing of five BRF 2.0 apartments

	Variables	50 sqm apartment	36 sqm apartment	42 sqm apartment	96 sqm apartment
+	*Pw*	845 000	450 000	495 000	995 000
	Yearly fees	161 940	101 940	119 940	299 940
	ϕ	3 238 800	2 038 800	2 398 800	5 998 800
+	0.12ϕ	388 656	244 656	287 856	719 856
=	*Pm*	1 233 656	694 656	782 856	1 714 856
	Diff	*46%*	*54%*	*58%*	*72%*

This analysis indicates that the impact of the discrepancy between the market's valuation of the discounted fee and that, which is rational according to economic theory, is considerable. Under the assumptions outlined above, this analysis indicates that the market would price the apartments within the BRF 2.0 concept remarkably above their fair value.

5.3.1. Limitations of the application on Well data

The analysis made above has only analysed the impact on consumers incorrect pricing of the discounted fee, and assumed that all other variables have been priced correctly by Well. It is not unlikely that Well has priced other factors analysed in the regression incorrectly as well, such as for instance the location discount. If the company has indeed priced such factors incorrectly, the result on the discrepancy between their pricing and the calculated market pricing would be affected. It is therefore possible that the market price could be even higher than estimated in the analysis above, or in fact not be as high at all.

5.4. Other factors affecting the market price

Applying the market's pricing of the capitalised fees for regular apartments in order to price apartments in the BRF 2.0 concept should be done with caution. It is possible that the coefficient of the capitalised fee could differ for the BRF 2.0 project compared to regular apartments. Seeing as the project is new and marketed as a completely new concept, buyers are likely to be more cautious, resulting in the BRF 2.0 buyers being

better informed than the average buyer. Furthermore, the fact that the concept is largely untested infers a potential risk for buyers, which might be translated into a discount. Additionally, when the apartments are priced in the open market, it is not unlikely that buyers will use Well's pricing as a reference when determining the value of the apartments. Thus, the initial price could have large implications on the future market price as well. All these factors could severely lower the market pricing of the apartments, and therefore reduce the effect of the mispriced capitalised fees.

Two other factors that should be taken into consideration are market impact and borrowing constraints. In the section "2.1.2.3 - Effect on the housing market", we concluded that most young people are not able to receive a loan from the bank due to credit restrictions. A legitimate question to ask is then: would they be able to buy an apartment with the concept of BRF 2.0? While the purchase price is lower, individuals still have to finance it, and are now unable to use their apartment as collateral for a loan, thus excluding the possibility regular house mortgages.

According to SBAB (2018), an average one-room-apartment of 30 m^2 demands a down payment of 418,020 SEK. In contrast, a one-room-apartment of 30 m^2 from Well Fastigheter has a purchase price of 395,000 SEK. Thus, the BRF 2.0 30 m^2 apartment's down payment is already lower than an average 30 m^2 in Stockholm, despite being completely new, unlike the average apartment in Stockholm.

While this price difference is likely to make it somewhat easier for young adults to purchase an apartment, the real benefit should instead be the lack of borrowing constraints. As mentioned, SBAB states that the down payment is often not the reason to why young adults are unable to afford buying an apartment. On the contrary, the cause is often borrowing restraints related to hard salary requirements. As the debt in the BRF 2.0 will be taken by the BRF and not the individual, these individuals would not need to be limited by said borrowing constraints. Thus, the real market impact could therefore be making housing accessible for individuals who have sufficient capital for the down payment, but are unable to lend due to borrowing constraints. Additionally, out of the 395,000 SEK down payment, the buyer may finance a part of the sum with a *blancolån*. When buying a regular apartment, on the other hand, the bank might be deterred by a *blancolån* and refuse to grant the regular house loan.

The BRF 2.0 apartments can also be compared to rental apartments. The monthly fee will be higher in the BRF 2.0 compare to other BRFs, all else being equal. However, they would be lower than the rent of newly produced rental apartments (Gunnarsson, 2019). Older rental apartments are likely to have cheaper monthly costs compared to the BRF 2.0 apartments, but then the buyer would have to wait 10.3 years on average (SvD, 2019). Another alternative is to turn to the second-hand rental market and pay *ockerhyror*, unfairly high rents, which would be higher than the monthly payments in the BRF 2.0.

When looking at Well Fastigheter's apartments in Sollentuna, 70 of the 115 apartments have been booked. There is a quite clear pattern: 43% of the buyers are born between 1990 and 2000. Possibly, there are an even larger amount of young buyers hidden in the statistics, if their parents' names are on the contract. All small-sized apartments have been booked and there is a queue to buy more. The demand for booking these apartments has been so high, that Well Fastigheter is currently changing the building plan to fit more small-sized apartments. This strengthens the conclusion that Well Fastigheter has managed to find a solution that enables some of these people to buy their first apartment. This conclusion should fortify the results of the regression, that the market could be willing to pay a premium for the BRF 2.0 apartments.

6. Implications and conclusions

In this thesis, we have explored the pricing of the BRF 2.0 concept, focusing on the market pricing of the discounted fee. Under the assumptions made throughout the study, it has been found that apartment buyers in the municipalities of Järfälla and Sollentuna are unable to price the capitalised fees correctly. This study suggests that buyers price the capitalised fee at 88% of its fair value. The results are generally in line with previous research (Hjalmarsson & Hjalmarsson, 2006; Meyer & Ulmgren, 2018). Likely, this is a result of buyers' inattention towards future payments, and their inability to assess these rationally due to lack of knowledge. However, the findings of this paper suggest that buyers in the municipalities of Järfälla and Sollentuna are substantially better at pricing the capitalised fee than the average buyers of Sweden. Furthermore, the buyers in these two municipalities are pricing the fees more correctly than the average buyer in Stockholm, Gothenburg and Malmö overall.

For the BRF 2.0 concept, which is based on a remarkably higher leverage accompanied by significantly higher fees, the impact of these results are significant. The study indicates that the market prices of the apartments sold within the BRF 2.0 concept might be remarkably higher than those set by the company. The study suggests that the buyers could pay a premium of 46%-72% compared to the prices set by Well.

When analysing the pricing of the BRF 2.0 apartments, it might be insufficient to only analyse the way fees are priced by the market today. Applying the market's pricing of the capitalised fees for regular apartments directly on BRF 2.0 apartments should be done with caution. There are other factors that might affect the price, both positively and negatively. For instance, since the concept is new, it could be that buyers are cautious and thus discount the price.

We deem the market impact to be of crucial impact for the pricing of the apartments. Our analysis shows that the concept could make housing more accessible for young adults, which might increase the possibility that the market would be willing to pay a premium for BRF 2.0 apartments. Specifically, individuals that have enough capital for down payment but are restricted by borrowing restraints could gain access to housing via the BRF 2.0 concept.

Another reason of caution when applying identified market pricing of the capitalised fee is that the findings of the regression are highly sensitive to the discount rate assumed. Therefore, this thesis cannot exclude the possibility that rather than mispricing the capitalised fee, buyers simply have a lower aptitude for money in the future, even if this would contradict prior research in the field. Further research on the discount rates assumption made in this thesis would be highly beneficial in order to make definitive conclusions on the market pricing of BRF 2.0 apartments.

If the accuracy of the regression could be confirmed by future studies, the results would have large implications for potential buyers, for any other company aiming to pursue this concept, as well as for the potential market impact of this concept as a whole. If the market will price the apartments higher than Well Fastigheter has priced them, the prices of the apartments will increase as soon as they start being sold in the open market. This finding indicates a substantial arbitrage opportunity for any buyer and small-scale investor, as buyers can sell the apartments as soon as they gain access to them for a hefty premium. The implications for Well and other companies aiming to produce apartments within the BRF 2.0 concept, are that they could potentially be losing large sources of income.

The findings of this study also have large implications for the potential of the concept to solve the market problem identified. Increasing the prices of the BRF 2.0 apartments by up to 72% is likely to decrease the potential benefit of the concept dramatically from a societal perspective. With such higher prices, the concept would not help the groups currently having difficulties entering the housing market, such as young adults, to enter the market to the same extent. It should be noted, however, that an increase in the price would likely still make housing more accessible for many. While the increase from 450,000 SEK to 675,000 SEK for a 36 m^2 apartment is large percentage-wise, 675,000 SEK is still substantially less than a regular 36 m^2 apartment. To compare, the average 36 m^2 apartment in the sample from Svensk Märklarstatistik was roughly 2,000,000.[32] Together with the possible financing of Blancolån, it could still be possible for these individuals to gain access to the BRF 2.0. Lending limits for Blancolån are often about 500,000 (Gunnarsson, 2019).

[32] For comparability reasons, apartments built prior to 5 years ago were excluded.

In general, we see substantial room for further research of the BRF 2.0 concept. As the concept is entirely new, there is no previous literature regarding it. Naturally, this thesis has not been able to or even aimed to explore all aspects of the concept. Indeed, it is just touching the surface of a completely new research subject, leaving some areas completely unexplored. For instance, research on the impact of fixed interest rates on the attractiveness of the apartments, and the need for renegotiating the interest rates after first 20 years, would be of great value. Furthermore, this thesis is merely a first attempt at describing this concept. Therefore, additional research on aspects of the concept that have been covered, are motivated and necessary to give strengthen the credibility of the findings.

Lastly, our findings are limited to Sollentuna and Jakobsberg. If the BRF 2.0 concept is expanded, it could be of great interest to further examine the pricing of the BRF 2.0 in other parts of Sweden or on average in the country.

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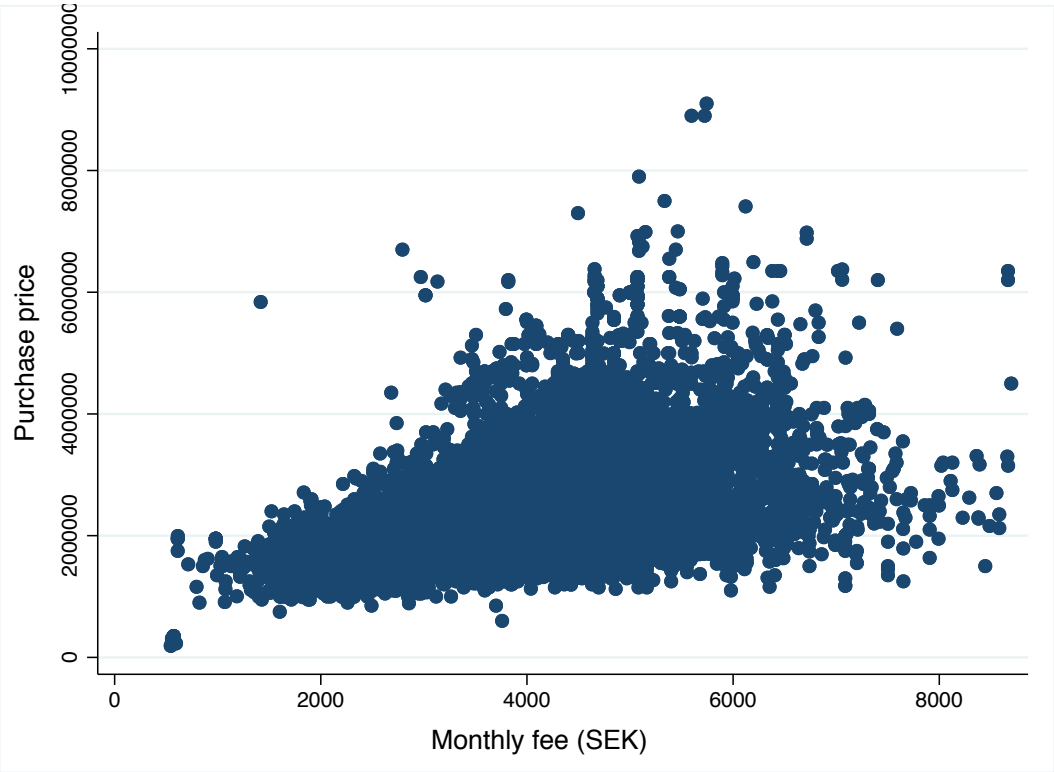
8. Appendices

Appendix 1

Figure 4. Purchase price plotted against the monthly fee



Note: The data used in the graph is from the Svensk Mäklarstatistik dataset

Appendix 2

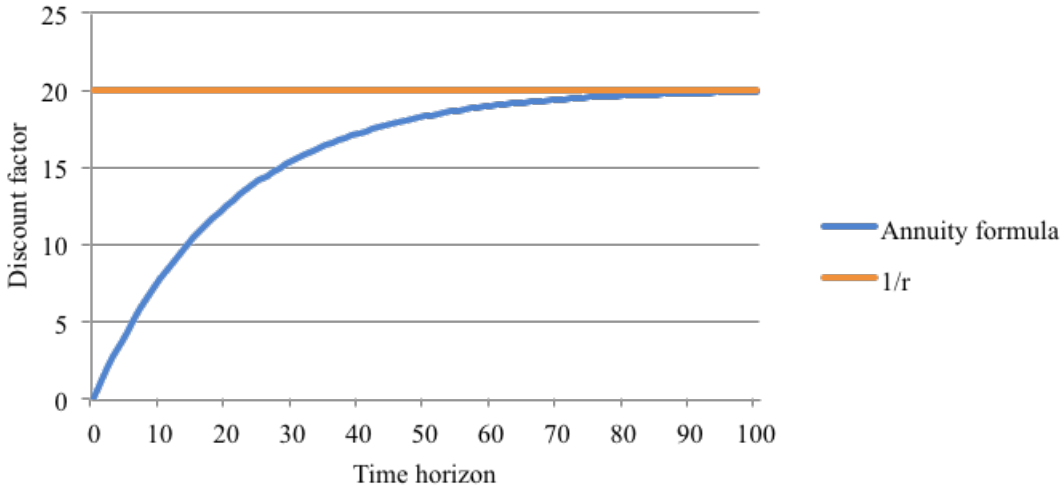
Table 8. Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

	Value
chi2(5)	3204
Prob > chi2	0.0000

Note: Variables included are discounted fee, living area, apartment floor, number of rooms, and building age.

Appendix 3

Figure 5. The impact on the time horizon on the annuity formula



Appendix 4

Table 9. Test for linearity of the floor and room variables

Variables	Both ungrouped	Rooms grouped	Floors grouped	Both grouped
ϕ	-0.8800***	-0.8891***	-0.8759***	-0.8849***
	(0.0398)	(0.0397)	(0.0398)	(0.0397)
Living area	27,184***	27,084***	27,259***	27,157***
	(869.8)	(854.9)	(877.8)	(823.9)
Apartment floor	15,766***	15,683***	37,638**	37,067**
	(2,640)	(2,642)	(10,812)	(10,819)
Number of rooms	87,892***	92,768***	86,561***	91,430***
	(14,457)	(14,775)	(14,501)	(14,823)
Building age	-8,195***	-8,230***	-8,255***	-8,289***
	(492.0)	(492.8)	(492.8)	(493.6)
Constant	1,329,342***	1,334,584***	1,289,099***	1,295,194***
	(29,470)	(29,900)	(34,374)	(34,859)
Time fixed effect	Yes	Yes	Yes	Yes
Geographic fixed effect	Yes	Yes	Yes	Yes
R2	0.746	0.745	0.745	0.745

Note: Grouped and ungrouped refer to the two variables floor and apartment. The model includes time and geographic fixed effects. Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

Appendix 5

Below follows a mathematical derivation of the $P_m = P_w + 0.12\phi$ formula. Please recall the basic Hedonic Price Model formula:

$$P = \gamma\phi + \boldsymbol{X}'\beta + \lambda + \varepsilon$$

Applying the finding that $\phi_m = -0.88$ and the assumption that $\phi_w = -1$, we gain the formulas for P_m and P_w:

$$P_w = -1*\phi + \boldsymbol{X}'\beta_w + \lambda_w + \varepsilon_w$$
$$P_m = -0.88*\phi + \boldsymbol{X}'\beta_m + \lambda_m + \varepsilon_m$$

Under the assumptions that $\beta_w = \beta_m$, $\lambda_w = \lambda_m$, and $\varepsilon_w = \varepsilon_m$, we can rewrite and rearranging the P_w formula:

$$P_w = -1*\phi + \boldsymbol{X}'\beta_m + \lambda_m + \varepsilon_m$$
$$P_w + 1*\phi = \boldsymbol{X}'\beta_m + \lambda_m + \varepsilon_m$$

We can thus substitute $\boldsymbol{X}'\beta_m + \lambda_m + \varepsilon_m$ for $P_w - 1*\phi$ in the P_m formula, and find the desired formula:

$$P_m = -0.88*\phi + (P_w + 1*\phi)$$
$$P_m = -0.88*\phi + 1*\phi + P_w$$
$$P_m = +0.12*\phi + P_w$$

Appendix 6

Table 10. Difference between P_m and P_w for all objects in the Well dataset

Apartment size	Apartment floor	Pw	Monthly fee	Yearly fee	Discounted fee	Rooms	0.12ϕ	Pm	Diff.
96	1	995 000	24 995	299 940	5 998 800	4	719 856	1 714 856	72,3%
93	1	995 000	24 995	299 940	5 998 800	4	719 856	1 714 856	72,3%
93	1	995 000	24 995	299 940	5 998 800	4	719 856	1 714 856	72,3%
93	1	995 000	24 995	299 940	5 998 800	4	719 856	1 714 856	72,3%
36	2	450 000	8 495	101 940	2 038 800	1	244 656	694 656	54,4%
36	3	450 000	8 495	101 940	2 038 800	1	244 656	694 656	54,4%
36	4	450 000	8 495	101 940	2 038 800	1	244 656	694 656	54,4%
36	5	450 000	8 495	101 940	2 038 800	1	244 656	694 656	54,4%
82	2	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
82	3	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
82	4	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
83	2	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
83	3	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
83	4	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
82	5	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
68	2	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
68	3	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
68	4	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
68	5	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
42	3	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	4	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	5	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	1	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	3	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	3	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
43	4	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
43	4	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
43	5	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
43	5	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
42	2	495 000	9 995	119 940	2 398 800	2	287 856	782 856	58,2%
41	3	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	3	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	3	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	4	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	4	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	4	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	5	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	5	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	5	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	1	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	2	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	3	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	4	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	1	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	1	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
41	1	495 000	9 959	119 508	2 390 160	2	286 819	781 819	57,9%
79	5	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
29	1	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	1	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	2	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	2	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	3	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	3	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	4	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	4	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	2	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	3	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	4	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
29	5	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
45	1	545 000	9 995	119 940	2 398 800	2	287 856	832 856	52,8%
45	2	545 000	9 995	119 940	2 398 800	2	287 856	832 856	52,8%
45	3	545 000	9 995	119 940	2 398 800	2	287 856	832 856	52,8%

45	4	545 000	9 995	119 940	2 398 800	2	287 856	832 856	52,8%
50	1	845 000	13 495	161 940	3 238 800	2	388 656	1 233 656	46,0%
51	2	795 000	13 495	161 940	3 238 800	2	388 656	1 183 656	48,9%
51	3	795 000	13 495	161 940	3 238 800	2	388 656	1 183 656	48,9%
51	4	795 000	13 495	161 940	3 238 800	2	388 656	1 183 656	48,9%
63	1	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	1	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	2	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	2	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	3	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	3	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	4	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
63	4	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
20	1	250 000	5 995	71 940	1 438 800	1	172 656	422 656	69,1%
20	1	250 000	5 995	71 940	1 438 800	1	172 656	422 656	69,1%
30	2	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	3	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	4	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	2	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	3	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	4	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
30	5	395 000	7 995	95 940	1 918 800	1	230 256	625 256	58,3%
39	5	475 000	8 995	107 940	2 158 800	2	259 056	734 056	54,5%
39	1	475 000	8 995	107 940	2 158 800	2	259 056	734 056	54,5%
39	2	475 000	8 995	107 940	2 158 800	2	259 056	734 056	54,5%
39	3	475 000	8 995	107 940	2 158 800	2	259 056	734 056	54,5%
39	4	475 000	8 995	107 940	2 158 800	2	259 056	734 056	54,5%
72	1	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
72	2	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
72	3	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
73	4	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
71	1	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
71	2	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
71	3	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
71	4	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
71	5	895 000	16 795	201 540	4 030 800	3	483 696	1 378 696	54,0%
77	1	895 000	16 995	203 940	4 078 800	3	489 456	1 384 456	54,7%
77	2	895 000	16 995	203 940	4 078 800	3	489 456	1 384 456	54,7%
77	3	895 000	16 995	203 940	4 078 800	3	489 456	1 384 456	54,7%
77	4	895 000	16 995	203 940	4 078 800	3	489 456	1 384 456	54,7%
33	2	450 000	8 495	101 940	2 038 800	2	244 656	694 656	54,4%
33	3	450 000	8 495	101 940	2 038 800	2	244 656	694 656	54,4%
33	4	450 000	8 495	101 940	2 038 800	2	244 656	694 656	54,4%
33	4	450 000	8 495	101 940	2 038 800	2	244 656	694 656	54,4%
59	2	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
59	3	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
59	4	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
59	5	795 000	15 495	185 940	3 718 800	3	446 256	1 241 256	56,1%
39	1	495 000	9 495	113 940	2 278 800	2	273 456	768 456	55,2%
39	1	495 000	9 495	113 940	2 278 800	2	273 456	768 456	55,2%
85	2	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
85	3	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
85	4	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%
80	5	995 000	18 995	227 940	4 558 800	4	547 056	1 542 056	55,0%