

# The Gender Gap in Housing Returns

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# Housing wealth is the dominant form of savings for US households

Housing differs from bank deposits, bonds, and stocks

- Illiquid
- Heterogeneous asset that delivers consumption flows
- Prices determined through bilateral negotiation

Motivated by research showing gender differences in ...

- Financial sophistication and risk tolerance (Sunden and Surette 1998)
- Negotiation (Ayres 1990; Babcock and Laschever 2009; Exley et al. 2018)
- Competitiveness and preferences (Sapienza et al. 2009; Reuben et al. 2015)

We investigate how men and women differ in their financial returns on housing investment

## Data on 53M US housing transactions reveals ...

Women earn 1 percentage point (pp) lower annualized unlevered returns than men

- Gender gap in returns increases to 5.7pp after accounting for **leverage**
- Couples also earn lower returns, but outperform women after adjusting for timing

Using repeat sales, women buy the same property for 2% more and sell for 2% less

Sources of the gender gap

- Location and timing of transactions
- Choice of list price
- Negotiated discount relative to the list price

Gender differences in property risk, maintenance investment, and preferences over housing characteristics appear to be less important factors

# Implications

Complements research on gender differences in stock market participation / performance

- Important to study housing, which is a larger proportion of savings
- Personal preferences and negotiation matter less for stock market returns

Complements literature on gender differences in negotiation in labor and auto markets

- Housing is likely to be the largest negotiated purchase
- Unlike labor market negotiations, little risk of future interaction
- However, we don't seek to disentangle negotiation ability from preferences
  - Women may derive greater utility from getting a particular house or having a fast or non-confrontational negotiation process

Differences in housing returns are large and contribute to the gender gap in wealth

# Limited existing evidence on gender and housing

Harding et al. (2003)

- Data from the American Housing Survey
- Structural estimation of how bargaining power varies with demographics

Andersen et al. (2018)

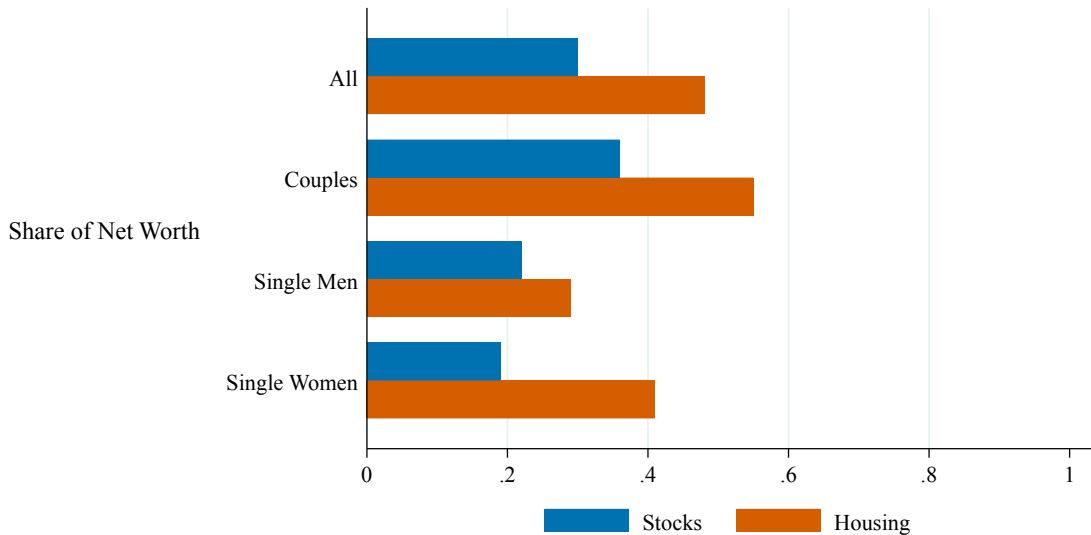
- Also focused on bargaining power and negotiation
- Insignificant gender gap in transaction prices for repeat sales *in Denmark*

We care about the gender gap in total housing returns, including non-bargaining channels

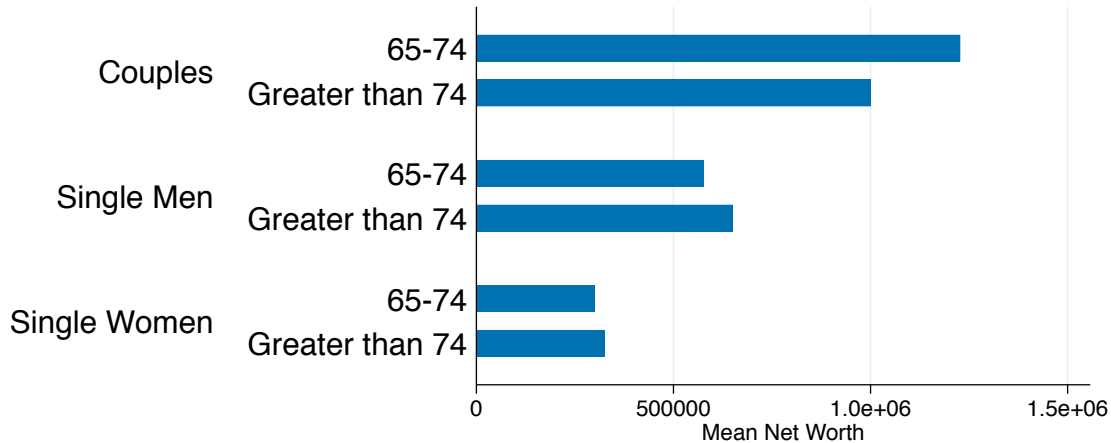
- Show women earn lower return due to market timing, selection of listing price
- First to use listing prices to isolate the negotiated discount
- Large US gender gap relative to Denmark suggests culture and environment matter

# Background on housing and wealth

# Stock market vs. housing wealth share

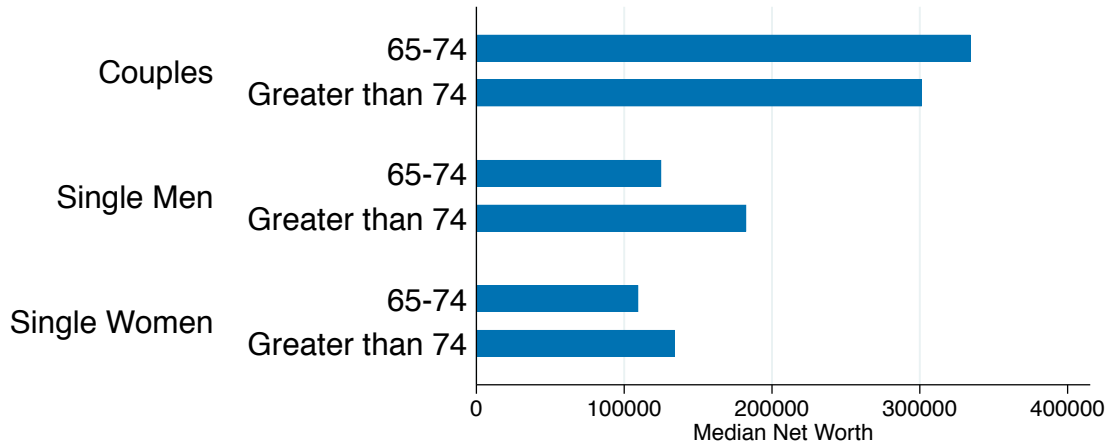


## Mean wealth at retirement





# Median wealth at retirement



# Measurement and data

# Data

## Corelogic county deed records

- Restrict to arms-length transactions, exclude refinancings
- Sale price, property address, names on both sides of transaction
- 53M obs, most US states, 1991-2017

## Linked to MLS property listings (20M obs)

- Listing date, list price, close date, sale price, listing agent
- Property features, e.g. number bedrooms, upgrades, age of house

## Supplement with data from Census and American Housing Survey

- Demographics

# Identification of gender and relationships

Deed records contain full names of buyers and sellers

- Identify number of parties on each side of the transaction
- Measure probability that first name is male or female
  - Following Chari and Goldsmith-Pinkham 2019; Tang et al. 2011
- Assign gender for names with probability  $\geq 95\%$ , else treat as unidentified gender

Categorization

- Single female: one person, identified female
- Single male: one person, identified male
- Couple: two people with identified gender
- Other: everybody else (including unidentified gender and institutions)

# Measuring unlevered housing returns

Property  $i$  bought in year  $b$  for  $P_{ib}$  and sold in year  $s$  for  $P_{is}$

- Restrict to identified female, male, and couples
- Name, gender, and family structure of buyer in  $b$  must match seller in  $s$
- Restrict to holding length  $> 3$  months
- 9.4M obs after these filters

Annualized unlevered return

$$r_{is} = \left( \frac{P_{is} - P_{ib}}{P_{ib}} \right)^{\frac{1}{(s-b)}} - 1$$

# Measuring levered returns

## Real return on housing is typically a levered return

- Majority of US homeowners buy homes using debt, with  $LTV \geq 80\%$
- Initial leverage persists because amortization schedules mainly pay interest upfront

Downpayment  $D_{ib}$  and principal paydowns  $\{W_{i\tau}\}_{\tau=b}^s$

NPV of equity in year  $b$ :  $\text{Equity}_{ib} \approx D_{ib} + \sum_{\tau=b}^s W_{i\tau} / (1 + \rho_{ib})^{\tau-b}$

- $\rho_{ib}$  is interest on a 30-year fixed mortgage

Equity in year  $s$ :  $\text{Equity}_{is} = \max\{0, P_{is} - \text{Mortgage}_{is}\}$

Annualized levered return :

$$r_{is}^{\text{lev}} = \left( \frac{\text{Equity}_{is} - \text{Equity}_{ib}}{\text{Equity}_{ib}} \right)^{\frac{1}{(s-b)}} - 1$$

# Baseline empirical results

# Estimation approach

## Baseline return regression

$$r_{is} = \text{Female}_{is}\beta_1 + \text{Couple}_{is}\beta_2 + X_{is}\tau + \epsilon_{is}$$

- $\beta_1$  and  $\beta_2$  capture difference in returns compared to  $\text{Male}_{is}$
- $X_{is}$  are controls such as five-digit zipcode  $\times$  sale-year-month FE
- Standard errors clustered by zipcode

## Examine other outcomes such as transaction price

$$Y_{it} = \text{Female}_{it}\beta_1 + \text{Couple}_{it}\beta_2 + \text{Other}_{it}\beta_3 + X_{it}\tau + \epsilon_{it}$$

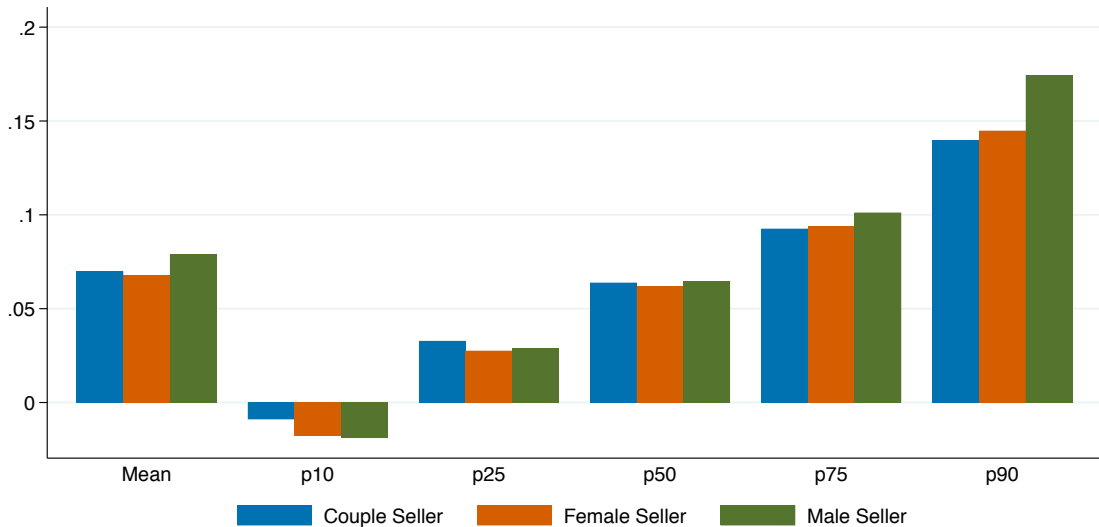
- Exploit repeat sales:  $X_{it}$  includes property FE
- Include other transactions outside the returns sample to better estimate property FE



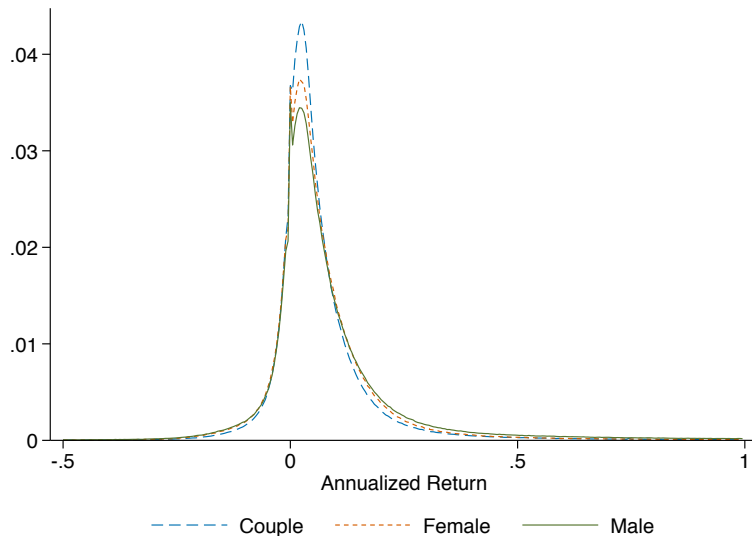
## Housing returns: unlevered

	Unlevered Ann Return		
	(1)	(2)	(3)
Single Female	-0.016*** (0.000)	-0.013*** (0.000)	-0.011*** (0.000)
Couple	-0.020*** (0.000)	-0.012*** (0.000)	-0.007*** (0.000)
Holding Length			-0.006*** (0.000)
Zip-Year-Month FE	No	Yes	Yes
R-squared	0.005	0.354	0.379
Observations	9,351,419	9,351,419	9,351,419

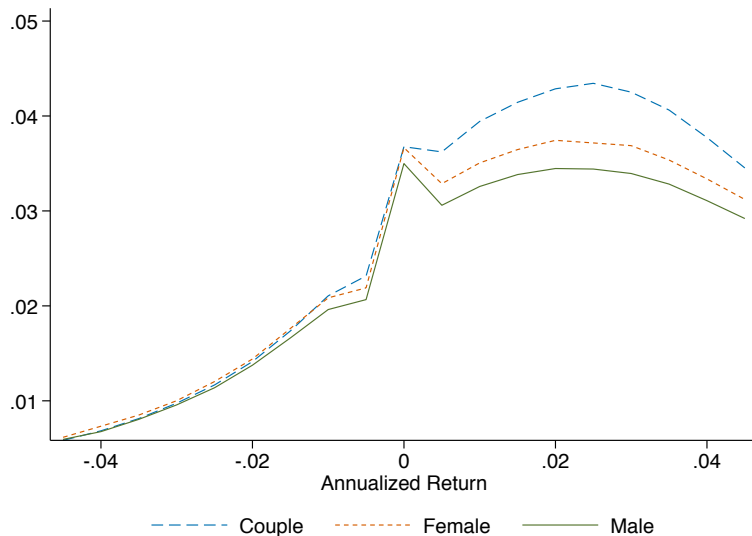
## Annualized unlevered returns by gender



# Density of unlevered returns by gender



## Suggestive evidence of the disposition effect

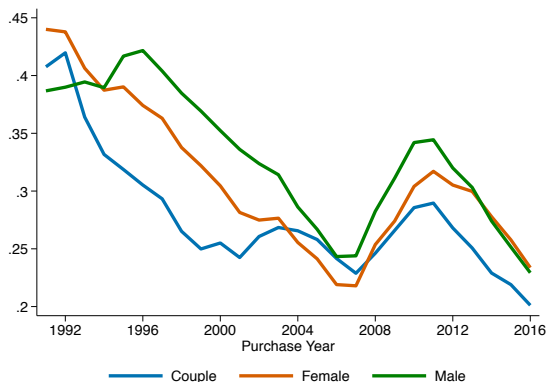


# Real return is likely to be levered return

## LTV conditional on mortgage



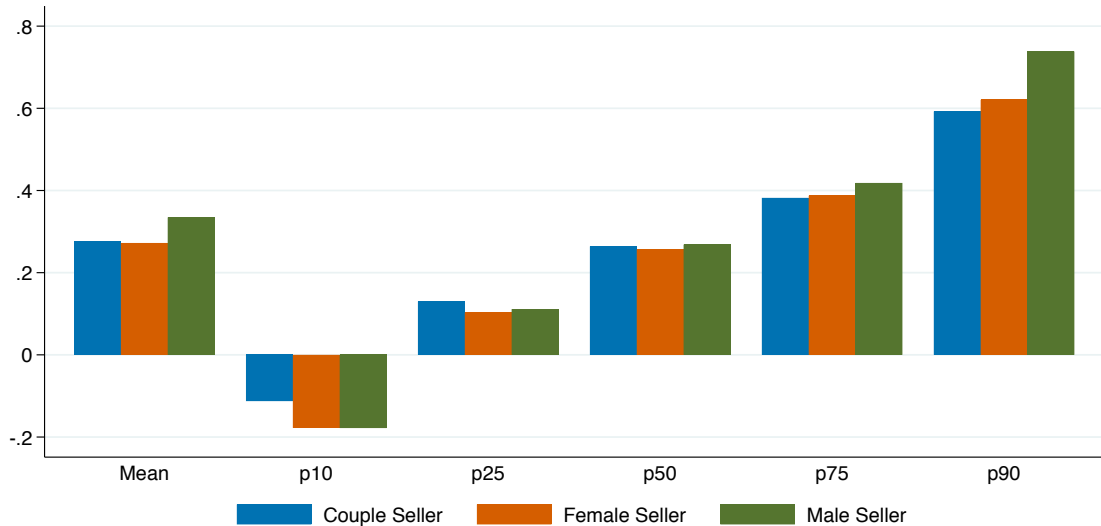
## Fraction missing mortgage data



## Housing returns: levered

	Lev Ann Ret (missing=0%)	Lev Ann Ret (missing=80%)	Lev Ann Ret (LTV=80%)
	(1)	(2)	(3)
Single Female	-0.033*** (0.001)	-0.056*** (0.001)	-0.057*** (0.001)
Couple	-0.032*** (0.001)	-0.055*** (0.001)	-0.043*** (0.001)
Holding Length	-0.035*** (0.000)	-0.047*** (0.000)	-0.037*** (0.000)
Zip-Year-Month FE	Yes	Yes	Yes
R-squared	0.349	0.346	0.330
Observations	9,351,419	9,351,419	9,351,419

## Annualized levered returns by gender - LTV of 80



# Heterogeneity and timing



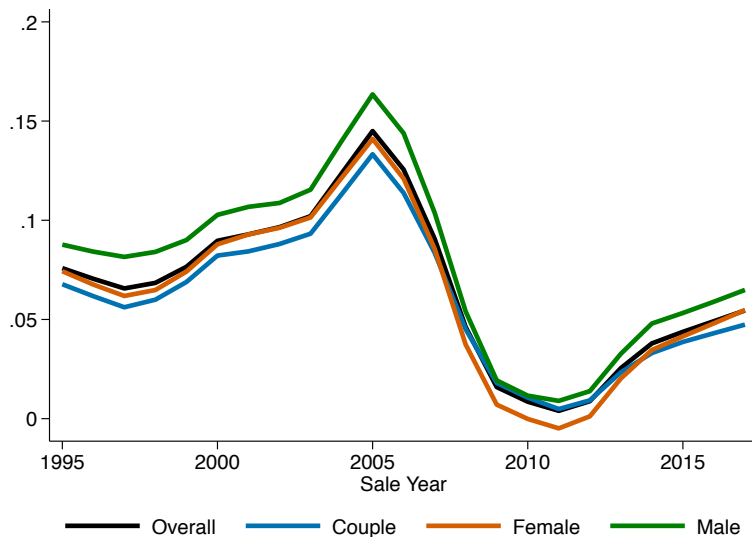
## Gender gap by zip-level demographics: quartile averages

Male - Female Unlevered Ann Return	Quartile 1	Quartile 2	Quartile 3	Quartile 4
	(1)	(2)	(3)	(4)
Frac Black	0.0101	0.0102	0.0105	0.0140
Frac HS Education or Less	0.0089	0.0100	0.0118	0.0119
Frac 60+	0.0065	0.0091	0.0130	0.0127
Frac Single Female	0.0089	0.0107	0.0100	0.0151
Median Family Income	0.0114	0.0114	0.0103	0.0103
House Price	0.0146	0.0103	0.0094	0.0063

## Gender gap by zip-level demographics: regressions

	Male - Female Unlevered Ann Return	Male - Female Levered Ann Return
	(1)	(2)
Frac Black	0.004 (0.006)	0.019 (0.028)
Frac HS education or less	0.024*** (0.009)	0.089** (0.043)
Frac 60+	0.025*** (0.009)	0.133*** (0.047)
Frac Single Female	0.038*** (0.012)	0.188*** (0.057)
Log Median Family Income	0.011*** (0.003)	0.052*** (0.014)
R-squared	0.003	0.003
Observations	14,310	14,310

# Unlevered annualized returns over time



- Mean return by *sale* year varies with the business cycle
- Large gender gap even in recent years

## Unlevered returns: market timing

	Unlevered Ann Return				
	(1)	(2)	(3)	(4)	(5)
Single Female	-0.016*** (0.000)	-0.012*** (0.000)	-0.011*** (0.000)	-0.010*** (0.000)	-0.009*** (0.000)
Couple	-0.020*** (0.000)	-0.014*** (0.000)	-0.007*** (0.000)	-0.007*** (0.000)	-0.004*** (0.000)
Holding Length		-0.008*** (0.000)	-0.006*** (0.000)	-0.001 (0.001)	
Zip-SaleYM FE	No	No	Yes	Yes	Yes
Zip-BuyYM FE	No	No	No	Yes	Yes
SaleYM FE x BuyYM FE	No	No	No	No	Yes
R-squared	0.005	0.069	0.379	0.534	0.592
Observations	9,351,419	9,351,419	9,351,419	9,351,419	9,351,419

# Gender gap in execution prices

## Transaction price

	Log(Purchase Price)		Log(Sale Price)	
	(1)	(2)	(3)	(4)
Single Female	0.013*** (0.001)	0.018*** (0.001)	-0.032*** (0.001)	-0.027*** (0.001)
Couple	0.023*** (0.002)	0.029*** (0.001)	0.007*** (0.001)	0.014*** (0.001)
Other	0.085*** (0.005)	0.015*** (0.003)	-0.064*** (0.002)	-0.054*** (0.001)
Property FE	Yes	Yes	Yes	Yes
Year-Month FE	Yes	No	Yes	No
Zip-Year-Month FE	No	Yes	No	Yes
R-squared	0.794	0.886	0.793	0.887
Observations	52,883,866	52,883,866	52,883,866	52,883,866

# Transaction price by buyer-seller gender



- Base group:  
male buyer - male seller
- Female sellers sell for less  
→ More so to men
- Male sellers sell for more  
→ More so to women

## List price

	Log(Purchase List Price)		Log(Sale List Price)	
	(1)	(2)	(3)	(4)
Single Female	0.035*** (0.001)	0.033*** (0.001)	-0.019*** (0.001)	-0.015*** (0.001)
Couple	0.017*** (0.001)	0.015*** (0.001)	-0.025*** (0.002)	0.002** (0.001)
Other	-0.076*** (0.002)	-0.060*** (0.002)	-0.164*** (0.004)	-0.093*** (0.002)
Property FE	Yes	Yes	Yes	Yes
Year-Month FE	Yes	No	Yes	No
Zip-Year-Month FE	No	Yes	No	Yes
R-squared	0.784	0.842	0.786	0.842
Observations	10,984,588	10,984,588	10,984,588	10,984,588

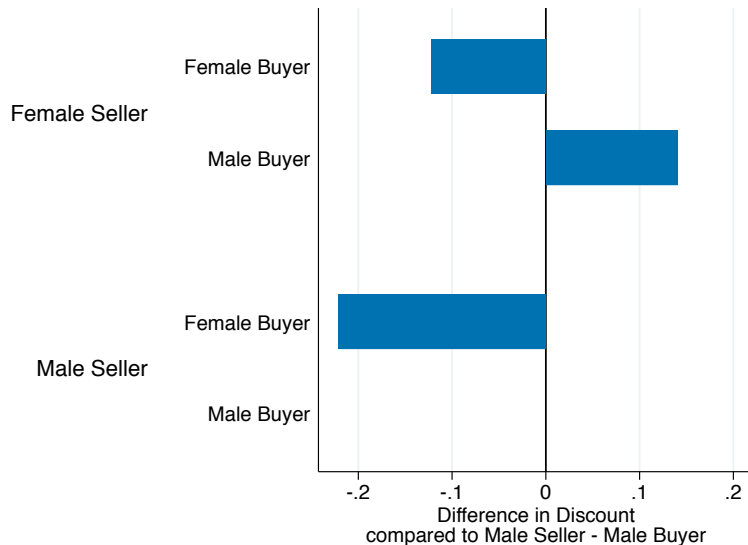


## Discount relative to listing price

	Purchase Discount		Sale Discount	
	(1)	(2)	(3)	(4)
Single Female	-0.283*** (0.007)	-0.260*** (0.005)	0.146*** (0.007)	0.107*** (0.005)
Couple	-0.141*** (0.013)	-0.059*** (0.005)	-0.350*** (0.013)	-0.190*** (0.005)
Other	0.452*** (0.012)	0.475*** (0.007)	0.205*** (0.018)	0.167*** (0.011)
Zip-Year-Month FE	No	Yes	No	Yes
R-squared	0.003	0.210	0.002	0.209
Observations	20,043,064	20,043,064	20,043,064	20,043,064

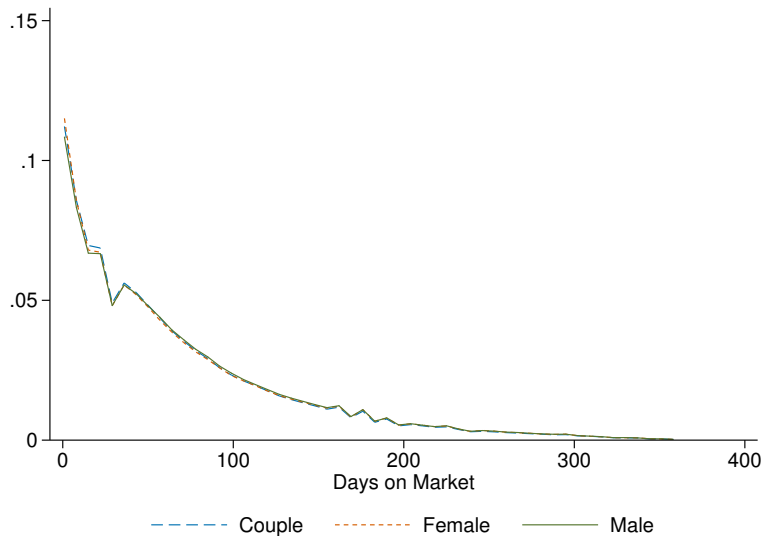
- $\text{Discount} = (\text{list price} - \text{transaction price}) / \text{list price} \times 100$
- Larger discount benefits the buyer and hurts the seller

# Discount by buyer-seller gender



- Base group: male buyer - male seller
- Female sellers give larger discount to men
- Male sellers give smaller discount to women

# Distribution of sale days on market



- Female sellers list lower and offer bigger discounts
- Sell approximately 3% faster

# Other potential channels

## Other potential channels

- Men may buy homes with characteristics associated with higher returns
  - Higher returns could compensate for higher risk
- Men may be more likely to investment in upgrades or maintenance
- Women may be older, have more children, be less educated, etc.

Explore these channels...

- Property characteristics from matched MLS listings data
- Demographic data from American Housing Survey
- Variation by holding length and market tightness

# Property characteristics

- Variation in location and timing accounts for nearly half of the gender gap
- Additional controls for property characteristics, upgrades, list agent popularity do not have a large impact

	Unlevered Ann Return			
	(1)	(2)	(3)	(4)
Single Female	-0.010*** (0.000)	-0.010*** (0.000)	-0.006*** (0.000)	-0.006*** (0.000)
Couple	-0.018*** (0.001)	-0.017*** (0.001)	-0.005*** (0.000)	-0.004*** (0.000)
Sale Discount		-0.003*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)
Purchase Discount		0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
Log(Age of Unit)				0.010*** (0.000)
Foreclosure				-0.002 (0.003)
Garage				-0.005*** (0.001)
Pool				-0.003*** (0.000)
Cooling				-0.003*** (0.001)
Fireplace				-0.004*** (0.000)
Basement				-0.001 (0.001)
Waterfront				-0.001* (0.001)
Short Sale				-0.046*** (0.001)
Bathrooms				0.000 (0.001)
Log(Sq Ft)				-0.005*** (0.001)
Bedrooms				0.002*** (0.000)
Log(List Agent Popularity)				-0.001*** (0.000)
Upgraded				0.008*** (0.000)
New Construction				-0.002*** (0.001)
Property Type FE	No	No	No	Yes
Zip-SaleYM FE	No	No	Yes	Yes
Zip-BuyYM FE	No	No	Yes	Yes
SaleYM FE x BuyYM FE	No	No	Yes	Yes
R-squared	0.005	0.022	0.703	0.709
Observations	1,132,921	1,132,921	1,132,921	1,510,609

# Upgrades

Unlevered Ann Return	No Upgrades	Upgrades
	(1)	(2)
Single Female	-0.010*** (0.000)	-0.017*** (0.000)
Couple	-0.009*** (0.000)	-0.020*** (0.001)
Zip-Year-Month FE	Yes	Yes
R-squared	0.416	0.388
Observations	2,406,965	1,135,146

# American Housing Survey

- Women do not invest less in maintenance
- Gender gap is smaller using self-reported estimated current value
- Large gender gap in returns even after controlling for demographics
- Having children predicts lower returns but being female  $\approx$  3 children

	Maint/price	Est Unlevered Return	Real Unlevered Return	
	(1)	(2)	(3)	(4)
Single Female	-0.000213 (0.000150)	-0.00602** (0.00240)	-0.0116** (0.00506)	-0.00969* (0.00508)
Couple	-0.0000813 (0.000126)	-0.00596*** (0.00215)	-0.00595 (0.00503)	-0.00359 (0.00476)
Other	-0.000219 (0.000345)	0.0185* (0.0105)	-0.00444 (0.00936)	-0.000308 (0.00953)
Age of house	0.0000676*** (0.00000198)	0.000493*** (0.0000363)	0.000262*** (0.0000504)	0.000263*** (0.0000503)
Holding length	0.000330*** (0.00000735)	-0.00142*** (0.000118)	-0.000576*** (0.000145)	-0.000606*** (0.000148)
Age of householder	-0.0000766*** (0.00000307)	-0.0000860 (0.0000647)	0.0000688 (0.0000828)	0.0000183 (0.0000990)
Some college				0.000933 (0.00368)
College degree				0.00107 (0.00319)
Graduate degree				-0.00114 (0.00366)
Number of adults				-0.00208 (0.00180)
Number of children				-0.00287** (0.00123)
Black				-0.00680 (0.00628)
American Indian				-0.0128 (0.00936)
Asian				-0.0127* (0.00697)
Other race				-0.00816 (0.0142)
Log family income				0.00238* (0.00128)
MSA x Survey Year FE	Yes	Yes	No	No
MSA x Sale Year FE	No	No	Yes	Yes
R-squared	0.114	0.026	0.296	0.301
Observations	124,505	135,669	3,716	3,678



# Execution prices and holding length

So far, we've shown that women buy the same property for  $\approx 2\%$  more and sell for 2% less

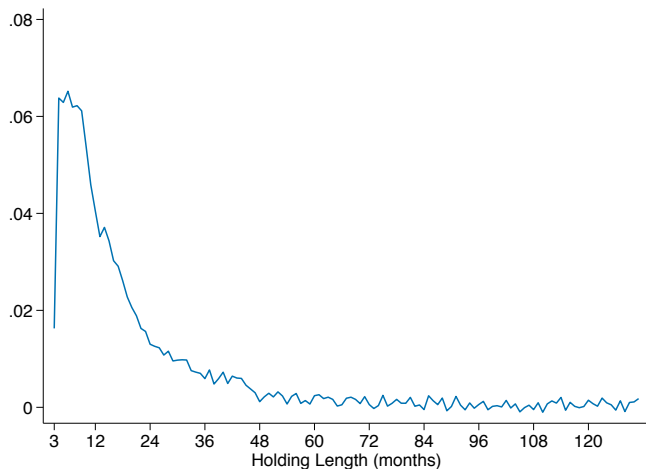
- Equivalent to women getting worse **execution prices** on real estate investment
- Differences in execution prices matter less for returns of “long term” investors

## Simple framework

- Let  $\delta$  be the female fractional disadvantage in execution prices
- Let  $\gamma$  be the gender gap in returns due to men investing more in maintenance or preferring properties with naturally higher returns

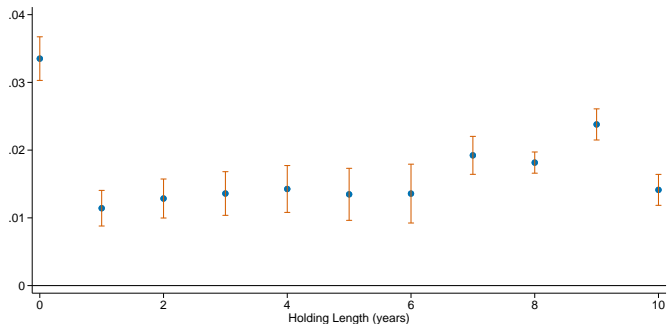
$$r^{\text{female}}(t) \approx r^{\text{male}}(t) - \left( \frac{2\delta}{t} + \gamma \right)$$

# Gender gap in unlevered returns by holding period



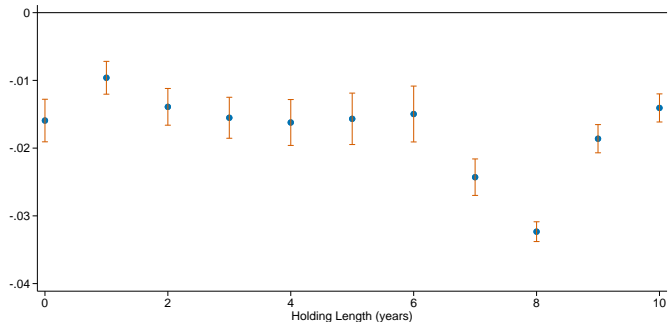
- Gender gap =  $\left(\frac{2\delta}{t} + \gamma\right)$
- Gender gap asymptotes toward 0, implying  $\delta > 0$  and  $\gamma \approx 0$
- Suggests gender gap arises primarily from differences in execution prices, not maintenance or preferences for properties with naturally higher returns

# Gender gap in purchase price by holding length



- Gender gap in purchase price does not asymptote toward 0
- But the impact of the gender gap in purchase price on annualized returns decreases with holding length

# Gender gap in sale price by holding length



- Gender gap in sale price does not asymptote toward 0
- But the impact of the gender gap in purchase price on annualized returns decreases with holding length

# Variation by market tightness

	Unlevered Ann Return	Purchase Discount	Sale Discount	Log(Purchase Price)	Log(Sale Price)
	(1)	(2)	(3)	(4)	(5)
Single Female	-0.016*** (0.000)	-0.275*** (0.018)	0.055*** (0.014)	0.023*** (0.001)	-0.029*** (0.001)
Couple	-0.012*** (0.000)	-0.236*** (0.018)	0.018 (0.014)	0.011*** (0.001)	0.016*** (0.001)
Other		0.018 (0.015)	0.422*** (0.016)	0.030*** (0.002)	-0.061*** (0.002)
Singe Female X Tightness	0.019*** (0.002)	0.283*** (0.090)	-0.554*** (0.066)	-0.039*** (0.004)	0.013*** (0.004)
Couple X Tightness	-0.002 (0.002)	0.415*** (0.087)	-0.141** (0.067)	-0.007 (0.006)	-0.036*** (0.005)
Other X Tightness		0.076 (0.072)	-0.000 (0.074)	-0.012 (0.008)	0.037*** (0.009)
Property FE	No	No	No	Yes	Yes
Zip-Year-Month FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.355	0.207	0.208	0.886	0.886
Observations	8,635,824	19,845,356	19,845,356	46,602,251	46,602,251

# Conclusion

## Large gender gap in housing returns

- Women buy the same property to 2% more and sell for 2% less
- Gender gap remains large even in wealthy, educated areas, and in recent years

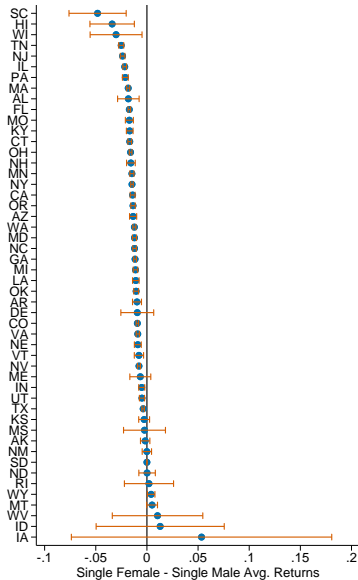
## Implications

- Gender gap in housing returns will contribute to the gender wealth gap
- Negotiated discount, choice of listing price, and timing all matter
- Women may be better off holding for longer, matching with other women, or sorting toward thicker markets
- We show that women have worse negotiated outcomes in housing, but...  
Does not imply women are doing anything wrong (Exley et al. 2018)

# Summary statistics

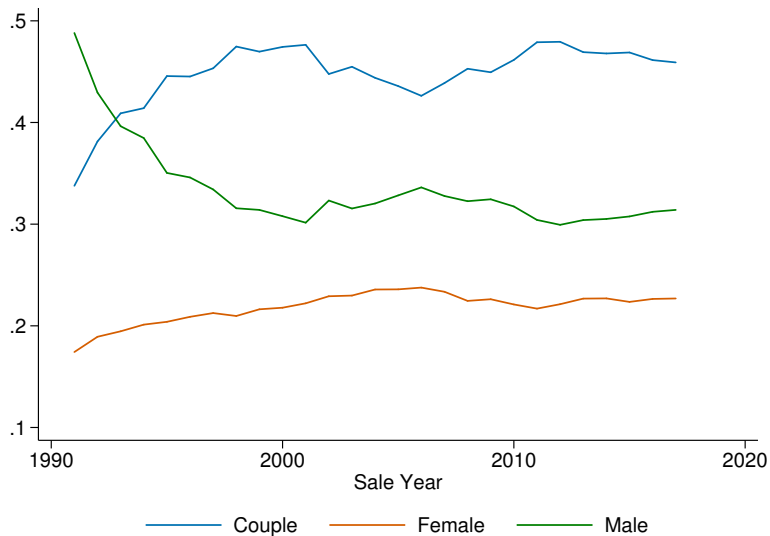
Panel A: Full Sample	Gender Group				Overall
	Single Male	Single Female	Couple	Other	
Log(Sale Price)	11.9473	11.9125	12.1383	12.1104	12.0704
Sample Size	7,721,833	5,751,347	10,127,535	29,283,151	52,883,866
Panel B: Listing Sample					
Log(Sale Price)	12.0798	12.0292	12.2709	12.0597	12.1095
Log(List Price)	12.0677	12.0236	12.2689	11.9539	12.0547
Sale Discount (p.p.)	2.8908	3.0368	2.5413	3.0954	2.9261
Log(Days on Market)	3.7339	3.7052	3.7016	3.7851	3.7467
Sample Size	3,100,949	2,728,421	4,689,273	9,524,421	20,043,064
Panel C: Returns Sample					
Log(Sale Price)	12.1429	12.0692	12.3342	-	12.2138
Annualized Unlevered Returns	0.0847	0.0692	0.0647	-	0.0720
Holding Length (Years)	5.2816	5.7174	5.9840	-	5.7029
Log(Purchase Price)	11.8990	11.8313	12.0793	-	11.9663
Purchase Discount (p.p.)	2.8150	2.5388	2.5629	-	2.6379
Sample Size	2,935,077	2,128,157	4,288,185	-	9,351,419

# Variation across states

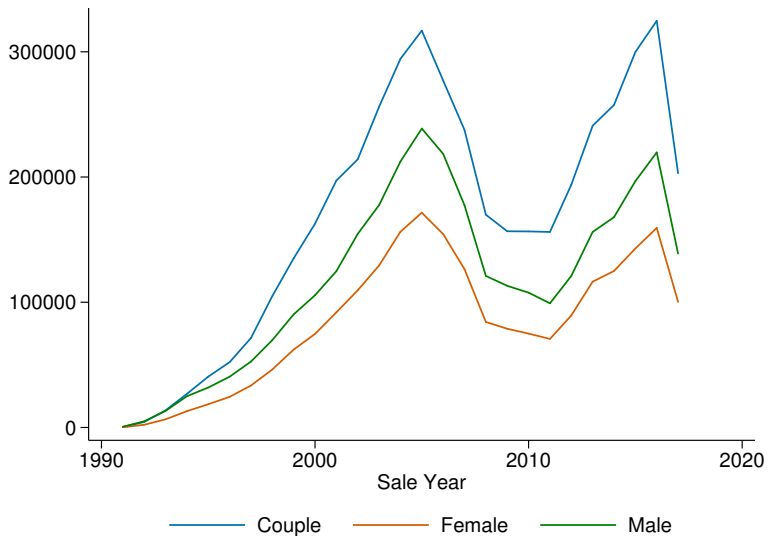




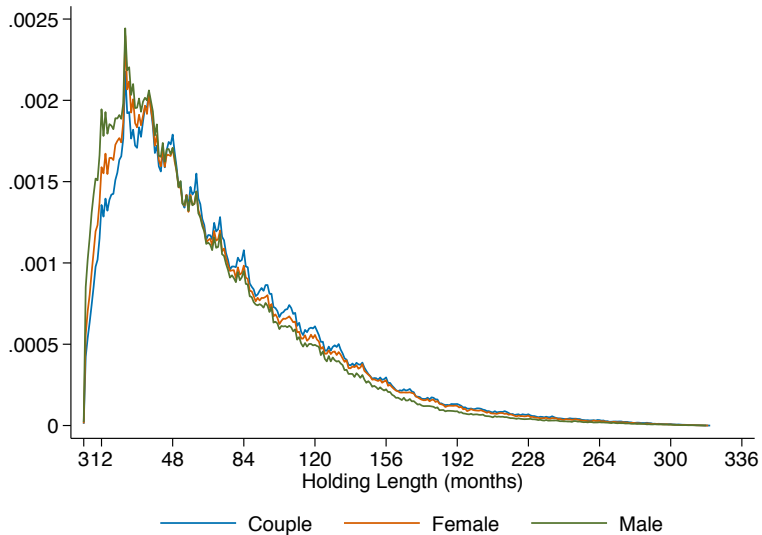
# Composition of transactions



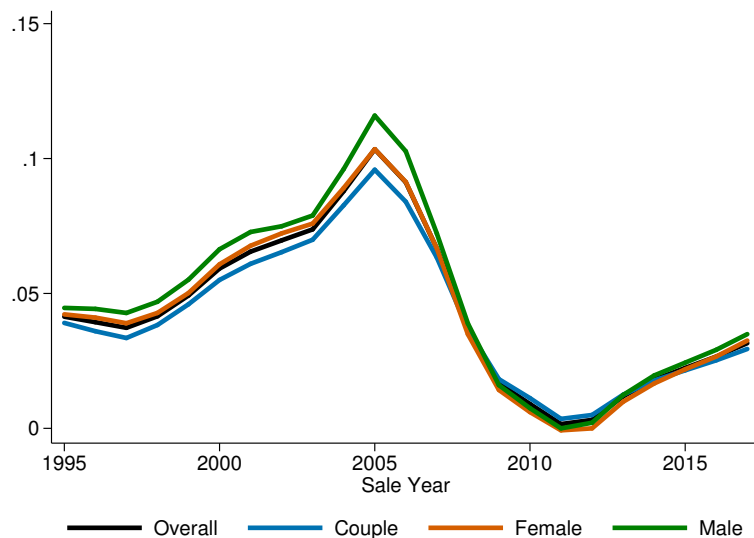
# Sale transactions over time



# Transaction share by holding length

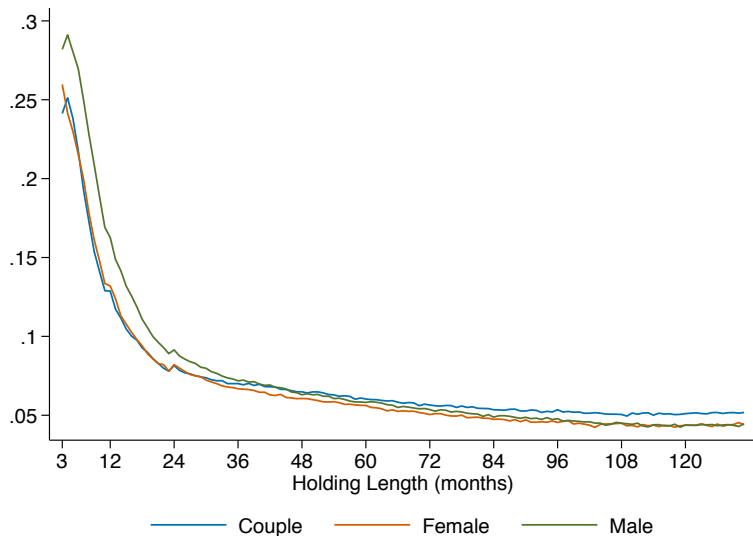


# Median annualized unlevered returns over time



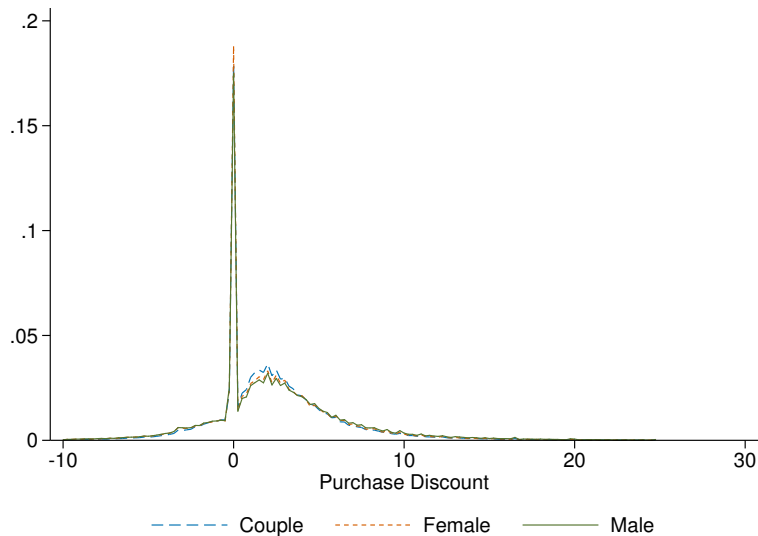
- Annualized return by *sale* year
- Strong variation over time
- Large gap in mean returns
- Smaller gap in *median* returns

## Variation in unlevered returns by holding period

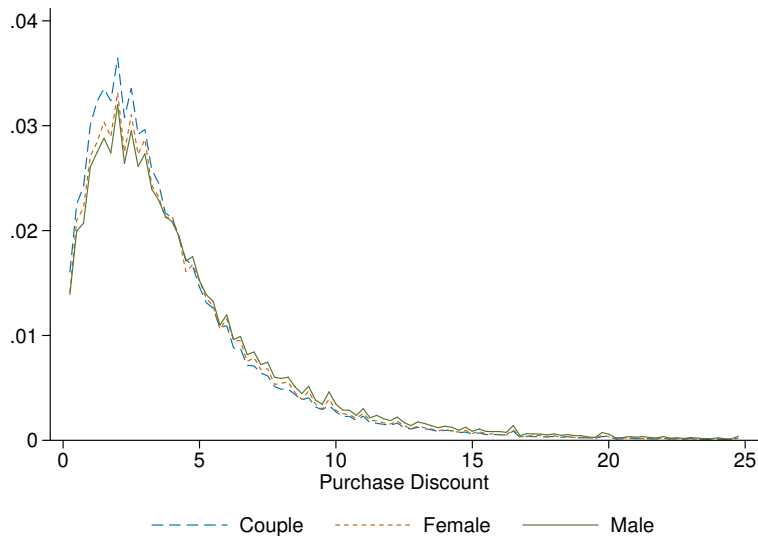


- Annualized return varies with holding length, possibly due to selection
- Will see later that gender gap also varies with holding length

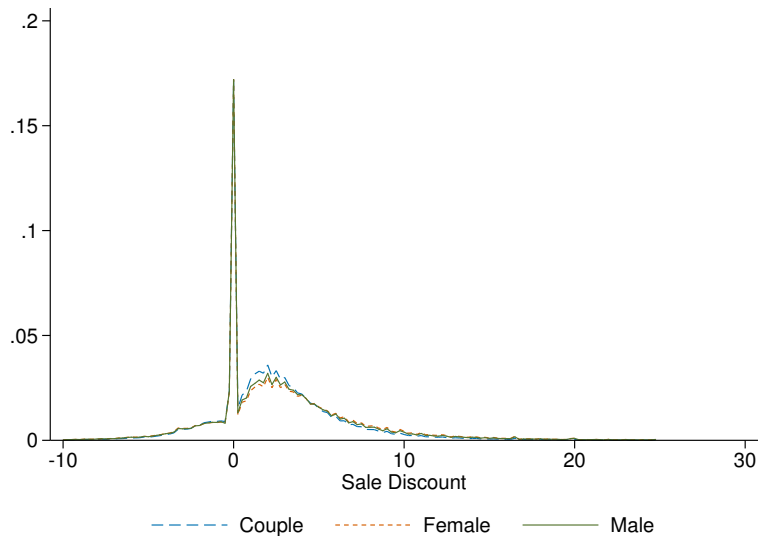
# Distribution of purchase discount



## Distribution of purchase discount: zoomed

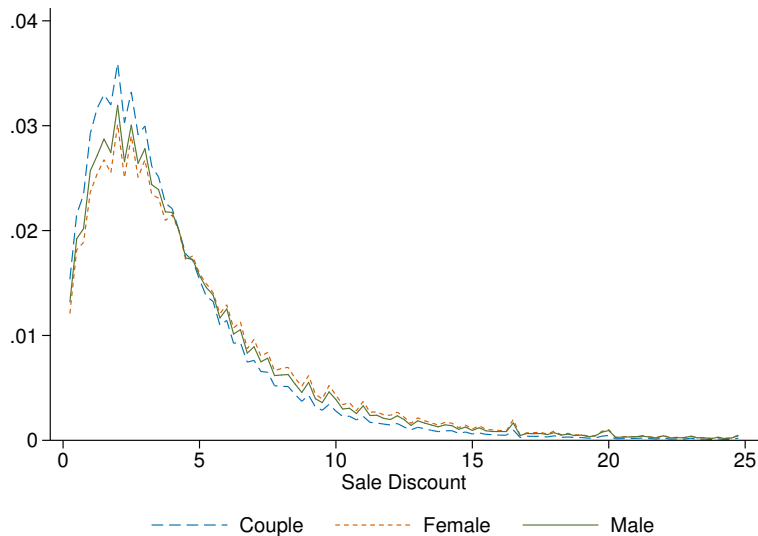


# Distribution of sale discount





## Distribution of sale discount: zoomed



# Days on market

	Sale Log(Days on Mkt)	Purchase Log(Days on Mkt)	Unlevered Ann Return
	(1)	(2)	(3)
Single Female	-0.031*** (0.003)	-0.034*** (0.003)	-0.013*** (0.000)
Couple	-0.041*** (0.003)	0.008*** (0.003)	-0.016*** (0.000)
Sale Log(Days on Mkt)			-0.003*** (0.000)
Purchase Log(Days on Mkt)			-0.003*** (0.000)
Zip-Year-Month FE	Yes	Yes	Yes
R-squared	0.415	0.309	0.398
Observations	2,024,580	2,024,580	2,024,580

# Selection of Property Characteristics

	Upgraded	New Construction	Log(House Age)	Log(Sq Ft)	Log(Agent Popularity)
	(1)	(2)	(3)	(4)	(5)
Single Female	-0.009*** (0.001)	0.002*** (0.000)	-0.020*** (0.003)	-0.066*** (0.001)	-0.019*** (0.002)
Couple	0.000 (0.001)	0.033*** (0.001)	-0.137*** (0.004)	0.143*** (0.002)	0.148*** (0.003)
Zip-Year-Month FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.299	0.274	0.515	0.448	0.255
Observations	3,542,111	9,351,419	2,211,953	2,007,061	4,000,582

## Unlevered returns: weighted by holding length

	Unlevered Ann Return		
	(1)	(2)	(3)
Single Female	-0.006*** (0.000)	-0.005*** (0.000)	-0.004*** (0.000)
Couple	-0.005*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)
Holding Length			-0.002*** (0.000)
Zip-Year-Month FE	No	Yes	Yes
R-squared	0.001	0.384	0.389
Observations	9,351,419	9,351,419	9,351,419

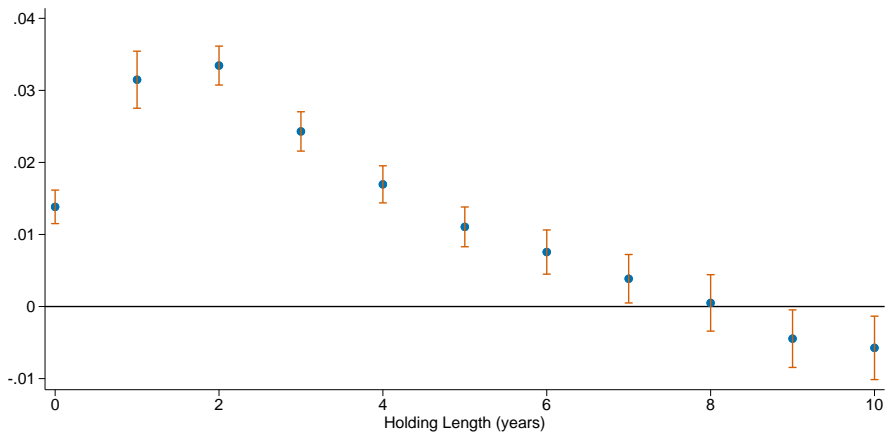
## Levered returns: weighted by holding length

	Lev Ann Ret (missing=0%)	Lev Ann Ret (missing=80%)	Lev Ann Ret (LTV=80%)
	(1)	(2)	(3)
Single Female	-0.009*** (0.000)	-0.014*** (0.000)	-0.014*** (0.000)
Couple	0.002*** (0.000)	-0.002*** (0.000)	0.004*** (0.000)
Holding Length	-0.011*** (0.000)	-0.013*** (0.000)	-0.007*** (0.000)
Zip-Year-Month FE	Yes	Yes	Yes
R-squared	0.337	0.329	0.328
Observations	9,351,419	9,351,419	9,351,419

## Match rates

Seller Gender	Buyer Gender			Overall
	Single Male	Single Female	Couple	
Single Male	0.1385 [0.1207]	0.0868 [0.0830]	0.1010 [0.1225]	0.3262
Single Female	0.0936 [0.0901]	0.0748 [0.0620]	0.0752 [0.0915]	0.2437
Couple	0.1378 [0.1591]	0.0930 [0.1095]	0.1993 [0.1615]	0.4301
Overall	0.3700	0.2546	0.3755	1

## Purchase price by holding length: Couples – Single Male



## Sale price by holding length: Couples – Single Male

