Soft Negotiators or Modest Builders? Why Women Earn Lower Real Estate Returns *

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Abstract

Using repeat-sales data on apartments in Sweden, we estimate the gender gap in housing returns. We confirm that single women's returns gross of renovations are lower than single men's by more than 2pp, that half of this gap is due to market timing, and that it is concentrated in short holding period. Adding administrative data on renovation expenses and traders' background, we find that women are much less likely to undertake renovations and to specialize in real estate professional activities. Once these differences are accounted for, we do not find any gender gap in real estate returns.

Keywords: gender gap, real estate, returns.
JEL Classifications: G5, G11

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1 Introduction

Housing is the biggest component of most households' wealth. By nature, it is also a major source of underdiversification (Giacoletti, 2021), and for this reason contributes to the development of wealth inequality over time (Bach et al., 2020). What would make those features of housing wealth even more worrisome is if, on top of being highly dispersed across households, returns on real estate wealth turned out to be predictable across welfare-relevant dimensions. Notably, one might wonder whether there is a systematic housing return gap across genders. The answer to this question is however formidably challenging as houses are typically unique assets trading at infrequent dates, in between which some additional capital investments (i.e., renovations) may be made. Furthermore, since the goal is to identify whether and how individuals' gender affects returns, it is essential to also have access to detailed biographical information on buyers and sellers involved in real estate transactions.

In this paper, we investigate whether this return differential is caused by differences in investor ability, experience and preferences across genders or instead reflects a lower propensity among women to invest further money and time into their housing assets via renovations and improvements between acquisition and sale.

We address this question using a new dataset of apartment transactions in Sweden over the period 2007-2016. The dataset is exhaustive because it comes from the tax registry. In Sweden, all apartment sales must be reported to tax authorities in order to levy capital gains taxes. These tax forms provide several pieces of information which are key for the measurement of housing returns: the price and date of acquisition of the flat and the expenses incurred for the maintenance and renovation of the flat in between acquisition and sale. Importantly, the latter information is exhaustively reported since renovation expenses increase the tax basis for capital gain assessments, which gives individuals a strong incentive to report. Such data allow us to compute actual housing returns from repeat sales, thus addressing one of the major challenges posed by the peculiarity of real estate assets. More importantly, we can measure returns both gross and net of renovations, which has been shown to matter greatly for the first and second moments of real estate returns (Giacoletti (2021), Nowak and Smith (2020), Chambers et al. (2021), Eichholtz et al. (2021)). Using individuals' social security numbers, the transaction data is perfectly matched with other Swedish registries already used in previous research (Calvet et al. (2007), Girshina (2019), Bach et al. (2020)), giving us information on the stock of housing held

by individuals, their occupational history, family relationships and school grades, among other individual characteristics of buyers and sellers.

The combination of rich apartment sales data with traders' individual characteristics provides us with an opportunity to investigate the role played by the gender of buyers and sellers on the returns earned on the real estate market. Our results are as follows. First, we find that in annual terms, and before accounting for market timing effects and renovations, the geometric average return on apartment repeat-sales is 2.2 percentage points lower for single women relative to single men. This result is qualitatively and quantitatively in line with the results obtained by Goldsmith-Pinkham and Shue (Forthcoming) and Andersen et al. (2021) in a large repeat-sales sample of housing transactions in the US and Denmark, respectively.

Second, we investigate the role of transaction market timing and property characteristics on this raw gender gap in returns. We find that roughly half of the gender gap in returns before renovations is driven by local housing market cycles, while observable transaction and property characteristics, such as apartment size, do not explain any of the gender gap in repeat sales returns. This substantial residual gender gap is again similar to the results in Goldsmith-Pinkham and Shue (Forthcoming) but is significantly larger than what has been estimated in a sample of Danish real estate transactions (Andersen et al., 2021), in which no gap in repeat sales returns could be identified between male and female real estate owners after household and property characteristics (including assessed value) were taken into account.

Third, we investigate the role played by trading experience in the residual gender gap we identify. We call real estate professionals those individuals who have experience as real estate agents or in the construction sector or sell apartments in which they have never lived. We show that such individuals represent a much larger share of the real estate market in terms of transactions than in terms of holdings. At the same time, there is a very strong self-selection of males into this category: there are three times as many transactions by males as by females among professionals, while there is an almost equal frequency of genders among sellers who are not real estate experts. As a result, gender gaps estimated on transaction data are not representative of most housing situations: professionals own less than 9% of the housing stock but represent more than 20% of transactions. Indeed, controlling for professional status reduces the gender gap of about half, down to 0.6 percentage points from 1.2 percentage points estimated after controlling for local market conditions and property characteristics. Importantly, we additionally find that

female real estate professionals do not underperform male real estate professionals. Half of the residual gender gap in transaction data is therefore driven by self-selection of males into real-estate-relevant occupations. Because this self-selection is correlated with trading frequency, its aggregate wealth impact is far more limited than what the transaction-based evidence suggests.

Fourth, we investigate the role played by renovations in explaining the gap in repeat sales returns between men and women. Over the life cycle of their housing investments, renovation expenses reported by men are 40% larger than those made by women. Because these renovation costs are capitalized almost one-for-one into resale prices, the residual gender gap in returns after renovations reduces dramatically to 0.2 percentage points, and disappears after controlling for professional status.

Fifth, we seek to explain the difference in renovation behavior between male and female sellers. Selling women earn lower labor income and may be more financially constrained in their home improvements. Women also tend to initially buy housing in better shape and more expensive. Yet, after taking into account those sensible explanations, the renovation gap only drops by 10%.

Sixth, we study the possibility of other mechanisms beyond renovations which could explain the gender gap in returns. The bargaining hypothesis specifies that women may have a preference against hard negotiation which would lead them to earn lower returns due to poorer execution prices. Our data allow us to investigate some market microstructure features of real estate sales in our sample. We find that the repeat sales return based on the listing price of resale is indeed significantly lower among women. However, accounting for renovations attenuates this gap to the extent that women on average entirely recoup this initial low starting point in negotiations, as they obtain, as sellers, a significantly higher premium between the execution price and the listing price. Overall, we fail to detect any strong bargaining disadvantage for Swedish women compared to men.

Summing up, our findings are highly suggestive that women experience lower house price growth than men primarily because they also put less money and effort into their house after the acquisition. The money that is not spent on renovations may be saved elsewhere by those women so the real estate market does not by itself prevent women from building up household wealth over time.

Our paper is closest to two recent contributions by Goldsmith-Pinkham and Shue (Forth-

coming) and Andersen et al. (2021), who estimate the gender gap in housing returns in the US and Danish contexts, respectively. While the former finds a strong gender gap in favor of men, the latter cannot detect any such gap once property characteristics and assessment value are controlled for. Our paper confirms the existence of a gender gap in real estate returns gross of renovations of similar size as in Goldsmith-Pinkham and Shue (Forthcoming). Yet, once we measure real estate returns net of renovations, we recover the null result from Andersen et al. (2021), most likely because the property assessed value for single property dwellings and some of the individual characteristics indirectly account for the extent of home improvements. Therefore, our paper helps clarify the apparent contradiction between those two recent contributions.

The findings in the paper provide new insights on the origins of the gender wealth gap (Ponthieux and Meurs, 2015). A well-established channel is that women earn less on the labor market, in part due to occupational segregation (Blau and Kahn, 2017). In this paper, we show that the segregation of women outside of real-estate-relevant occupations is strongly associated with their tendency to build housing wealth at a slower rate than men. Such segregation has also been documented in the US and, contrary to other kinds of occupational segregation by gender, it has definitely not subsided over the last four decades (Blau et al., 2013).[1]

Another channel through which one could explain wealth growth patterns by gender is saving behavior. A lot of attention has in particular been paid to differences in asset allocation between men and women, with the latter being regularly documented as more risk-averse in their allocation decisions (Sunden and Surette, 1998). Our results rather suggest that more attention must be paid to differences in active saving behavior between men and women: housing renovations are one way to save out of disposable income and women engage in those much less intensely than men.

The paper also connects with the literature on the measurement of real estate returns. We follow the conventional approach of measuring returns via repeat sales. It has long been established that the approach delivers biased estimates of returns in the presence of renovations. To compute the first repeat-sales index, Case and Shiller (1987) focus on transactions where there is no evidence that the housing structure was altered in any way between the initial acquisition and the resale of the housing unit. Goetzmann and Spiegel (1995) use the same sample as Case and Shiller (1987) and estimate that the same house could well be bought and

[1]The origins of segregation of construction jobs by gender could be linked to the physical requirements of such jobs and their inflexible time schedules (Cortes and Pan, 2018).

sold at very different prices almost from one day to the other, which they can only assign to home improvements not reported in the Case-Shiller data. Since these two seminal papers, US-based research has sought to circumvent the problem either by the inclusion of building permit data Giacoletti (2021) or via machine learning techniques applied to property listings (Goldsmith-Pinkham and Shue (Forthcoming), Nowak and Smith (2020)). Compared to these, our approach to measuring renovations, based on tax reports, has the advantage that renovators have a strong monetary incentive to precisely and extensively report incurred home improvement expenses. We show that accounting for properly-measured renovation expenses has a very strong effect on the first moment of real estate returns. Thanks to having data on both holdings and transactions of real estate, we are able to quantify the bias introduced by real estate professionals over the size of the gender gap. We confirm that their weight in transactions is much larger than their weight in the general population.

The rest of the paper is as follows. Section 2 describes the data and the empirical methodology. Section 3 provides the results from the empirical analysis. Section 4 concludes.

2 Data and Methodology

2.1 Data Description

This paper uses an administrative dataset containing the universe of all apartment sales in Sweden during the period 2007 to 2016 with properties acquired from 1990 onward. The data is collected by Statistics Sweden from the tax form for transfers of a co-op apartment (Överlåtelse av bostadsrätt, KU55). The KU55 register records the seller, co-op association identifier, sale price, prior purchase price, ownership share, and transaction type of both the prior acquisition and the current sale. Conditional upon a sale, we know the exact period during which the seller owned the apartment. We obtain detailed hedonic characteristics from a commercial dataset maintained by Svensk Mäklarstatistik (the Swedish Real Estate Agent Association, henceforth MKS), which collects the data directly from its members on real estate transaction. The MKS dataset provides also information on co-op fees and sale features, such as the listing price and listing date. We obtain the apartment geographical location at the level of 250×250 meter blocks using the Apartment Register (Lägenhetsregistret). Finally, we merge the housing transaction data with demographics, employment, and schooling registers maintained by Statistics Sweden

to control for individual characteristics. In particular, we obtain traders' residence, gender, occupation, business sector, as well as high school grades as a proxy of individual ability.

A unique feature of this paper is the possibility of computing returns net of renovation costs. We expect the quality of the renovation data to be exceptionally high for at least four reasons. First, in Sweden all apartment sellers are required to submit a tax form upon the sale of a co-op apartment (Försäljning av Bostadsrätt, K6), in which renovation, maintenance and sale costs can be reported. Second, these costs are deductible towards the real estate capital gain tax, which, in addition to the mandatory filing of the K6 form, creates a uniquely strong incentive for sellers to accurately declare to the tax authorities.[2] Third, the deductions should include all improvements, renovation, repair and maintenance costs that represent an investment in the property. Indeed, the guidelines provided by the Swedish tax authority recommend deduction at cost of new constructions (e.g. new guest house in the garden), extensions (e.g. adding a new floor), renovations (e.g. changing floors from carpet to parquet) or major improvements (e.g. installing a security door). Instead, ordinary maintenance, improvements and repairs, such as re-painting walls or the renovation of kitchen/bathroom, should be deducted after depreciation and up to five fiscal years after they are performed. The only limitations are that costs must be larger than 5,000 SEK and cannot include self-work. Finally, the K6 form also contains information on sale-related costs, as owners can also deduct real estate agent commissions, valuation fees and home-staging costs.

To the best of our knowledge, this paper is the first to access high quality and comprehensive administrative data on renovation and maintenance costs made during the entire ownership tenure of all transacted apartment. Recently, a handful of papers have been able to access information on renovation costs using hand collected data from ledger books of institutional investors (Chambers et al. (2021) and Eichholtz et al. (2021)), textual analysis of listing agents' written descriptions (Goldsmith-Pinkham and Shue (Forthcoming), Nowak and Smith (2020)), or building permits available in third-party commercial datasets (Giacoletti, 2021). Our data: 1. are available for the entire universe of transaction, and thus free from selection bias, 2. report all maintenance and renovation costs that represent property investment excluding those that

[2]In 2004 the government introduced the possibility of deducting from taxable income the labor cost of reparation, remodelling, and renovation (reparation, ombyggnad, tillbyggnad, or *ROT*, in Swedish) up to 50,000 SEK. In 2013 the tax authorities specified that ROT deductions cannot be used against the capital gain tax and should not be reported in the K6 form. We have access to the ROT data and add the costs declared through ROT to the total renovation and maintenance costs we observe in the K6 form from 2013 onward.

constitute housing consumption but including those unrelated to major remodelling events that require approvals by the authorities, 3. are directly provided by owners upon sale, who are likely to be the most informed party.

We apply several filters to the raw KU55 data. First, we keep only sales of the entire property, and thus exclude partial sales, gifts or bequests, and property divisions between spouses. Second, we exclude all observations for which the tax form is not filled in accordance with the official rules, as outlined in the taxation brochures published annually by the Swedish tax authority. For example, we exclude observations with missing fields (e.g. missing acquisition date or transaction price), or when the sum of the transferred ownership shares does not sum up to 100%. Third, we keep only transactions between individuals, excluding all transactions that involve a legal entity. Fourth, we drop transactions which took place less than a year after the conversion of a rental building to co-op (bostadsrätt), as acquisition prices at the time of conversion do not represent market valuations. Similarly, we drop the few transactions with acquisition before 1990, as we can observe only repeat-sales with purchase price from 2005 onward. Fifth, we exclude transactions with abnormally low prices[3], or between members of the same family, to filter out non arm's length transactions and distressed sales.[4] We follow GPS and drop transactions with holding periods of fewer than 90 days. Finally, we exclude observations which have experienced extreme price growth in a short period of time, i.e. those in the top and bottom 1 basis point of the distribution of annualized log-returns across all years. The resulting KU55 repeat-sale data, combined with the K6 cost data, is the backbone of our empirical analysis and allows us to precisely measure returns and renovation costs as described in section 2.2.

For the purpose of this project, we attribute repeat-sale returns to a single person if 100% of the property was bought and sold by the same individual (male or female). We refer to a "woman" ("man") or "female" ("male") repeat sale when it is executed (at purchase and at sale) by the same single woman (single man). The only other repeat-sales considered in the paper are those from couples. We attribute a sale to a couple when the same two individuals bought and sold the property with unchanged ownership shares. We exclude all transactions with more than two owners or with a change in ownership share between acquisition and sale.

[3]More precisely, we exclude transactions with prices below the highest of 1,000 SEK and the first percentile of the municipality price distribution across all years

[4]Family members include: parents, spouses, children, siblings, grandparents, aunts/uncles, parent-in-laws, siblings-in-law, children-in-law, nephews/nieces, and grandchildren.

Finally, we drop the few cases in which the apartment is sold by a minor. The resulting dataset has 194,554 repeat-sale pairs executed by 233,254 unique individuals.

2.2 Returns and Renovations

We follow the literature and start by defining the (unadjusted) return r^u to real estate transactions as the difference in logs between the sale and purchase price over ownership tenure:

$$r^u_{i,j,t,T} = log(P_{j,T}) - log(P_{j,t}). \tag{1}$$

where j indexes the apartment bought at time t and sold at time T by individual or couple i. To illustrate the bias introduced by failing to account for additional capital investments in real estate properties, it is useful to also define returns adjusted for expenses in maintenance and renovation. Assume that renovations are entirely made at time of purchase[5], the return net of renovation costs $c_{j,t}$ can be measured by adding $c_{j,T}$ to the purchasing price $P_{j,t}$:

$$r^a_{i,j,t,T} = log(P_{j,T}) - log(P_{j,t} + c_{j,t}). \tag{2}$$

In an efficient real estate market, renovation costs should impact one-to-one unadjusted returns. Indeed, if a renovated apartment would cost as much as an identical unrenovated apartment plus renovation expenses, the difference in unadjusted returns between the unrenovated and renovated apartment would be equal to:[6]

$$log(P_{j,T}) - log(P_{j,t})) - [log(P_{j,T}) - log(P_{j,t} + c_{j,t})] = log(1 + \frac{c_{j,t}}{P_{j,t}}) \tag{3}$$

Table IA.II, column (1) reports the regressions of unadjusted returns on renovation costs as measured by (3). The impact of renovation costs is strikingly close to unity and precisely estimated. In addition, since the value of self-work cannot be expensed, the point estimate slightly greater than one is consistent with self-work being correlated with renovation costs that are tax deductible. Overall, these results confirm the quality of our renovation measure, the assumption that renovations are mainly done at purchase, and that unaccounted renovation

[5] In table IA.III of the appendix, we show that our main results are strikingly similar when we assume the opposite, but less plausible case, in which all renovations are assumed to be undertaken at time of sale

[6] When renovations are assumed to be made at sale, the impact of renovations on returns is equal to $-log(1 - \frac{c_{j,T}}{P_{j,T}})$.

costs are a small fraction of overall renovation expenses. Yet, as we show next, even negligible unaccounted costs might have a large effect on annualized returns for short holding periods. The annualized version of (adjusted or unadjusted) return $r^x_{i,j}$ of apartment j bought at time $t_{i,j}$ and sold at time $T_{i,j}$ by individual or couple i is defined as:

$$r^x_{i,j} = \frac{r^x_{i,j,t_{i,j},T_{i,j}}}{T_{i,j} - t_{i,j}} 365, \ x \in \{u, a\} \tag{4}$$

Failing to account for renovation costs might have a huge impact on annualized returns. The difference between annualized returns adjusted and unadjusted for renovation:

$$r^u_{i,j} - r^a_{i,j} = \frac{365}{T_{i,j} - t_{i,j}} [log(P_{j,t} + c_{j,t}) - log(P_{j,t})] = \frac{365}{T_{i,j} - t_{i,j}} log(1 + \frac{c_{j,t}}{P_{j,t}}) \tag{5}$$

converges to infinity as holding periods become small, i.e. $T_{i,j}$ approaches $t_{i,j}$. By the same logic, unobserved renovations (as self-work) can dramatically inflate even adjusted returns for short holding periods. In column (2) of table IA.II, we perform the same regression as in column (1) but with annualized returns and annualized renovation costs as in equation (5). As expected, the impact of renovation costs on returns is much higher than unity with a point estimate of 1.33: unobserved renovations have exponential impact on returns for shorter and shorter holding periods.

2.3 Gender gap in returns and renovations

We report annualized returns and annualized renovations by gender over time in Figure 1 and Figure 2 respectively. During the entire sample period, men earn higher renovations-unadjusted returns compared to both women and couples. Although yearly returns vary over time, from around 11% at its minimum for men in 2012 to over 20% in the beginning of the sample period, the gender gap is rather stable over time. In particular, men earn on average around 2.2pp ($\sim$ 18%) more than women and 3.6pp ($\sim$ 34%) more than couples on a yearly basis on their apartment transactions between 2007 and 2016, which is consistent with the previous evidence.

On Figure 2, we plot average annualized renovations, defined in equation 5, by gender and year. First, the dynamics of renovations over time seems to resemble that of returns: when returns are at their highest, so are the renovations, suggesting their procyclicality. Second, similarly to returns, there is gender gap in renovations. In particular, men appear to renovate

substantially more than both women and couples. During our sample period, average annualized renovations undertaken by men is around 40% higher compared to others.[7]

As evidenced by the equation 5, the fact that men renovate substantially more compared to women means that the gender gap estimated using renovations-unadjusted returns, used in the previous literature due to the lack of data on the renovation expenses, is overestimated. Importantly, as holding period decreases, the impact of renovation adjustment on returns increases. Combined with the fact that men tend to transact over shorter holding periods, makes this impact on the estimated gender gap in returns particularly severe. In the following section, we quantify the role of renovations, along with other characteristics, on the gender gap in real estate returns.

3 Why women earn lower real estate returns

To study the role of different channels for gender gap in real estate returns, we employ standard regression analysis. We start with a simple gender regression, where we regress unadjusted annualized real estate returns $r_{i,j}$, specified in equation 1, for a person/couple i and property j on identifiers for $Female_{i,j}$ and $Couple_{i,j}$:

$$r_{i,j} = \alpha + \beta^{Female}\ Female_{i,j} + \beta^{Couple}\ Couple_{i,j} + \epsilon_{i,j}$$

The results are reported in Table 1 and Figure 3. In our sample, single men earn the average repeat-sale return gross of renovation and maintenance costs of 14.1% per year, whereas single female earn 11.9%. Unconditionally, the gender gap is thus about 2.2 percentage points (pp) with women earning an 18% lower return than men on a yearly basis. Couples earn lower returns than men by about 3.6 pp and are thus faring worse than both men and women. Perhaps surprisingly, the gender gap in Sweden is even larger than in the US, where GPS documents that single women earn lower returns than single men by 1.5 pp and that the gap between couples and single men is 1.9 pp.

[7] We report gender difference in renovation components in the Appendix Tables IA.VI and IA.VII.

3.1 The role of property characteristics, location, and timing

We next turn to exploring the role of property characteristics, market timing and the choice of property location. As shown in Table 2, single women buy somewhat larger apartments than single men - by about 1 sqm (61.1 sqm vs 59.2 sqm respectively), but otherwise hold remarkably similar properties. Couples, on the other hand, choose larger apartments (by about 30% or 17 sqm, and with one more room on average) in somewhat newer buildings that are more likely to have an elevator. Expectedly, in column (2) of Table 1, we find that property characteristics do not explain the gender gap but account for 50bp of the lower returns earned by couples.

To explore the role of location and timing, we follow Goldsmith-Pinkham and Shue (Forthcoming) and augment the regression with municipality x year-month of sale, municipality x year-month of purchase, and year-month of sale x year-month of buy fixed effects. Accounting for the differences in decisions on when and where to transact explains about half of the gender gap in real estate returns, with the coefficient on the *Female* dummy going down from -2.2 to -1.17. We also find a large effect of local market timing on the *Couple* coefficient, which falls by more than two-thirds to -0.86.[8] These results confirm the finding that, as in the US, market timing explains about half of the gender gap in returns and about three quarter of the return differential between single men and couples.[9]

Thus, differences in property characteristics account for part of the difference in returns between men and couples, but they do not explain the gender gap since single women and men hold similar properties. Local market timing decisions, on the other hand, account for about half of the gender gap and for about two-thirds of the lower returns earned by the couples. A significant return differential however remains. In the next sections, we turn to studying the role of differential investment in property maintenance and renovation and of the occupational selection for gender gap in real estate returns, which is the main contribution of this paper.

[8]Table IA.IV shows the role of location, location x time, and timing fixed effects in turn. Municipality FEs by themselves have a negligible impact on the gender gap. SaleYM x BuyYM fixed effects alone account for 80bp of the gender gap, whereas location x time FEs reduce the gender gap by 40bp.

[9]To characterize the source of variation in local market timing, we plot market indexes for Sweden and by clusters in Appendix Figures IA.II and IA.III respectively. We explain how we construct indexes in Appendix Section IA.A.

3.2 Accounting for renovations and occupational selection

In this section, we study the role of renovations and occupational selection in explaining the gender gap in real estate returns. We think of total home improvements as of a combination of reported, or monetary, renovation expenses and "sweat equity". As is discussed in Section 2.2, failing to account for either leads to the mismeasurement of actual returns on real estate, which is particularly pronounced for short holding periods. If on top of that, women renovate less than men - either in terms of monetary costs or unaccounted effort - the gender gap in real estate returns is overestimated if these costs are not taken into account. Below, we investigate the role of these channels.

3.2.1 The role of renovations

In this section, we explicitly account for the reported maintenance and renovation expenses occurred during the holding period.

Figure 2 plots annualized renovation costs to sell price, defined in equation 5, by gender over the entire sample period. Throughout, men reported substantially higher renovation expenditures compared to both women and couples, by about 40%.

We then include renovations in our regression analysis by controlling for annualized renovation expenses. We report results in column (4) of Table 1. The main takeaway is that once the heterogeneity in renovations is taken into account, gender gap in real estate returns decreases by 1pp ($\sim 85\%$) to -23bp. Further, the estimated coefficient on *Couple* becomes economically and statistically not significant.

Thus, taking into account reported renovation expenses decreases dramatically the estimated gender gap. Yet, the monetary measure might not fully account for the extent of home improvements since it does not include do-it-yourself type of work. To capture this channel, we explore the role of different gender selection across occupations.[10]

[10]In Appendix Table IA.IV we control in turns for different fixed effects and renovations. We show that only controlling for renovations, without fixed effects, reduces the gender gap from -2.2pp to -0.4pp. This suggests that accounting for local housing cycle captures in part the fact the renovations are procyclical.

3.2.2 Real estate professionals

We proceed by exploiting the richness of our data to study the role of professional experience, in particular the occupational selection into professional real estate market players, on the remaining gender gap. We build on the findings by Giacoletti and Westrupp (2017), who argue that experienced asset flippers earn a sizable abnormal performance in real estate markets. More generally, real estate professionals might be able to earn higher observed returns on real estate transactions due to their professional activity as they would do more capital improvements, both in monetary and "sweat equity" terms, as well as thanks to the experience they have gained in their line of work. If men are more likely to select themselves into this occupation, this would increase the observed gender gap in real estate returns. In this section we explore the role of this channel.

As it is notoriously difficult to identify professional segment of the real estate market, we employ a definition by building a proxy based on two data sources. First, we identify persons who have experience in real estate or construction by using historical information on occupation and sector of employment. Specifically, we identify individuals who have worked as real estate agents or have being employed in the construction sector or as construction worker in the year of sale or in the year before sale.[11] To identify "flippers", we unfortunately cannot rely on employment information as there is no professional occupation or sector defined as such. We instead use detailed information on persons addresses and exact moving dates to identify owners that have never lived in the transacted apartment. A transaction is considered as part of the professional segment of the real estate market if the owner has real estate or construction experience or never lived in the transacted apartment.[12]

In Table 3, we show the difference in demographic composition, returns, renovations, as well as holding periods between the "Professional" and "Non-professional" segments of the real estate market. First of all, among professionals, the transactions executed by men prevail. More than half of the transactions which we assign to the professional market segment are carried out by single males, compared to 35% among the non-professionals. On the contrary, only 18% of the professional segment transactions are executed by women, compared to 37% among the non-professionals. At the same time, returns earned by professionals are almost twice as

[11] More precisely, we define construction workers as those whose profession is defined as *"Craftsmen in construction and manufacturing"*.

[12] A couple has construction experience if at least one person in the couple does.

high compared to those earned by non-professionals (19.7% vs 10.4%). Professional traders also report much higher renovations, with the annualized renovation costs to sell price being almost three times higher, as well as have faster turn-around times by almost a year (3.7 years vs 4.5 years).[13]

In Figure 4 panels (a) and (b), we follow Giacoletti (2021) and Goldsmith-Pinkham and Shue (Forthcoming) and analyze the term structure of real estate returns overall and by gender. We confirm the findings that on the real estate market as a whole returns are substantially higher for the transactions with short holding periods and that these transactions drive the gender gap.[14] For properties held less than one year, the average annualized return is around 40% with a gender gap of about 20pp. As the holding period decreases, the average return on the market goes down to around 10% and the gender gap becomes virtually non-existent.

In Figure 4 panels (c) and (d), we go a step further and show the return dynamics separately for professional and non-professional market segments. The plots reveal that the steepness of the return profiles in the short term is largely driven by professional players. More specifically, the average yearly return for professional male trades with holding period of less than one year is around 65% and drops by more than 3 times to 20% as the holding period increases to 1-2 years. In comparison, the average return for non-professional male trades with the shortest holding periods is 25% and it decreases by less than a half, to 13%, as the holding period goes up. Similarly on both markets, the returns continue to decrease as holding periods increase further, but to a much lesser extent, with both profiles flattening out at a level of around 10-11%.[15]

For the transactions executed by female traders, the dynamics of the returns term structure is similar. Women with the experience on real estate markets also earn very high returns - of over 55% - in short holding periods, compared to much lower returns - of around 20% - that women in non-professional market segment earn on similar trades. Similarly to men, the returns earned by women decrease as holding periods go up and the profiles gradually flatten out. What is important however, is that the gender gap in this raw, in a sense of not being adjusted for renovations, yearly returns is the highest among professionals with quick trades. Specifically, the average return for professional female trades with holding period of less than a year is 10pp

[13]We report summary statistics by each group comprising real estate market professionals in the Appendix Table IA.V. Across all groups, men dominate in terms of gender composition, but it is particularly so for Construction Sector and Construction Worker groups. In these groups, men account for 59% and 60% of observations respectively, whereas women are only 5% and 3%.

[14]We report renovations by holding period in Appendix Table IA.XI.

[15]We show average holding period by gender and occupation in Appendix Table IA.XII.

lower compared to similar trades by males, whereas this gap is less than a half, 5pp, on the non-professional market. Even more strikingly, the gap on both markets virtually disappears for the trades with holding period of more than a year. Thus, short-term professional transactions are largely responsible not only for the term-structure of real estate returns on the overall market, but also for the observed gender gap. Combined with the facts that the professional segment of the market is dominated by men, that male professionals are precisely the group that undertakes the largest capital investments, that renovations have the largest impact on returns in short holding periods, and that the return gender gap in the short-term professional transactions is the highest, one can only expect that this short-term transactions in professional market also have a disproportionate impact on the average gender gap in raw returns.[16]

We next zoom in into the professional market segment. To study the gender gap among professionals, we interact the *Female* dummy with being a professional on real estate market. As shown in Table 5 column 4, while professional women earn somewhat higher real estate return compared to professional men, there is no gender gap among non-professionals professionals.

Finally, it is important to note that, since executed over shorter holding periods, professional transactions constitute a large fraction of overall market transactions - thus driving estimates of average returns. Yet, professional ownership only accounts for a small share of the aggregate apartment stock. As shown in Figure 5, professional transactions constitute about 20% of the total number of transactions, but professional ownership accounts for only about 10% of apartment wealth.

Motivated by all these facts, we focus on the non-professional real estate market segment to study the role of negotiation channel of the gender gap in returns.

3.2.3 Retired

We next focus on apartment owners that are retired to consider another selection issue relevant for the observed gender gap in real estate returns. Contrary to the case with real estate market professionals, the retired are over-represented by women: 46% of retired are females compared to only 25% of males (Table 4). At the same time, retirees earn lower returns (10.8% vs 12.5%), renovate less and hold apartments 2.5 years longer, on average. Thus again, women constitute a large part of the socio-demographic group that fair relatively worse on the real

[16]We show average renovations by holding period in Appendix Table IA.XI.

estate market.

Consistently with the descriptive evidence, Table 1 shows that retirees earn on average 2pp lower returns even after accounting for property characteristics and local housing market cycles. Yet, there is no difference in returns between retired women and men and between non-retired women and men (Table 5 column 3).

3.2.4 Role of occupational selection and the difference in longevity for real estate returns

We report the results in which we control for the heterogeneity in professional experience and demographics in Table 1 column 7. Accounting for this selection eliminates the gender gap in real estate returns. The difference between couples and single men also remains small and not statistically significant. Interestingly, once we control for both renovations and professional selection, the coefficient on the latter goes down suggesting that it partly proxies for higher capital investments. Similarly, the coefficient on Retired also decreases in magnitude, suggesting that it partly captures the fact that the retired renovate less.[17]

In Figure 3, we show that accounting for local housing cycle, reported renovations and professional selection eliminates the gender gap completely, suggesting that it is largely driven by unaccounted capital investments.

3.3 The role of negotiation ability in listing and execution prices

In this section, we analyze an alternative explanations for the gender gap in real estate returns, namely the bargaining on the real estate markets and the idea that women can be more reluctant to negotiate aggressively. In fact, simple summary statistics, shown in the Table 6, would suggest that women buy at higher prices compared to men and pay a higher premium at the purchase.

To understand the role of this channel in explaining the gender gap in real estate returns, we focus on the bidding process and study differences in listing premium across gender groups. We follow Goldsmith-Pinkham and Shue (Forthcoming) and define the listing premium as the

[17]In Appendix Table IA.IV we control in turns for different fixed effects, renovations, and professional real estate experience. We show that only controlling for occupation, without fixed effects, reduces the gender gap from -2.2pp to -0.75pp.

percentage difference in the final sale price and the listing sale price: *log(sale price)-log(list sale price)*.[18]

Gender differences in this premium can arise for two reasons. On the one hand, women might be setting lower listing prices to start with, which would lead to lower returns among women even if the premium is the same across genders. On the other hand, given the listing price, women and men might be able to negotiate different premia during the bidding process. In this case, higher premia would indeed imply higher returns.

To account for both channels, we decompose returns into two components: the increase from the purchase price to the listing sell price and the premium to the listing price:

$$return = log(sale\ price) - log(list\ sale\ price) + log(list\ sale\ price) - log(buy\ price) \quad (6)$$

Table 7 shows the results. Columns 1 and 3 suggest that in a sample of non-professionals and after accounting for property characteristics, full set of location and time fixed effect and the heterogeneity in the retirement status, women do sell at a lower price compared to the listing price by -1.12pp. At the same time, women also set a higher listing price compared to their buy price by 0.37pp. Combined, these two estimates would imply a gender difference in holding period returns of 75 bp, with women faring worse.

To understand why women set starting selling prices relative to the purchase price so much lower than men, we conjecture that the difference in listing price may arise not only for strategic or behavioral reasons (for example, to attract more viewings or if women are too shy to set a higher price), but also from the fact that it may reflect the difference in the apartment quality and, therefore, in transformations it underwent during the ownership tenure.

To test this hypothesis and disentangle the two channels, we simply account for the fact that women renovate less than men. We find that renovations impact the listing sale price: a 1pp increase in renovations expenditures relative to purchase price translates to a 0.06pp increase in listing price relative to the purchase price. We also find that renovations have a very strong impact on the sale premium - of 0.93pp - suggesting that sellers are shy of fully integrating renovations into the list price. Altogether the renovations affect holding period returns one for one: 1pp increase in renovations increases holding period returns by 1pp.

[18]We define it it as a "premium" rather than as a "discount" since in the Swedish residential market the prices are typically bid up in the negotiation process.

Most importantly, once we account for the heterogeneity in renovation expenditures across gender, the lower sale price obtained by women is exactly compensated by the higher listing price they set (columns 2 and 4). That is, while it is true that, even after adjusting for renovations, women sell at a lower price compared to men, this is because they start with a higher listing price to start with. Put together, these findings result in no gender difference in returns from negotiation.

3.4 The role of negotiation ability in hot and cold markets

In this section we analyze whether there is more room for differences in negotiation ability in cold housing markets. To identify those, we construct a measure which captures the share of transactions executed at a price which is below the listing price in a given market, which we define to be canton and quarter specific.

We plot the distribution of this measure in Figure 6. It shows that while many transactions are executed at a premium, there are markets in which share of properties sold with a discount picks at above 60% with a lot of heterogeneity across markets.

To study the role of market tightness for gender gap, we interact the Female and Couple coefficients with the share of transactions in a given market at a discount. The Table 8 shows that without controlling for renovations, it is indeed the case that women perform worse in cold markets. Yet, once we account for renovations, there is no gender gap independently on the market tightness. The conclusions are the same once we look at the holding returns decomposition reported in Table 9.

3.5 What explains renovations

The question that remains to answer is what drives differences in renovations between males and females. To do so, we rely on extremely rich individual information that we obtain from registry data on sellers. We test a number of alternative channels. First, we account for the fact that women could be buying more expensive higher quality apartments. Then we test whether there is room for differential general ability, ability specifically related to construction work acquired through professional education, or knowledge or experience in finance related fields. We further test if the fact that women earn lower labor income and thus face more binding

financial constraints can explain differential willingness to undertake renovation works. Finally, we also test for different family composition, such as number of cohabiting children, family origin, and risk aversion. We report all the detailed coefficients in the Appendix Table IA.IX and summarize the restuls in Table 11.

We find that none of the observable characteristics, albeit affecting the level of renovations, explain the gender gap. At the same time, we find that once we account for common family unobservables, by including siblings fixed effects, we are able to explain gender gap in renovations. This suggests that women choose to renovate less than men due to some unobservable characteristics, such as preferences.

4 Conclusions

In this paper, we have used a novel repeat-sales data on apartments in Sweden to study the gender gap in real estate returns. We have confirmed the finding that women's returns gross of renovations are lower than men's, especially over short holding periods. Adding administrative data on renovation expenses and traders' personal background, we have shown that single women are less likely to participate in the professional real estate market, have less construction-related experience than single men, and undertake fewer renovations. After accounting for this heterogeneity, there is no gender gap in real estate returns. We have found no evidence supporting the alternative explanation that women are unwilling to bargain hard for housing, as the lower listing price that women advertise on average reflects lower investment in renovations.

5 Figures

Figure 1: Gender gap in real estate returns

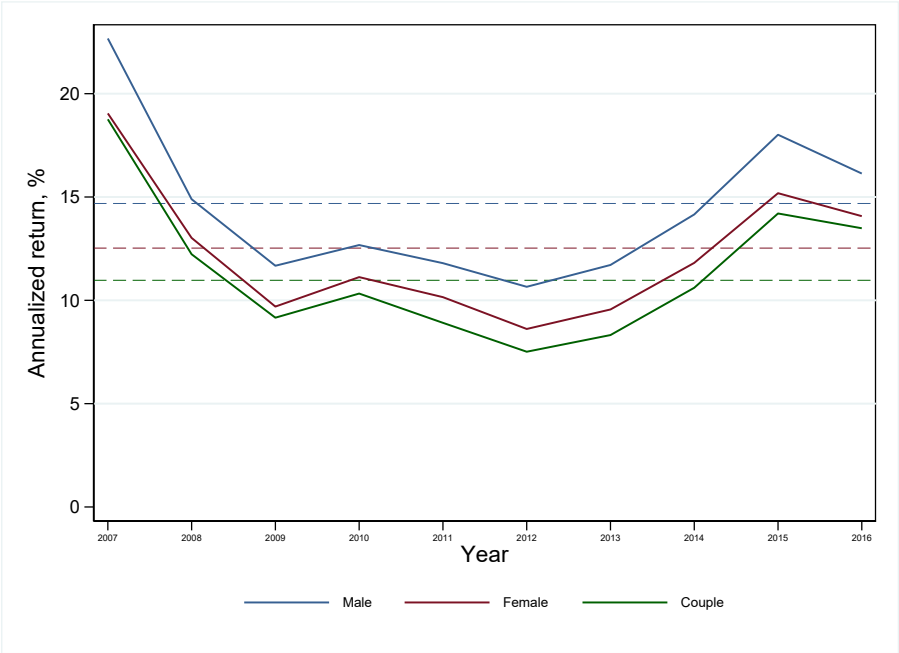


Figure 2: Gender difference in renovation expenses

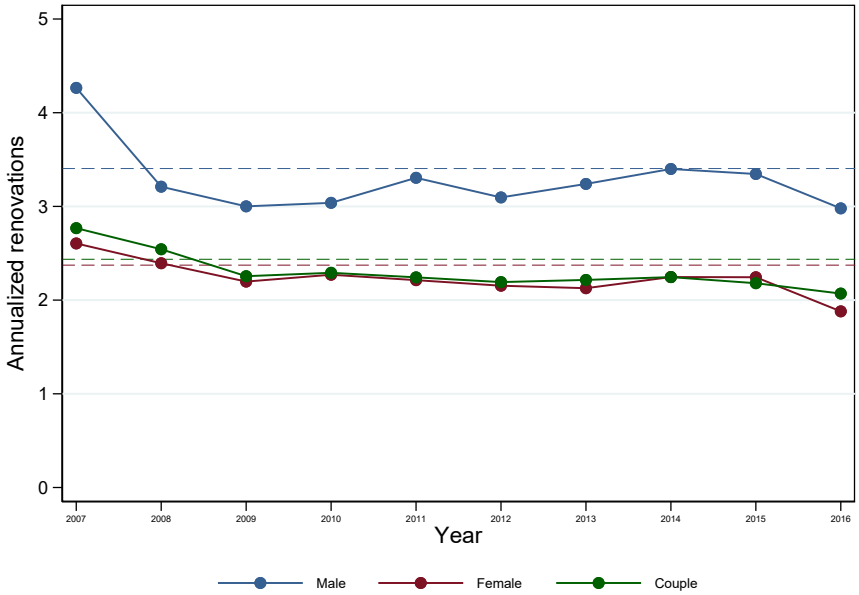


Figure 3: Gender gap in real estate returns

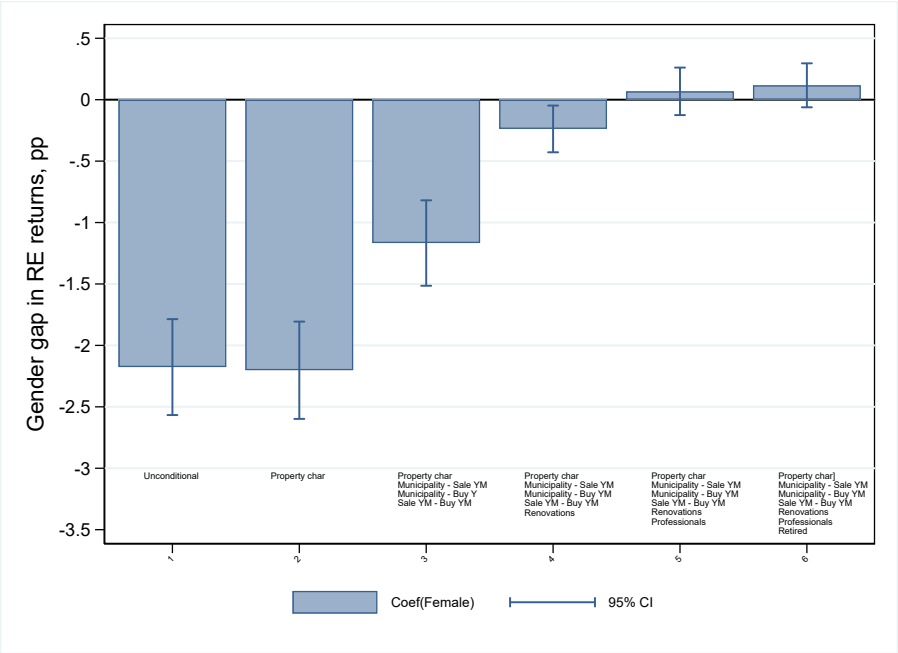


Figure 4: Heterogeneity of gender gap in real estate returns by holding period

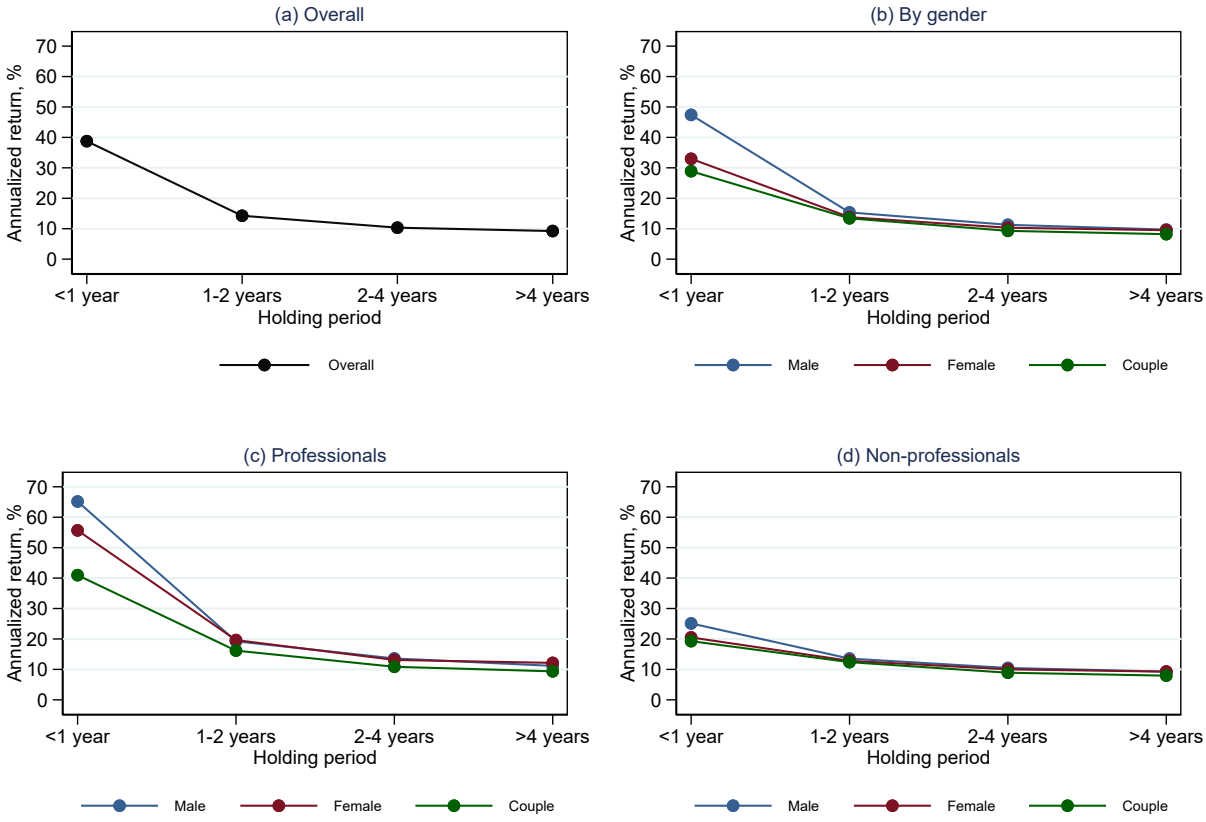


Figure 5: Apartment wealth and share of transactions by market segment

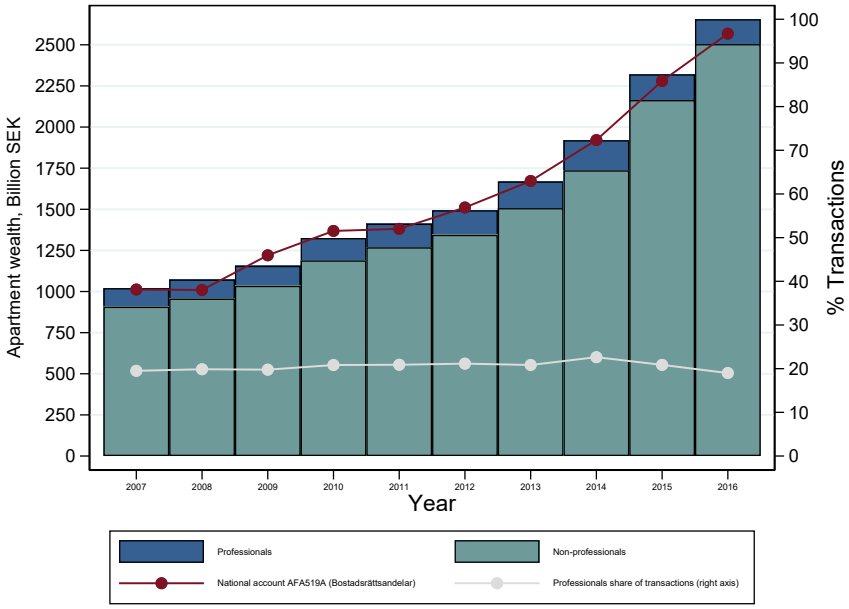
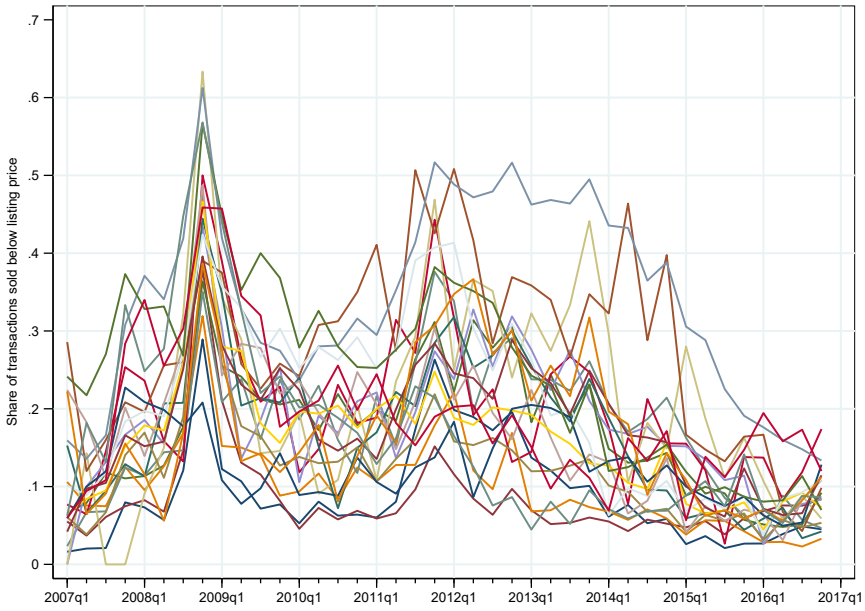


Figure 6: Geographical variation in market tightness



6 Tables

Table 1: Gender gap in real estate returns

	Full sample						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-2.176***	-2.202***	-1.167***	-0.238**	-0.613***	-1.078***	0.117
	(0.199)	(0.202)	(0.177)	(0.097)	(0.151)	(0.158)	(0.091)
Couple	-3.598***	-3.100***	-0.857***	-0.066	-0.804***	-0.808***	-0.016
	(0.269)	(0.189)	(0.117)	(0.078)	(0.117)	(0.107)	(0.074)
Annualized renovations				1.338***			1.327***
				(0.023)			(0.023)
Professional					3.788***		2.149***
					(0.200)		(0.247)
Retired						-1.957***	-1.052***
						(0.300)	(0.195)
Observations	160,927	160,927	160,927	160,927	160,927	160,927	160,927
Adjusted R2	0.007	0.021	0.469	0.694	0.475	0.470	0.697
Mean DV Male	14.116	14.116	14.116	14.116	14.116	14.116	14.116
Property char.	No	Yes	Yes	Yes	Yes	Yes	Yes
Municipality-SaleYM FE	No	No	Yes	Yes	Yes	Yes	Yes
Municipality-BuyYM FE	No	No	Yes	Yes	Yes	Yes	Yes
SaleYM x BuyYM FE	No	No	Yes	Yes	Yes	Yes	Yes
Retired dummy	No	No	No	No	Yes	Yes	Yes

Note: The table reports the gender gap in the annualized real estate returns. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Columns (2)-(7) include controls for property characteristics (*Property char.*) consisting of living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm. Columns (3)-(7) include municipality-year-month of sale fixed effects, municipality-year-month of buy fixed effects, and year-month buy × year-month sale fixed effects. Columns (3) and (7) include control for annualized renovations, defined in the equation 5. Columns (5) and (7) include control for $Professional$ transactions, which is an indicator for the transaction carried out by a real estate professional as defined in Section 3.2.2. Columns (6) and (7) include retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Summary statistics: property characteristics

	Female		Male		Couple		Overall	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Living area, sqm.	61.08	22.01	59.19	20.71	77.74	22.96	65.14	23.24
Building year	1961	27	1960	32	1966	37	1962	32
Number of rooms	2.24	0.95	2.14	0.87	2.96	0.96	2.41	0.99
Apartment floor	2.28	1.61	2.40	1.66	2.37	1.72	2.35	1.66
Elevator exist	0.39	0.49	0.40	0.49	0.46	0.50	0.41	0.49
Monthly fee, SEK/sqm	56.64	11.02	56.24	11.03	55.13	10.79	56.05	10.98
Observations	53,007		61,736		46,184		160,927	

Note: The table reports summary statistics of the property characteristics by gender. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.

Table 3: Summary statistics: transactions by professional and non-professional investors

	Professionals	Non-professionals	Overall
Female	0.18	0.37	0.33
Male	0.51	0.35	0.38
Couple	0.30	0.28	0.29
Annualized return	19.82	10.41	12.37
Renovation (=1 if renovated)	0.73	0.72	0.72
Annualized renovation	5.17	1.91	2.59
Holding period (years)	3.69	4.52	4.34
Observations	33,419	127,508	160,927

Note: The table reports summary statistics for the transactions executed by real estate professional and non-professional players. Real estate professionals ($Professionals$) are defined in Section 3.2.2. The *Annualized return* is defined in equation 4. The *Renovation* is an indicator if the apartment was renovated during the holding period, defined as having a non-zero renovation expense. The *Annualized renovation* is defined in equation 5. *Holding period* is the number of years between the purchase and sale date. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.

Table 4: Summary Statistics: transactions by retired and non-retired

	Retired	Non-retired	Overall
Female	0.46	0.32	0.33
Male	0.25	0.40	0.38
Couple	0.29	0.29	0.29
Annualized return	10.78	12.51	12.37
Renovation (=1 if renovated)	0.69	0.72	0.72
Annualized renovation	1.93	2.65	2.59
Holding period (years)	6.61	4.14	4.34
Observations	13,282	147,645	160,927

Note: The table reports summary statistics for transactions performed by retired and non-retired individuals. The *Retired* are defined as those older than 64 years old measured at the time of sale. The *Annualized return* is defined in equation 4. The *Renovation* is an indicator if the apartment was renovated during the holding period, defined as having a non-zero renovation expense. The *Annualized renovation* is defined in equation 5. *Holding period* is the number of years between the purchase and sale date. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.

Table 5: Heterogeneity of the gender gap in real estate returns

	Full sample				Non Professionals
	(1)	(2)	(3)	(4)	(5)
Female	-2.176***	-1.167***	0.104	0.017	0.044
	(0.113)	(0.092)	(0.074)	(0.059)	(0.050)
Couple	-3.598***	-0.857***	0.030	0.207***	0.140**
	(0.107)	(0.097)	(0.075)	(0.067)	(0.055)
Retired			-0.860***	-1.054***	-1.276***
			(0.278)	(0.141)	(0.090)
Professional			2.149***	2.261***	
			(0.088)	(0.142)	
Annualized renovations			1.327***	1.326***	1.259***
			(0.021)	(0.021)	(0.016)
Retired × Female			0.039		
			(0.340)		
Retired × Couple			-0.669*		
			(0.344)		
Professional × Female				1.014***	
				(0.339)	
Professional × Couple				-1.002***	
				(0.211)	
Observations	160,927	160,927	160,927	160,927	123,154
Adjusted R2	0.007	0.471	0.698	0.698	0.655
Mean DV Male	14.116	14.116	14.116	14.116	10.853
Property char.	No	Yes	Yes	Yes	Yes
Municipality-SaleYM FE	No	Yes	Yes	Yes	Yes
Municipality-BuyYM FE	No	Yes	Yes	Yes	Yes
SaleYM x BuyYM FE	No	Yes	Yes	Yes	Yes
Retired dummy	No	No	Yes	Yes	Yes

Note: The table reports the gender gap in the annualized real estate returns. The sample in columns (1)-(4) consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. The sample in column (5) is restricted to the transactions by non-professional investors. Columns (2)-(5) include controls for property characteristics (*Property char.*) consisting of living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm, as well as municipality-year-month of sale fixed effects, municipality-year-month of buy fixed effects, and year-month buy × year-month sale fixed effects. Columns (3) and (5) include control for annualized renovations, defined in the equation 5, and control for retirement status, where *Retired* is an indicator if a person is older than 64 years old measured at the time of sale. Columns (5) and (4) include control for $Professional$ transactions, which is an indicator for the transaction carried out by a real estate professional as defined in Section 3.2.2. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Summary statistics: listing and execution prices

	Female		Male		Couple		Overall	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Purchase price	1,133,472	883,038	1,158,246	942,170	1,732,964	1,275,465	1,311,787	1,061,739
Selling price	1,629,291	1,141,707	1,668,277	1,223,181	2,347,940	1,640,839	1,846,292	1,365,073
Purchase listing price	1,152,856	734,401	1,180,366	785,485	1,653,204	1,034,698	1,304,652	875,085
Sale listing price	1,453,166	956,627	1,484,154	1,007,955	2,107,362	1,335,740	1,649,133	1,131,080
Premium at purchase, %	11.72	15.52	10.78	15.00	10.02	14.12	10.91	14.97
Premium at sale, %	12.06	14.08	12.01	13.80	10.09	12.60	11.48	13.61
Weeks on the market	3.91	5.77	4.03	6.00	4.31	6.35	4.06	6.02
Observations	46,889		44,533		36,086		127,508	

Note: The table reports summary statistics of listing and execution prices by gender. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors. *Premium at purchase*, % is defined as (*Purchase price/Purchase listing price* − 1)*100. *Premium at sale*, % is defined as (*Selling price/Sale listing price* − 1)*100. *Weeks on the market* is the number of weeks between the listing date and the selling date.

Table 7: Gender gap in listing and execution prices

	Log(sale price) - log(list sale price)		Log(list sale price) - log(buy price)	
	(1)	(2)	(3)	(4)
Female	-1.120***	-0.425***	0.372***	0.417***
	(0.162)	(0.143)	(0.099)	(0.099)
Couple	-1.157***	-0.593***	0.614***	0.651***
	(0.175)	(0.151)	(0.101)	(0.101)
Renovations		0.932***		0.061***
		(0.009)		(0.004)
Observations	123,154	123,154	123,154	123,154
Adjusted R2	0.758	0.811	0.223	0.225
Mean DV Male	34.074	34.074	10.758	10.758
Property char.	Yes	Yes	Yes	Yes
Municipality-SaleYM FE	Yes	Yes	Yes	Yes
Municipality-BuyYM FE	Yes	Yes	Yes	Yes
SaleYM x BuyYM FE	Yes	Yes	Yes	Yes
Retired dummy	Yes	Yes	Yes	Yes

Note: The table reports the gender gap in listing premium at sale (*log(sale price)-log(list sale price)*) and in listing price relative to the purchase price (*log(list sale price)-log(buy price)*). All columns include controls for property characteristics (living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm), a retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale, as well as a municipality-year-month of sale fixed effect, a municipality-year-month of buy fixed effect, and a year-month buy × year-month sale fixed effect. Specifications reported in columns (2) and (4) include control for *Renovations*, defined in equation 3. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors, where real estate professionals are defined in section 3.2.2. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Heterogeneity of gender gap in real estate returns by market tightness

	Non-professionals	
	(1) Annualized return	(2) Annualized return
Female	-0.131	0.113
	(0.092)	(0.076)
Couple	-0.317***	-0.057
	(0.099)	(0.080)
Cold market intensity × Female	-1.370***	-0.510
	(0.510)	(0.405)
Cold market intensity × Couple	1.362**	1.401***
	(0.536)	(0.416)
Annualized renovations		1.258***
		(0.016)
Observations	123,154	123,154
Adjusted R2	0.471	0.656
Mean DV Male	10.853	10.853
SD(Cold market intensity)	.115	.115
Property char.	Yes	Yes
Municipality-SaleYM FE	Yes	Yes
Municipality-BuyYM FE	Yes	Yes
SaleYM x BuyYM FE	Yes	Yes
Retired dummy	Yes	Yes

Note: The table reports heterogeneity of gender gap in real estate returns by market tightness, measured by *Cold market intensity*, which is a share of transactions with the sell price below the list price at county *(län)* level. All columns include controls of property characteristics (living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm), a retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale, as well as a municipality-year-month of sale fixed effect, a municipality-year-month of buy fixed effect, and a year-month buy × year-month sale fixed effect. Specification in column (2) includes control for *Annualized renovation*, as defined in equation 5. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors, where real estate professionals are defined in section 3.2.2. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Heterogeneity of gender gap in listing premia by market tightness

	Non-professionals			
	(1) log(list sale price) - log(buy price)	(2) log(list sale price) - log(buy price)	(3) Log(sale price) - log(list sale price)	(4) Log(sale price) - log(list sale price)
Female	-1.143***	-0.506**	0.576***	0.618***
	(0.251)	(0.224)	(0.155)	(0.155)
Couple	-1.216***	-0.537**	-0.023	0.021
	(0.256)	(0.224)	(0.144)	(0.144)
Cold market intensity × Female	0.165	0.596	-1.495**	-1.468**
	(1.363)	(1.172)	(0.704)	(0.703)
Cold market intensity × Couple	0.420	-0.390	4.537***	4.485***
	(1.378)	(1.174)	(0.680)	(0.679)
Renovations		0.932***		0.061***
		(0.009)		(0.004)
Observations	123,154	123,154	123,154	123,154
Adjusted R2	0.758	0.811	0.224	0.226
Mean DV Male	34.074	34.074	10.758	10.758
SD(Cold market intensity)	.115	.115	.115	.115
Property char.	Yes	Yes	Yes	Yes
Municipality-SaleYM FE	Yes	Yes	Yes	Yes
Municipality-BuyYM FE	Yes	Yes	Yes	Yes
SaleYM x BuyYM FE	Yes	Yes	Yes	Yes
Retired dummy	Yes	Yes	Yes	Yes

Note: The table reports heterogeneity of gender gap in listing premium at sale (*log(sale price)-log(list sale price)*) and in listing price relative to the purchase price (*log(list sale price)-log(buy price)*) by market tightness, measured by *Cold market intensity*, which is a share of transactions with the sell price below the list price at county *(län)* level. All columns include controls of property characteristics (living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm), a retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale, as well as a municipality-year-month of sale fixed effect, a municipality-year-month of buy fixed effect, and a year-month buy × year-month sale fixed effect. Specifications in columns (2) and (4) include control for *Renovations*, defined in equation 3. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors, where real estate professionals are defined in section 3.2.2. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Explaining gender difference in renovations

	Non-professionals				Sibling FE sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.261***	-0.280***	-1.574***	-0.217***	-0.512***	-0.396***	-0.139
	(0.054)	(0.044)	(0.399)	(0.036)	(0.127)	(0.100)	(0.144)
Couple	-0.157***	-0.242***	-1.058**	0.527	-0.463***	1.186	-0.370
	(0.049)	(0.036)	(0.532)	(0.872)	(0.131)	(2.887)	(4.399)
Retired		-0.493***	-0.518***	-0.150*		-1.714***	-1.834**
		(0.068)	(0.070)	(0.086)		(0.484)	(0.830)
Female × HP: 1-2 years			1.102***				
			(0.384)				
Female × HP: 2-4 years			1.352***				
			(0.380)				
Female × HP: > 4 years			1.448***				
			(0.396)				
Observations	123,154	123,154	123,154	122,783	15,724	15,724	15,724
Adjusted R2	0.001	0.304	0.305	0.346	0.002	0.072	0.376
Mean DV Male	1.996	1.996	1.996	1.985	2.373	2.373	2.373
Property char.	No	Yes	Yes	Yes	No	Yes	Yes
Municipality-SaleYM FE	No	Yes	Yes	Yes	No	No	No
Municipality-BuyYM FE	No	Yes	Yes	Yes	No	No	No
SaleYM x BuyYM FE	No	Yes	Yes	Yes	No	No	No
Retired dummy	No	Yes	Yes	Yes	No	Yes	Yes
Interaction with Couples	No	Yes	Yes	Yes	No	Yes	Yes
Socio-demographic controls	No	No	No	Yes	No	Yes	Yes
Holding Period	No	No	Yes	No	No	No	No
Sibling FE	No	No	No	No	No	No	Yes

Note: The table reports the gender gap in *Annualized renovation* as defined in equation 5. Columns (2)-(4) and (6)-(7) include controls for property characteristics (living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm) and the retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale. Columns (2)-(4) include municipality-year-month of sale fixed effects, a municipality-year-month of buy fixed effects, and a year-month buy × year-month sale fixed effects. Columns (4) and (6)-(7) include a set of socio-demographic controls (log of apartment purchase price, log of labor income, renovation education, age at purchase, family size at purchase, indicator if a father or a brother is alive or missing, log of total interest expense, finance experience, indicator if ever divorced, region / country of birth, number of children at purchase, indicator if participates in the stock market, indicator if has other real estate property, indicator if parents are real estate professionals, indicator if parents are boy biased, indicator of ability levels, indicator of high-school grades). Whenever socio-demographic controls are included, they are also interacted with *Couple* dummy (not displayed). The main effect of coefficients are shown in the Appendix Table IA.IX. Column (3) includes controls for holding period. Column (7) includes siblings fixed effects. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors, where real estate professionals are defined in section 3.2.2. The sample is columns (5)-(7) is restricted to non-singleton observations with siblings FEs. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Implications of gender gap in renovations for housing wealth accumulation

	Log(Purchase price)		Log(Purchase price + renovation)		Log(Selling price)	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.001	0.005*	-0.008	-0.003	-0.008	-0.003
	(0.006)	(0.003)	(0.006)	(0.003)	(0.005)	(0.002)
Couple	0.444***	0.096***	0.436***	0.090***	0.349***	0.091***
	(0.006)	(0.003)	(0.006)	(0.003)	(0.005)	(0.003)
Observations	123,154	123,154	123,154	123,154	123,154	123,154
Adjusted R2	0.052	0.826	0.057	0.823	0.051	0.825
Mean DV Male	13.665	13.665	13.736	13.736	14.114	14.114
Property char.	No	Yes	No	Yes	No	Yes
Municipality-SaleYM FE	No	Yes	No	Yes	No	Yes
Municipality-BuyYM FE	No	Yes	No	Yes	No	Yes
SaleYM x BuyYM FE	No	Yes	No	Yes	No	Yes
Retired dummy	No	Yes	No	Yes	No	Yes

Note: The table reports the gender gap in apartment purchase price (with and without renovation expense) and selling price. Columns (2), (4), and (6) include controls for property characteristics (living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm), retirement status (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale, as well as municipality-year-month of sale fixed effects, a municipality-year-month of buy fixed effects, and a year-month buy $\times$ year-month sale fixed effects. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1 and restricted to the transactions by non-professional investors, where real estate professionals are defined in section 3.2.2. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

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Online Appendix to "Why Women Earn Lower Real Estate Returns"

Laurent Bach [19] , Anastasia Girshina [20], Paolo Sodini [21]
and the MiDA Team[22]

IA.A Index construction

We use the 290 municipalities in which Sweden is divided to create local areas (clusters) with enough transactions per year to build local indexes. We employ a max-p-region algorithm to aggregate adjacent municipalities into clusters with at least 25 sales of unique properties per year, and obtain 147 municipality clusters.[1] Figure IA.I shows on a map of Sweden how the 290 municipalities are aggregated into the 147 clusters chosen by the algorithm for index formation purposes.

We build indexes following a standard repeated sales methodology. The index $I_{c,t}$ for cluster c at time t is given by:

$$I_{c,t} = \frac{e^{U_{c,t}}}{e^{U_{c,t_0}}} * 100 \tag{IA.7}$$

where t_0 is 1990, and $U_{c,t}$ are time fixed effects estimated from a repeat-sales regression of all apartments sold in cluster c during our sample period. Specifically, we regress the selling price $P_{j,t}$ in logs of each apartment j sold in cluster c on time fixed effects $U_{c,t}$ and apartment fixed effects F_j:

$$log(P_{j,t}) = a + U_{c,t} + F_j + \epsilon_{j,t} \tag{IA.8}$$

The market index is calculated in the same way but all sales are included in regression (IA.8).

Table IA.I reports key statistics for the market index and the mean and cross sectional dispersion of the same statistics for local indexes. In Figure IA.II and IA.III, we plot the corresponding market and cluster-specific indexes . The apartment market appreciated 11.52% per year in our sample period, with a standard deviation of 6.1%. The second and third rows of table IA.I report a substantial cross sectional dispersion in municipality cluster indexes as can be clearly seen in Figure IA.III.

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[1]We use the the GeoDa open-source implementation of the max-p-region algorithm available at https://geodacenter.github.io (see Duque et al. (2012)). The shape files of all municipalities in Sweden are provided by Lantmäteriet.

Figure IA.I: Geographical distribution of clusters in Sweden

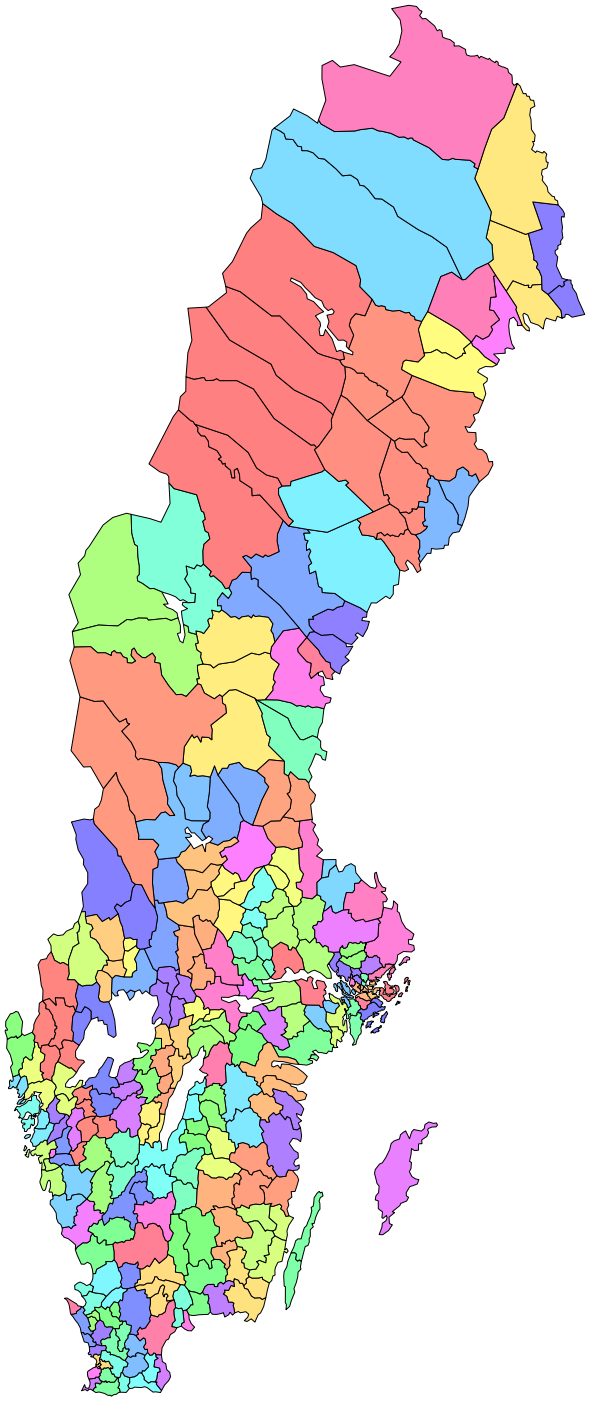

Figure IA.II: Market index

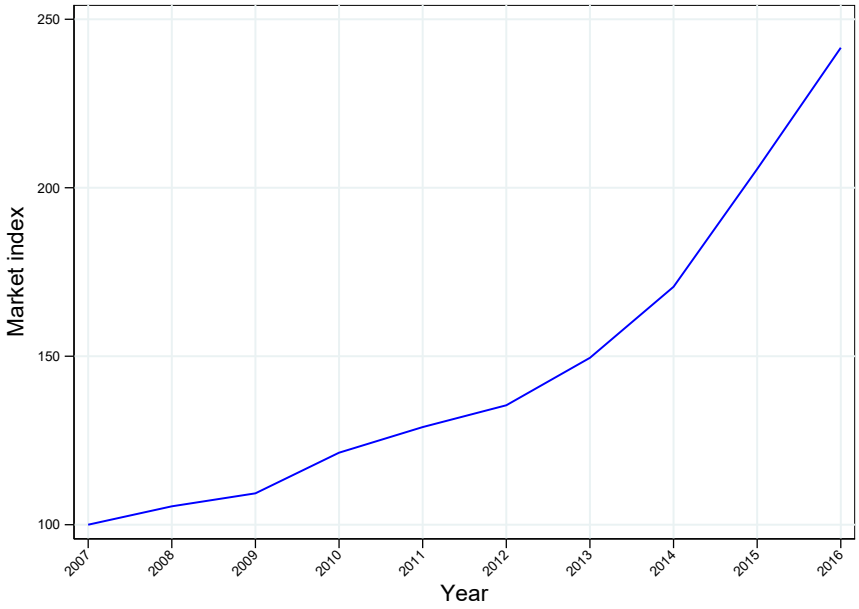

Figure IA.III: Cluster indexes

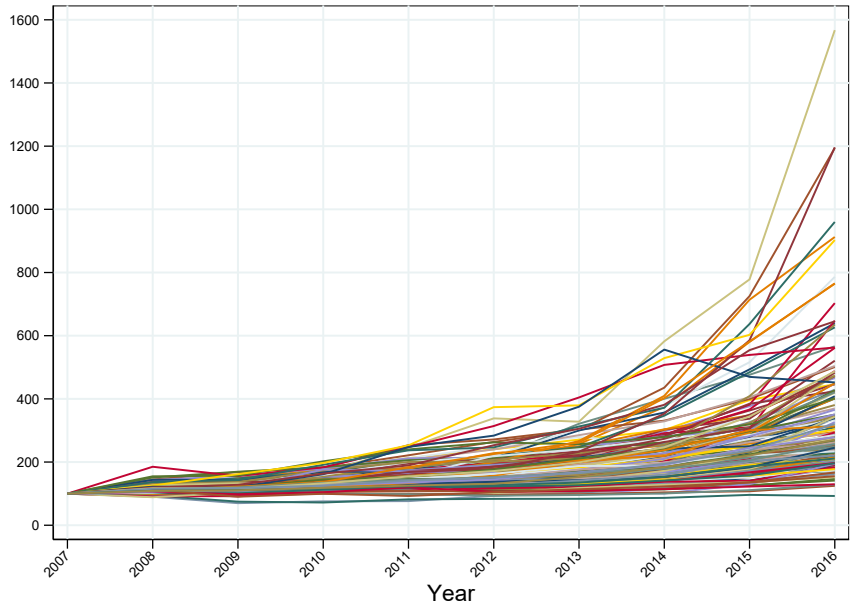

Figure IA.IV: Geographical distribution of counties in Sweden by market tightness

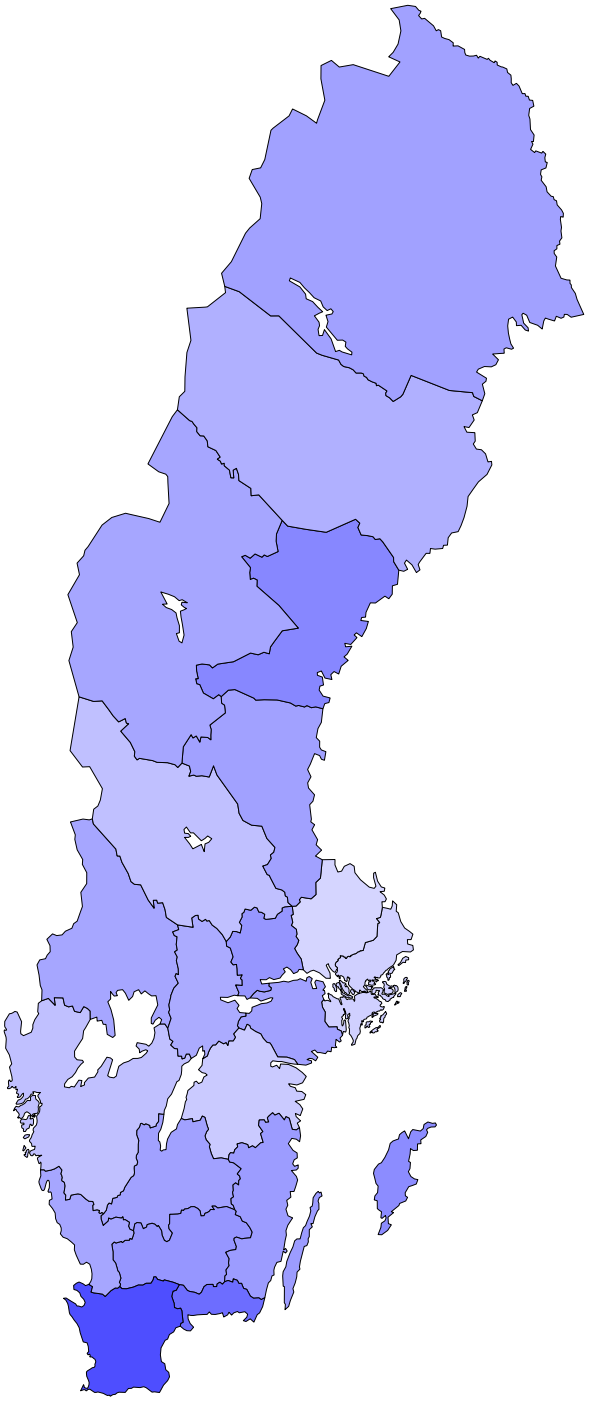

Table IA.I: Summary Statistics: Indexes

	Mean	Median	St. dev.	p25.	p75
Market return, %	11.52	10.46	6.11	5.31	18.44
Cluster returns (mean), %	14.56	13.66	11.30	6.04	23.00
Cluster returns (sd), %	5.18	5.72	4.96	4.51	8.54

Note: The table reports distribution of market and cluster-specific indexes. The index methodology is outlined in section IA.A.

Table IA.II: Annualizing returns and renovations

	Return	Annualized Return
	(1)	(2)
Renovation	1.018***	
	(0.008)	
Annualized Renovation		1.328***
		(0.019)
Observations	170,766	170,766
Adjusted R2	0.821	0.692
Mean DV	45.99	12.502
Municipality-SaleYM FE	Yes	Yes
Municipality-BuyYM FE	Yes	Yes
SaleYM x BuyYM FE	Yes	Yes

Note: The table reports the regressions of return and annualized return on renovation and annualized renovation. The renovation (*Renovation*) is defined in equation 3 and the annualized renovation (*Annualized Renovation*) is defined in equation 5. Both columns include a municipality-year-month of sale fixed effects, a municipality-year-month of buy fixed effects, and a year-month buy $\times$ year-month sale fixed effects. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.III: Gender gap in real estate returns: renovation timing at sale

	Full sample						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-2.176***	-2.202***	-1.167***	-0.455***	-0.613***	-1.078***	-0.009
	(0.199)	(0.202)	(0.177)	(0.131)	(0.151)	(0.158)	(0.110)
Couple	-3.598***	-3.100***	-0.857***	-0.242**	-0.804***	-0.808***	-0.176*
	(0.269)	(0.189)	(0.117)	(0.110)	(0.117)	(0.107)	(0.102)
Annualized renovations (sale)				1.455***			1.438***
				(0.038)			(0.038)
Professional					3.788***		2.659***
					(0.200)		(0.213)
Retired						-1.957***	-1.421***
						(0.300)	(0.249)
Observations	160,927	160,927	160,927	160,927	160,927	160,927	160,927
Adjusted R2	0.007	0.021	0.469	0.604	0.475	0.470	0.608
Mean DV Male	14.116	14.116	14.116	14.116	14.116	14.116	14.116
Property char.	No	Yes	Yes	Yes	Yes	Yes	Yes
Municipality-SaleYM FE	No	No	Yes	Yes	Yes	Yes	Yes
Municipality-BuyYM FE	No	No	Yes	Yes	Yes	Yes	Yes
SaleYM x BuyYM FE	No	No	Yes	Yes	Yes	Yes	Yes
Retired dummy	No	No	No	No	Yes	Yes	Yes

Note: The table reports the gender gap in the annualized real estate returns. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Columns (2)-(7) include controls for property characteristics (*Property char.*) consisting of living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm. Columns (3)-(7) include municipality-year-month of sale fixed effects, municipality-year-month of buy fixed effects, and year-month buy × year-month sale fixed effects. Columns (3) and (7) include control for annualized renovations assumed to be undertaken at sale, as defined in a footnote of section 2.2. Columns (5) and (7) include control for $Professional$ transactions, which is an indicator for the transaction carried out by a real estate professional as defined in Section 3.2.2. Columns (6) and (7) include retirement dummy (*Retired*), which is an indicator if a person is older than 64 years old measured at the time of sale. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.IV: Gender gap in real estate returns: location, timing, and renovations

	Full sample							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-2.202***	-2.045***	-1.779***	-1.380***	-1.167***	-0.410***	-0.753***	0.192**
	(0.202)	(0.170)	(0.162)	(0.223)	(0.177)	(0.091)	(0.126)	(0.085)
Couple	-3.100***	-2.754***	-2.311***	-1.214***	-0.857***	-1.088***	-2.833***	-1.011***
	(0.189)	(0.188)	(0.166)	(0.146)	(0.117)	(0.148)	(0.202)	(0.154)
Annualized renovations						1.647***		1.614***
						(0.030)		(0.027)
Professional							9.084***	3.996***
							(0.424)	(0.410)
Observations	160,927	160,927	160,927	160,927	160,927	160,927	160,927	160,927
Adjusted R2	0.021	0.055	0.267	0.365	0.469	0.525	0.062	0.533
Mean DV Male	14.116	14.116	14.116	14.116	14.116	14.116	14.116	14.116
Property char.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	No	Yes	No	No	No	No	No	No
Municipality-SaleYM FE	No	No	Yes	No	Yes	No	No	No
Municipality-BuyYM FE	No	No	Yes	No	Yes	No	No	No
SaleYM x BuyYM FE	No	No	No	Yes	Yes	No	No	No

Note: The table reports the gender gap in the annualized returns. All columns include property characteristics (*Property char.*) consisting of living area, number of rooms, apartment floor, building year, dummy for an elevator, and monthly fee per sqm. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.V: Summary statistics of sub-groups of real estate professionals

	Never Lived in the apartment	Construction Sector	Construction Worker	Real estate agent
Female	0.32	0.05	0.03	0.25
Male	0.47	0.59	0.60	0.33
Couple	0.21	0.36	0.37	0.42
Annualized return	27.49	16.08	15.30	17.55
Renovation (=1 if renovated)	0.66	0.79	0.78	0.85
Annualized renovation	7.34	4.45	4.09	5.56
Holding period (years)	3.24	3.78	4.05	3.31
Observations	15,647	12,723	13,657	885

Note: The table reports summary statistics of the sub-groups of real estate professionals. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.

Table IA.VI: Gender gap by renovations component, unconditional

	2007-2012			>=2013			
	(1) Log(Renovation cost)	(2) log(Major renovations)	(3) log(minor renovations)	(4) Log(Renovation cost)	(5) log(Major renovations)	(6) log(minor renovations)	(7) log(rot)
Female	-0.204***	-0.288***	0.025	-0.121***	-0.185***	-0.043	0.161***
	(0.054)	(0.046)	(0.054)	(0.041)	(0.038)	(0.044)	(0.038)
Couple	1.096***	0.746***	0.745***	0.927***	0.721***	0.720***	0.266***
	(0.055)	(0.052)	(0.057)	(0.043)	(0.045)	(0.049)	(0.042)
Constant	6.767***	2.469***	5.313***	7.779***	2.500***	5.708***	3.363***
	(0.039)	(0.034)	(0.039)	(0.029)	(0.028)	(0.032)	(0.027)
Observations	52,879	52,879	52,879	74,629	74,629	74,629	74,629
Adjusted R2	0.012	0.009	0.004	0.009	0.006	0.004	0.001
Mean DV Male	6.767	2.469	5.313	7.779	2.5	5.708	3.363
Property char.	No	No	No	No	No	No	No
Municipality-SaleYM FE	No	No	No	No	No	No	No
Municipality-BuyYM FE	No	No	No	No	No	No	No
SaleYM x BuyYM FE	No	No	No	No	No	No	No
Retired dummy	No	No	No	No	No	No	No

Note: The table reports the gender gap in renovations components. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.VII: Gender gap by renovations component, conditional on log(renovation cost)>0

	2007-2012			>=2013			
	(1) Log(Renovation cost)	(2) log(Major renovations)	(3) log(minor renovations)	(4) Log(Renovation cost)	(5) log(Major renovations)	(6) log(minor renovations)	(7) log(rot)
Female	-0.090***	-0.373***	0.225***	-0.121***	-0.237***	-0.027	0.237***
	(0.015)	(0.067)	(0.053)	(0.015)	(0.049)	(0.046)	(0.046)
Couple	0.299***	0.587***	0.075	0.286***	0.617***	0.259***	-0.043
	(0.015)	(0.070)	(0.056)	(0.016)	(0.055)	(0.049)	(0.049)
Constant	10.558***	3.852***	8.290***	10.528***	3.384***	7.725***	4.552***
	(0.011)	(0.049)	(0.039)	(0.011)	(0.036)	(0.033)	(0.033)
Observations	34,999	34,999	34,999	56,357	56,357	56,357	56,357
Adjusted R2	0.020	0.006	0.000	0.012	0.005	0.001	0.001
Mean DV Male	10.558	3.852	8.290	10.528	3.384	7.725	4.552
Property char.	No	No	No	No	No	No	No
Municipality-SaleYM FE	No	No	No	No	No	No	No
Municipality-BuyYM FE	No	No	No	No	No	No	No
SaleYM x BuyYM FE	No	No	No	No	No	No	No
Retired dummy	No	No	No	No	No	No	No

Note: The table reports the gender gap in renovations components, conditional on log(renovation cost)>0. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.VIII: Heterogeneity of gender gap by the amount of renovations

	Full sample		
	(1)	(2)	(3)
Female	0.117	0.238**	0.095
	(0.072)	(0.120)	(0.072)
Couple	-0.016	0.065	-0.013
	(0.074)	(0.114)	(0.074)
Professional	2.149***	2.149***	1.684***
	(0.088)	(0.088)	(0.117)
Annualized renovations	1.327***	1.343***	1.198***
	(0.021)	(0.023)	(0.020)
Annualized renovations × Female		-0.051	
		(0.053)	
Annualized renovations × Couple		-0.031	
		(0.044)	
Professional × Annualized renovations			0.175***
			(0.031)
Observations	160,927	160,927	160,927
Adjusted R2	0.698	0.698	0.699
Mean DV Male	14.116	14.116	14.116
Property char.	Yes	Yes	Yes
Municipality-SaleYM FE	Yes	Yes	Yes
Municipality-BuyYM FE	Yes	Yes	Yes
SaleYM x BuyYM FE	Yes	Yes	Yes
Retired dummy	Yes	Yes	Yes

Note: The table reports the heterogeneous effect of gender annualized real estate returns by the amount of renovations. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.IX: Explaining annualized adjusted renovation

	Non-professionals																					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Female	-0.252***	-0.321***	-0.265***	-0.232***	-0.253***	-0.249***	-0.238***	-0.262***	-0.293***	-0.266***	-0.251***	-0.240***	-0.299***	-0.227***	-0.315***	-0.260***	-0.267***	-0.251***	-0.264***	-0.325***	-0.230***	-0.217***
	(0.052)	(0.058)	(0.039)	(0.048)	(0.045)	(0.051)	(0.051)	(0.048)	(0.056)	(0.052)	(0.053)	(0.050)	(0.052)	(0.048)	(0.053)	(0.054)	(0.052)	(0.052)	(0.053)	(0.056)	(0.050)	(0.036)
Couple	-0.145***	-0.357***	0.016	-0.177***	2.932**	0.388*	-0.149***	-0.413***	-0.190***	0.021	0.230	-0.061	-0.132***	-0.093*	-0.241***	-0.087	-0.140**	-0.165***	-0.165***	0.287	0.015	0.527
	(0.049)	(0.048)	(0.037)	(0.049)	(1.363)	(0.208)	(0.047)	(0.093)	(0.054)	(0.162)	(0.161)	(0.049)	(0.047)	(0.052)	(0.047)	(0.060)	(0.061)	(0.052)	(0.048)	(0.183)	(0.068)	(0.872)
Retired				-0.380***																		-0.150*
				(0.127)																		(0.086)
Log of purchase price					-1.161***																	-2.369***
					(0.158)																	(0.341)
Log of labor income						0.011																0.009
						(0.013)																(0.013)
Renovation Education							0.555***															0.282**
							(0.142)															(0.139)
Age at purchase								0.002														-0.001
								(0.003)														(0.003)
Family size at purchase									0.276***													0.070**
									(0.033)													(0.031)
Has father or brother alive										-0.116												0.064
										(0.078)												(0.082)
Missing has Father/Brother										0.221**												0.032
										(0.096)												(0.109)
Log(Total Interest Expense)											0.005											0.050***
											(0.010)											(0.007)
Finance experience ever												-0.367***										0.117***
												(0.069)										(0.043)
Ever divorced													0.467***									0.041
													(0.056)									(0.043)
Birth country: Nordics without Sweden														0.070								0.037
														(0.101)								(0.100)
Birth country: EU28 without Nordics														0.512**								0.404**
														(0.247)								(0.179)
Birth country: Other														1.289***								0.712***
														(0.217)								(0.134)
Number of children at purchase															0.203***							-0.070***
															(0.022)							(0.024)
Participate in stock markets, purchase																-0.128**						0.278***
																(0.060)						(0.071)
Equal to 1 if owner of non-apartment RE during holding period																	0.347***					0.157***
																	(0.067)					(0.045)
Professional Parent																		0.240***				0.017
																		(0.065)				(0.047)
Boy biased parents: yes																			-0.084*			0.001
																			(0.043)			(0.034)
Boy biased parents: unknown																			0.332***			-0.330***
																			(0.091)			(0.109)
Imputed gfactor 4-6																				-0.708***		-0.100
																				(0.099)		(0.067)
Imputed gfactor 7-9																				-1.142***		-0.117
																				(0.123)		(0.082)
Missing imputed gfactor																				-0.289***		-0.114
																				(0.097)		(0.123)
High-school grade, low																					-0.067	-0.150*
																					(0.056)	(0.090)
High-school grade, medium																					-0.389***	-0.171*
																					(0.060)	(0.089)
High-school grade, high																					-0.757***	-0.202**
																					(0.074)	(0.082)
Observations	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783	122,783
Adjusted R2	0.001	0.028	0.286	0.001	0.058	0.001	0.001	0.001	0.004	0.001	0.001	0.002	0.002	0.006	0.004	0.001	0.002	0.001	0.001	0.007	0.006	0.346
Mean DV Male	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985	1.985
Property char.	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Municipality-SaleYM FE	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Municipality-BuyYM FE	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
SaleYM x BuyYM FE	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Retired dummy	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Interaction with Couples	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports the effect of different characteristics on the annualized renovations. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.X: Role of location and timing for the gender gap in housing wealth accumulation

	Log(Purchase price)					Log(Purchase price + renovation)					Log(Selling price)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Female	-0.001	0.016***	0.004	0.018***	0.005*	-0.008	0.007	-0.003	0.010*	-0.003	-0.008	0.003	-0.005	-0.001	-0.003
	(0.006)	(0.005)	(0.004)	(0.006)	(0.003)	(0.006)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.002)
Couple	0.444***	0.242***	0.325***	0.452***	0.096***	0.436***	0.223***	0.326***	0.444***	0.090***	0.349***	0.144***	0.301***	0.352***	0.091***
	(0.006)	(0.005)	(0.004)	(0.006)	(0.003)	(0.006)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)
Observations	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154	123,154
Adjusted R2	0.052	0.322	0.698	0.065	0.826	0.057	0.338	0.681	0.069	0.823	0.051	0.353	0.671	0.053	0.825
Mean DV Male	13.665	13.665	13.665	13.665	13.665	13.736	13.736	13.736	13.736	13.736	14.114	14.114	14.114	14.114	14.114
Property char.	No	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No	Yes
Municipality-SaleYM FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Municipality-BuyYM FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes
SaleYM x BuyYM FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Retired dummy	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No	No	Yes	Yes

Note: The table reports the effect of different fixed effects on the gender gap in housing wealth accumulation. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1. Standard errors are heteroscedasticity robust and clustered at the cluster level. Significance levels are denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table IA.XI: Summary statistics of renovations by holding period

	Renovations, SEK		Adjusted renovations		Annualized adjusted renovations		
	Mean	SD	Mean	SD	Mean	SD	Observations
HP: <1 year	71,468	137,467	6.17	11.70	11.90	24.37	10,771
HP: 1-2 years	52,215	104,482	4.76	9.93	3.21	6.76	25,225
HP: 2-4 years	57,612	130,011	5.66	10.70	1.95	3.72	53,383
HP: >4 years	70,113	130,321	10.01	19.29	1.45	2.55	71,548

Note: The table reports the mean and standard deviation of the total renovation costs in SEK, the adjusted renovation cost $log(1+\frac{c_{j,t}}{P_{j,t}})$, and the annualized adjusted renovation cost by holding period. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.

Table IA.XII: Holding period by gender and professional

	Overall	Professional	Non-professional
Male	4.38	3.73	4.63
Female	4.55	3.71	4.66
Couple	4.06	3.62	4.18

Note: The table reports the mean holding period in years by gender and real estate professional category. The sample consists of apartment repeat-sales in Sweden in the period 2007-2016, as described in Section 2.1.