

Housing Price, Homeownership, and Retirement Behavior

- Evidence from Korean Longitudinal
Study of Ageing

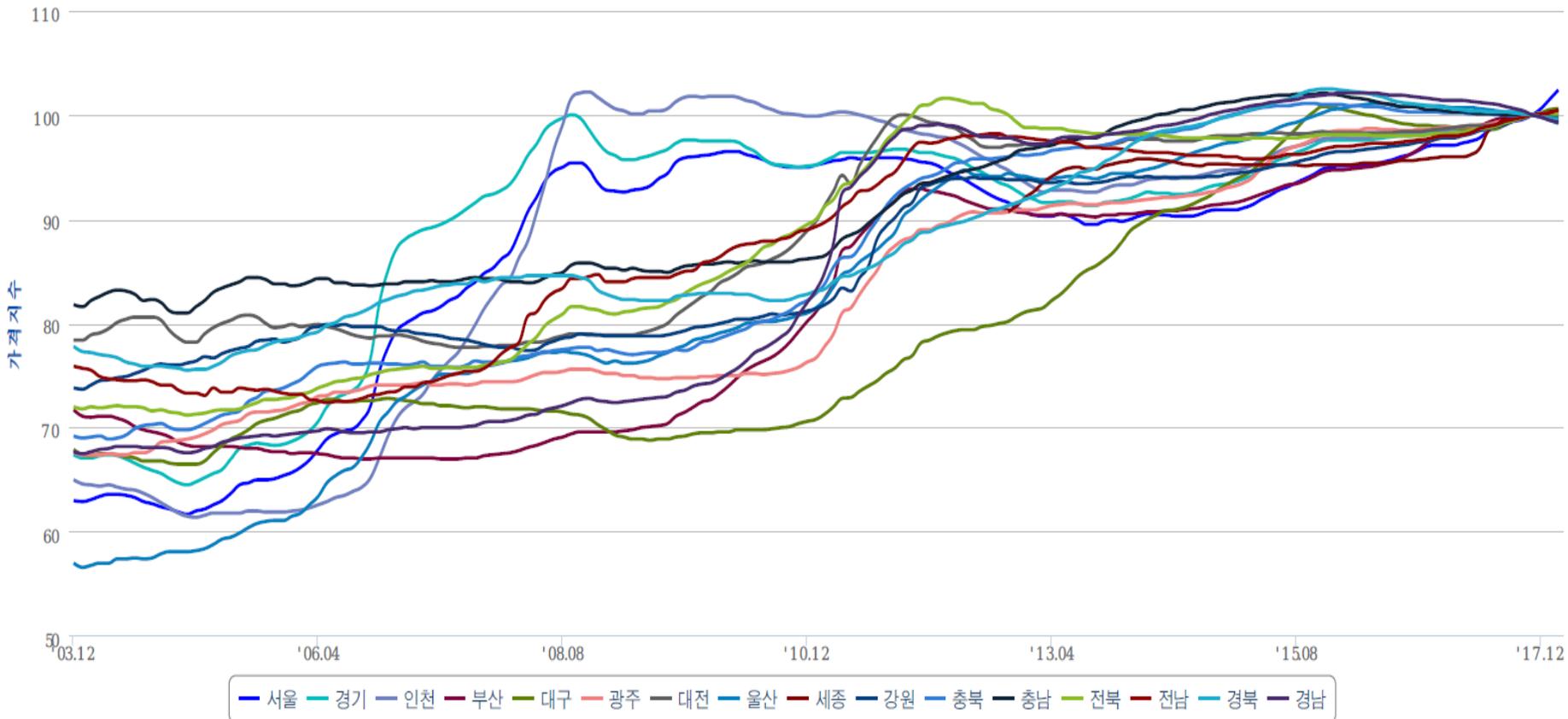
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Motivation

- Housing wealth is the major component of retirement asset portfolios in Korea
- Over the last fifteen years, housing price in Korea(especially capital area) has highly increased.
 - Little attention to the effect of housing wealth on older worker's retirement.
- Retirement age of Korea is the highest among the OECD countries(OECD, 2017).
 - Traditional family transfer system has been weaken.
 - Household wealth worsen after 1997 Asian financial crisis
 - Pension system doesn't cover their income enough.
 - **Most of elderly are not ready to retire.**

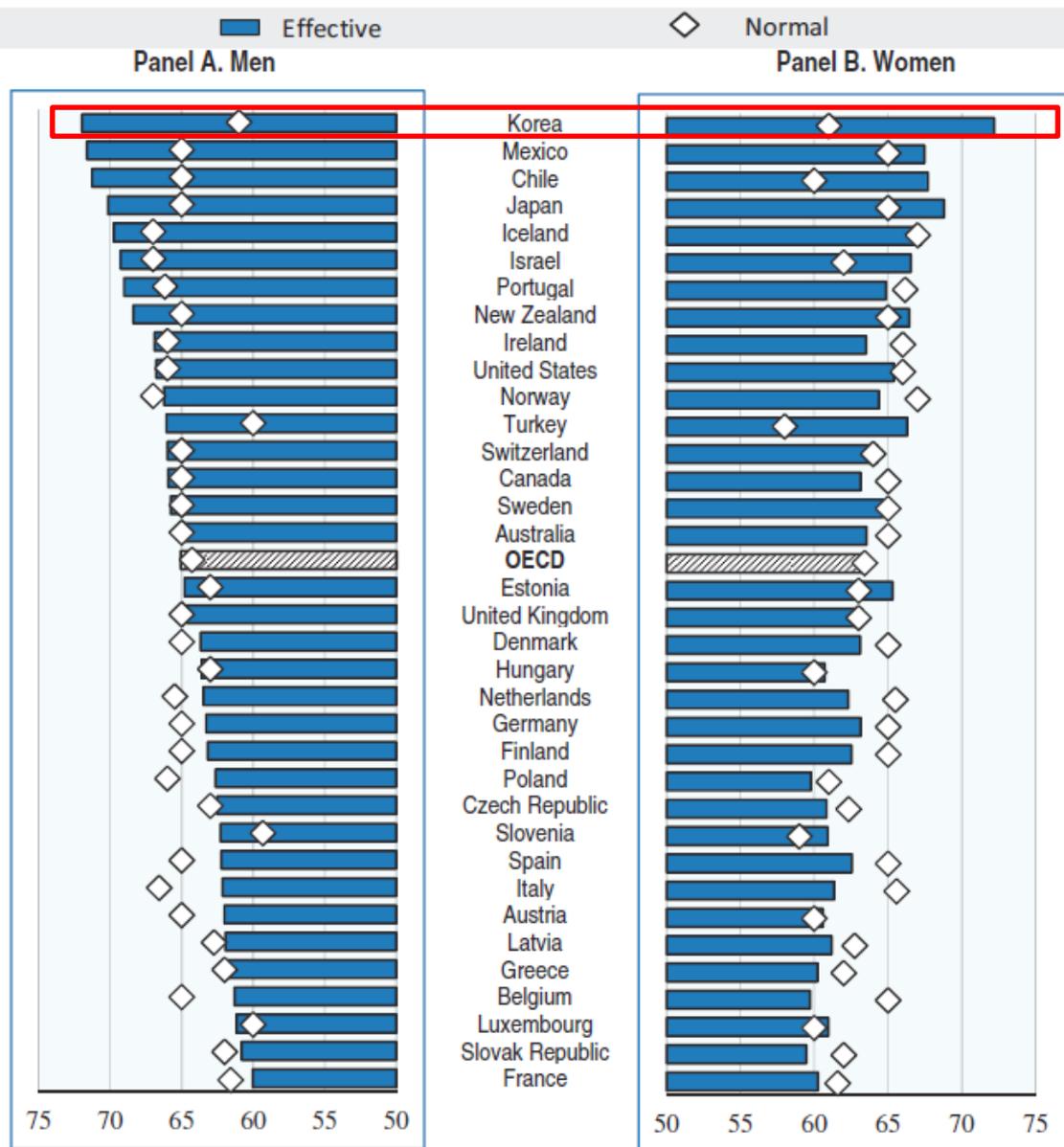
종합주택 매매가격지수



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Figure 1.6. Average effective age of labour-market exit and normal pensionable age in 2016



Source: OECD estimates based on the results of national labour force surveys and the European Union Labour Force Survey.

StatLink <http://dx.doi.org/10.1787/888933633261>

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Previous Research

- Housing wealth and retirement
 - Farnham and Sevak(2016): Housing price changes homeowners' expected retirement age.
 - Zhao, and Burge(2017): Elderly respond to housing wealth and property taxes
 - Homeowners are more likely to respond housing wealth shock
- Housing wealth and consumption
 - Benjamin, Chinloy, & Jud(2004): Housing wealth affects consumption
 - Cho(2011): Changes in housing wealth do not significantly affect household consumption.
 - The effect of housing wealth on consumption is still ambiguous
- Other wealth effect on retirement
 - Coile and Levine(2006): Stock market performance and retirement
 - Brown, Coile, & Weisbenner(2010): Inheritance effect on retirement

Research Questions

- Can changes in housing wealth affect worker's retirement plan?
 - Compared to renters, are homeowners more likely to change their expected retirement age?
 - Preliminary analysis
- Do changes in housing wealth exert older worker's retirement?
 - Compared to renters, are homeowners more likely to retire during the housing market boom years?
 - Is the effect of housing wealth shock different by region?
 - Which characteristics of older worker affect the magnitude of housing wealth effect?
- How big is the magnitude of housing wealth effect?

Data

- KLoSA(Korean Longitudinal Study of Ageing)
 - 2006-2016 biannual panel data (1st to 6th wave)
 - (Preliminary) Young group
 - Male workers aged 45-54 years in 2006
 - Not yet retired, but reported their expected retirement age
 - Old group
 - Male workers aged 55-70 years in 2006
 - About 40% of them retire in by 2016
 - Divided by homeowners and renters
- Housing Price Index(province level)
 - Based on local market price surveyed by the Korea Appraisal Board.
 - Proxy for unexpected changes in residential and other real estate assets
 - Instrument for older workers' assets
- Unemployment data
 - Annual unemployment rate (province level) form Korea Statistics

Empirical Strategy

- Baseline Regression Model

- Samples are restricted to workers who are working at t-1

$$Retire_{ijt} = \beta_0 + \Delta HPI_{ijt} + \beta_2 X_{ijt} + \beta_3 W_{ijt-1} + \mu_{jt} + \gamma_t + \delta_j + \epsilon_{ijt}$$

ΔHPI_{ijt} : Unexpected Housing wealth shock

X_{ijt} : Age, Education, # of children, health status, pension

W_{ijt-1} : lagged income, lagged asset, occupation, formal retirement system

μ_{jt} : unemployment rate at time t (province level)

γ_t, δ_j : year and region dummies

ϵ_{ijt} : error term

- Measuring unexpected changes in housing wealth

- I use the same definition of Farnham and Sevak(2016)
- AR(3) model including province dummies, and unemployment rates.
- Subtract the forecasted growth rate from the actual growth rate

$$\Delta HPI_{ijt} = HPI_{ijt} - \widehat{HPI}_{ar3_{ijt}}$$

Regression 1. (Preliminary) Expected Retirement Age

- Question: Can changes in housing wealth affect worker's retirement plan?
- I did the same regression of Farnham and Sevak(2016)
- Individual fixed effect model

$$\text{Exp}[Retire]^{age}_{ijt} = \beta_0 + \beta_1 \Delta HPI_{ijt} + \beta_2 X_{ijt} + \beta_3 W_{ijt} + \mu_{jt} + \gamma_t + \delta_i + \epsilon_{ijt} \quad (1)$$

– $\text{Exp}[Retire]^{age}_{ijt}$: worker i's expected retirement age at time

$$\text{NoRet}_{ijt} = \beta_0 + \beta_1 \Delta HPI_{ijt} + \beta_2 X_{ijt} + \beta_3 W_{ijt} + \mu_{jt} + \gamma_t + \delta_i + \epsilon_{ijt} \quad (2)$$

– NoRet_{ijt} : Equal to 1 if worker i want to work as long as possible.

- Other controls are equal to the baseline regression model.

Regression 1. Expected Retirement Age

Summary Stats. (Under 55)

Variable	Mean	Std. Dev.	Min	Max
Basic Information				
Age	49.24	2.825	45	54
Self reported health(Bad =1)	0.051	0.219	0	1
Assets				
HPI(2016 HPI=100)	74.92	5.340	63.9	85.1
%Δ HPI(biennial)	8.13	8.31	-6.6	31.5
Homeowner(=1)	0.562	0.496	0	1
Total Assets(realestate assets+financial assets)	18145.7	28208.6	0.0	500100.0
Before retired				
Expected retirement Age	63.76	6.85	47.00	101.00
Plan to work as long as possible(=1)	0.4747	0.4996	0	1
Income (10K KRW)	3005.91	2022.843	55	28000
Unemployment rate(% , Province level)	3.390	0.987	1.3	4.6
Observations	1,186			

Regression 1. Results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample		Homeowners		Renters	
	Expected Retirement Age	Plan to work as long as possible(=1)	Expected Retirement Age	Plan to work as long as possible(=1)	Expected Retirement Age	Plan to work as long as possible(=1)
Unexpected %Δ HPI	-0.017*	-0.007***	-0.042***	-0.011***	0.024	0.000
	(0.009)	(0.001)	(0.014)	(0.002)	(0.021)	(0.003)
Asset Controls	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES	YES	YES
Unemployment Rate	YES	YES	YES	YES	YES	YES
Other controls	YES	YES	YES	YES	YES	YES
Mean of Dep. Var.	65.643	0.4840	65.728	0.4621	65.311	0.5331
Observations	5,353	5,353	2,214	2,214	1,013	1,013
R-squared	0.081	0.042	0.087	0.035	0.106	0.074
Number of pid	1,186	1,186	516	516	258	258
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Regression 1. Results

- The effect of housing wealth shock is only significant to the homeowners' retirement plan.
- Here I find that 10% increase in the housing price is found to decrease the expected retirement age by .4 years, its about 5 months to the homeowners.
- People who experience their housing price increase are more likely to cancel their plan to work as long as possible.

Regression 2. Actual Retirement Behavior

- I did the baseline regression using old group sample.
- I also estimate difference in difference (DD) for comparing homeowners and renters.

$$Retire_{ijt} = \beta_0 + \beta_1 Homeowner + \beta_2 \Delta HPI_{ijt} + \beta_3 Homeowner * \Delta HPI_{ijt} \\ + \beta_4 X_{ijt} + \beta_5 W_{ijt-1} + \mu_{jt} + \gamma_t + \delta_j + \epsilon_{ijt}$$

- Same regression from Farnham and Sevak(2016)
- $Retire_{ijt}$: equal to 1 if workers retire at time t
- β_3 : DD estimator (Renters as a control group)
- Other controls are equal to the baseline regression model.

Regression 2. Actual Retirement Behavior

Summary Stats. (Male, 55-70 years old worker, KloSA 1st wave)

Variable	Mean	Std. Dev.	Min	Max
Basic Information				
Age	61.578	4.451	55	70
Assets				
Housing Price Index (2016 HPI=100)	72.75	7.474	56.8	85.1
% Δ HPI(biennial)	7.46	9.01	-6.6	58.0
Unexpected % Δ HPI(biennial)	-0.06	6.20	-14.0	27.2
Homeowner(=1)	0.767	0.423	0	1
Total Assets(realestate + financial assets, 10K KRW)	17,130.0	27319.7	0.0	380000.0
Income (10K KRW)	2,048	1887	23	18000
Retired				
Retired by 2016	0.382	0.486	0	1
Observations	692			

Results 2. Actual Retirement Behavior

VARIABLES	(1) Full Sample	(2) Homeowners Only	(3) Renters Only	(4) DD
Unexpected % Δ HPI	0.0019* (0.0011)	0.0031** (0.0014)	0.0001 (0.0020)	-0.0018 (0.0016)
Homeowner(=1)				-0.0165 (0.0241)
% Δ HPI * Homeowner				0.0051*** (0.0019)
Asset Controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Retired by 2016	0.382	0.376	0.398	0.382
Observations	2,236	1,795	441	2,236
R-squared	0.0857	0.1039	0.1082	0.2078
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Results 2. Actual Retirement Behavior(DD by age)

	(1)	(2)	(3)	(4)
Age Group	50-60	55-70	60-70	65+
Unexpected %Δ HPI	0.0009 (0.0014)	-0.0018 (0.0016)	-0.0015 (0.0023)	-0.0024 (0.0034)
Homeowner(=1)	0.0290 (0.0251)	-0.0184 (0.0243)	-0.0363 (0.0343)	-0.0609 (0.0440)
%Δ HPI * Homeowner	0.0017 (0.0017)	0.0051*** (0.0019)	0.0061** (0.0028)	0.0062 (0.0041)
Asset Controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Retired by 2016	0.236	0.382	0.444	0.525
Observations	1,601	2,236	1,319	967
R-squared	0.0857	0.0868	0.1039	0.1082

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results 2. Actual Retirement Behavior

- Homeowners are more likely to respond to unexpected housing wealth shock.
- 10% increase in unexpected housing price increase homeowners' retirement rate about 3%p, or about 7.5%.
- DD estimator shows that the difference of retirement rate between homeowners and renters is about 5%p. when housing price increase 10%.
- Effects are restricted to old workers around 70 years old.

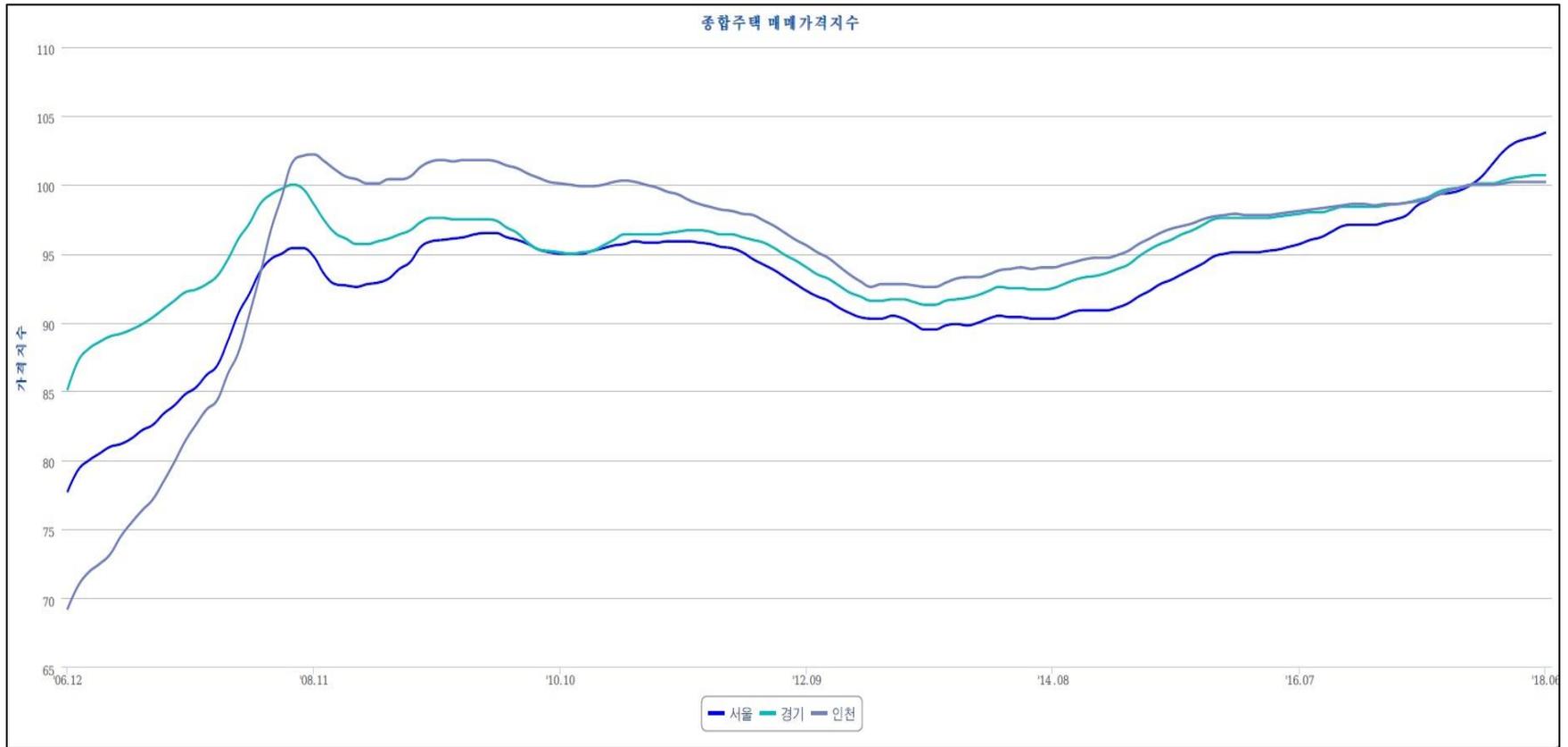
Regression 3. Retirement by Region

- Trends in housing market differ by regions.
- I use the idea of Coile and Levine(2006).
 - They estimate the effect of bust and boom year of stock market.
- I estimate difference in difference (DD) for comparing homeowners and renters.

$$Retire_{ijt} = \beta_0 + \beta_1 CapitalArea + \beta_2 After + \beta_3 CapitalArea * After \\ + \beta_4 X_{ijt} + \beta_5 W_{ijt-1} + \mu_{jt} + \gamma_t + \epsilon_{ijt}$$

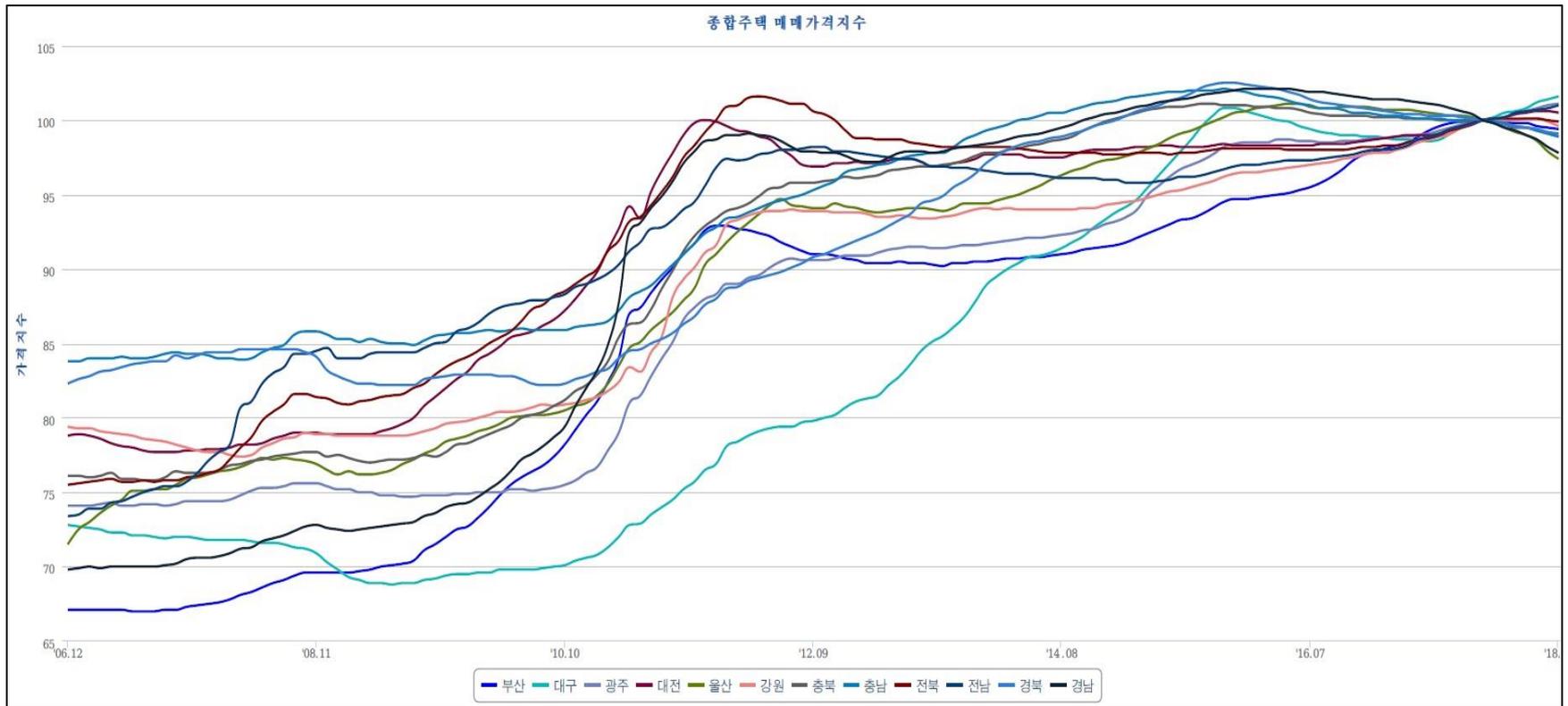
β_3 : DD estimator (non-capital areas as a control group)

Regression 3. Retirement by Region



- In case of capital area, housing price highly increase from 2006 to 2008.
- After financial crisis, housing market continued to stagnate, and revive since 2012

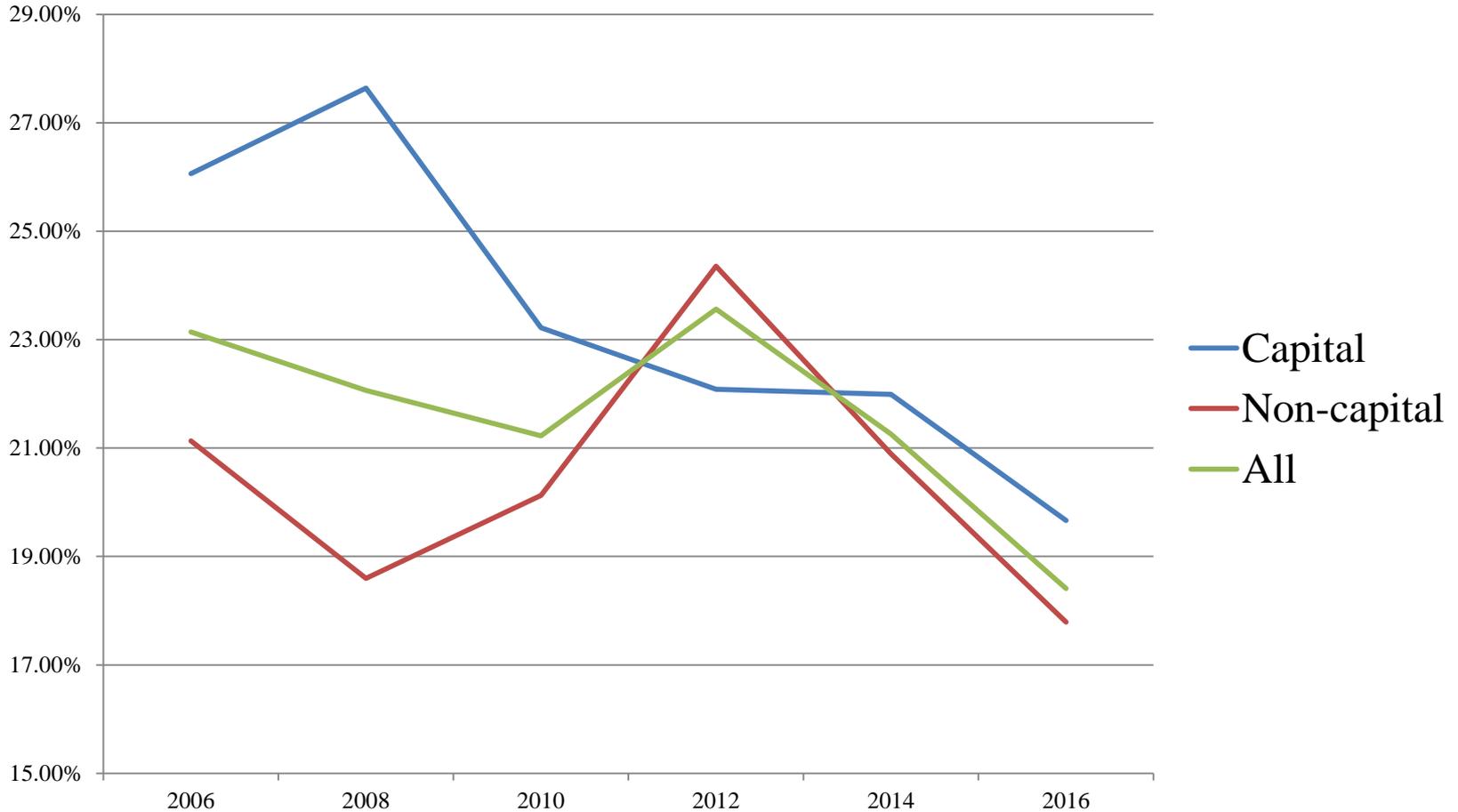
Regression 3. Retirement by Region



- In case of non-capital area, housing price highly increase from 2010 to 2012.

Regression 3. Retirement by Region

- Retirement Rate: 55-70 years old male workers



Results 3. Retirement by Region

DD: Capital area and housing wealth shock

VARIABLES	(1) 06~08	(2) 08~10	(3) 10~12	(4) 12~14	(5) 14~16
Capital	-0.007 (0.005)	0.030 (0.019)	0.015 (0.029)	-0.071** (0.032)	0.011 (0.036)
After	0.041*** (0.008)	0.015 (0.014)	0.056*** (0.020)	-0.034 (0.023)	0.010 (0.024)
CapXafter	0.050*** (0.018)	-0.006 (0.029)	-0.086*** (0.033)	0.090** (0.039)	-0.029 (0.045)
Other controls	YES	YES	YES	YES	YES
Retirement Rate	0.0575	0.1213	0.2197	0.2929	0.3734
Observations	2,008	1,825	1,633	1,424	1,210
R-squared	0.074	0.054	0.049	0.046	0.068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results 3. Retirement by Region

DD: Capital area and housing wealth shock(Homeowners only)

VARIABLES	(1) 06~08	(2) 08~10	(3) 10~12	(4) 12~14	(5) 14~16
Capital	-0.005 (0.009)	0.019 (0.024)	-0.015 (0.040)	-0.054 (0.042)	0.024 (0.054)
After	0.052*** (0.012)	0.008 (0.021)	0.051* (0.026)	-0.045 (0.028)	0.001 (0.032)
CapXafter	0.044** (0.020)	-0.012 (0.043)	-0.054 (0.052)	0.094* (0.053)	-0.032 (0.075)
Other controls	YES	YES	YES	YES	YES
Retirement Rate	0.0598	0.1194	0.2111	0.2923	0.3592
Observations	1,313	1,162	1,024	889	752
R-squared	0.090	0.064	0.052	0.054	0.100

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results 3. Retirement by Region

- Workers who live in capital areas are more likely to retire 2006-2008 and 2012-2014. Housing price of capital area highly increased in these periods.
- Workers who live in non capital areas are more likely to retire 2010-2012. Housing price of non capital area highly increased in this period.

Regression 4. Household Liability and Retirement

- Not all homeowners have their house without debt
 - I controlled debt to asset ratio, or total household liability, and did the baseline regressions.
- Hypothesis: homeowners who experience that earnings from housing wealth shock is bigger than their liabilities are more likely to retire
 - I divide samples into group 1(earnings from housing price shock is bigger than their liabilities) and group 2(liabilities are still bigger than earnings). Then I did the baseline regressions.

Results 4. Household Liability and Retirement

	(1)	(2)	(3)	(4)
	Debt to Asset ratio Controlled	Total household liability controlled	(Subgroup 1) Expected earnings >= Liabilities	(Subgroup 2) Expected earnings < Liabilities
Unexpected % Δ HPI	0.0030** (0.0014)	0.0031** (0.0014)	0.0043* (0.0022)	0.0016 (0.0026)
Year Fixed Effects	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Retirement Rate	0.376	0.376	0.256	0.192
Observations	1,795	1,795	1,260	715
R-squared	0.1082	0.1086	0.1317	0.1060
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Results 4. Household Liability and Retirement

- Housing price shock still affect retirement behavior when controlling debt to asset ratio, or total household liability.
- Group 1(Expected earnings \geq Liabilities) are more likely to retire than group 2(Expected earnings $<$ Liabilities).

Regression 5. Subgroup of Homeowners

- Using the Baseline regression, I estimated the effect of housing price shock on homeowners' retirement by subgroups.
 - Employment type: wageworker or self-employed
 - Decent job(manager, professional, or 1st quantile of income) or not
 - Main job(worked for at least 10 years) or not

Results 5. Subgroup of Homeowners

VARIABLES	Subgroups (Homeowners only)					
	(1) Wageworker	(2) Self employed	(3) Decent Job or Inc. 1Q	(4) Not a Decent Job nor Inc. 1Q	(5) Main Job	(6) Not a Main Job
Unexpected % Δ HPI	0.0064** (0.0027)	0.0018 (0.0016)	0.0031 (0.0021)	0.0032 (0.0026)	-0.0036 (0.0055)	0.0029** (0.0015)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES	YES	YES
Other controls	YES	YES	YES	YES	YES	YES
Retirement Rate	0.5186	0.2807	0.3947	0.3524	0.5343	0.3203
Observations	543	1,292	774	678	169	1,626
R-squared	0.1807	0.1015	0.1615	0.0959	0.6410	0.1068

Regression 6. Wealth Effect of Housing Price

- I estimate the effect of unexpected housing wealth shock.
 - But how big is the wealth effect?
- I estimate the household wealth using house price index (instruments), and estimate the wealth effect on retirement
 - IV Fixed effect model
 - First stage: estimate worker's asset by housing price index
 - $\widehat{Asset}_{ijt} = \pi_0 + \pi_1 HPI + \pi_2 X_{ijt} + \pi_3 W_{ijt} + \mu_{jt} + \gamma_t + \tau_j + \delta_i + \epsilon_{ijt}$
 - Second stage: regress $Retire_{ijt}$ on predictions \widehat{Asset}_{ijt} and covariates.
 - $Retire_{ijt} = \beta_0 + \beta_1 \widehat{Asset}_{ijt} + \beta_2 X_{ijt} + \beta_3 W_{ijt-1} + \mu_{jt} + \gamma_t + \tau_j + \delta_i + \epsilon_{ijt}$

Results 6. IV Fixed Effects Model(1st stage)

VARIABLES	(1) Full Sample	(2) Homeowners	(3) Renters
Housing Price Index	0.568*** (0.187)	0.658*** (0.165)	1.872* (0.997)
Year Fixed Effects	YES	YES	YES
Region Fixed Effects	YES	YES	YES
Other controls	YES	YES	YES
F Test Statistics	18.76	29.75	2.00
Observations	3,089	2,442	647
Number of pid	692	531	161

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results 6. IV Fixed Effects Model(2nd stage)

VARIABLES	(1) Full Sample (Fixed Effect)	(2) Full Sample (IVFE)	(3) Homeowners (IVFE)	(4) Renters (IVFE)
Log Assets	-0.0040 (0.0089)	0.3558* (0.1857)	0.2637* (0.1554)	0.0639 (0.1588)
Year Fixed Effects	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Retirement rate	0.382	0.382	0.376	0.398
Observations	3,089	3,089	2,442	647
Number of pid	692	692	531	161

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results 6. Wealth Effect of Housing Price

- In the first stage, housing price index is statistically significantly associated with household asset.
- Second stage, homeowners' asset significantly affects their retirement behavior.
 - 10 % increase in homeowners' asset increases about 3%p., or 7.7% of their retirement rate.
 - Renters are less likely to retire in case of their wealth increase. And the effect is not significant.

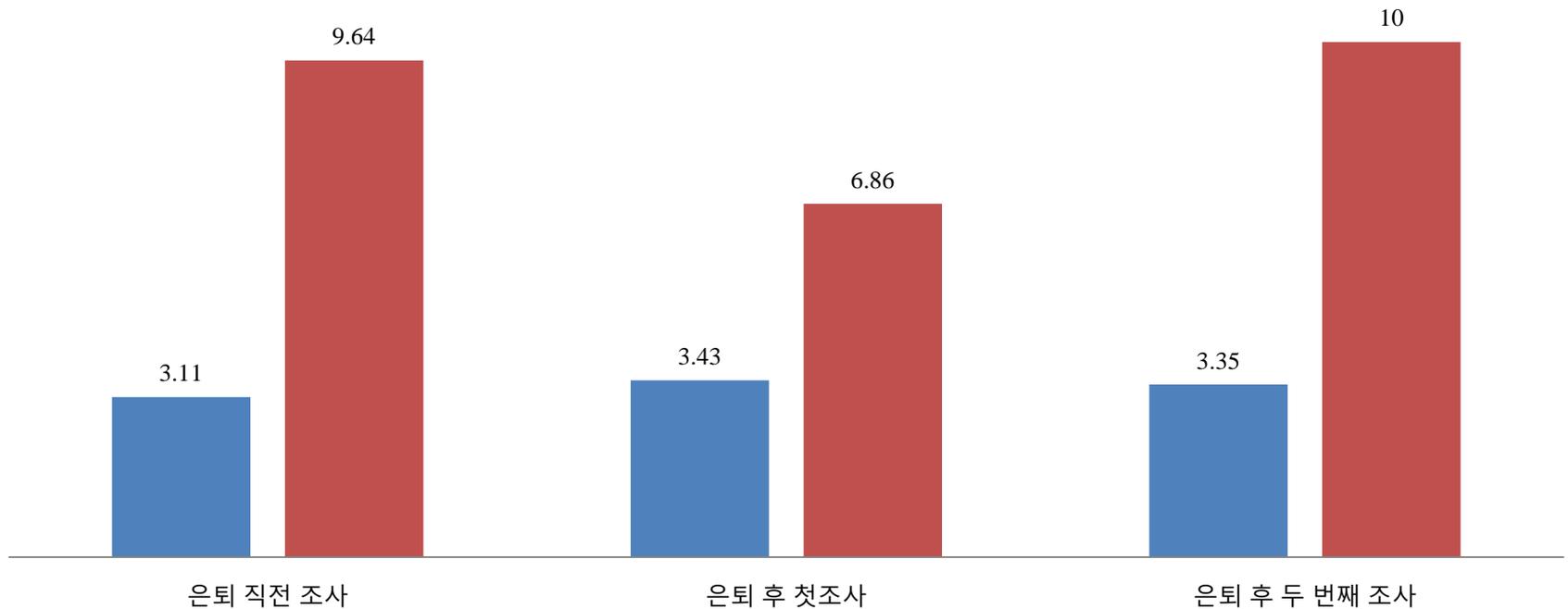
Conclusion

- Increase in housing price affects old male worker's retirement behavior as well as their retirement plan.
 - Only homeowners are responding to the housing price shock.
 - Workers who are around 70(effective retirement age of Korean) are more likely to retire when they experience their housing price increase.
 - Workers who live in the region where housing market is boom are more likely to retire.
 - Workers who are wageworkers, do not a decent job, do secondary job are more likely to retire
- 10% increase in asset lead to increase the retirement rate about 3%p. ,or about 7.7%.
- Why those effects exist?
 - For expanding liquidity?(selling their house or increase debt)
 - Some evidences exist but they seem to be not major reasons.
 - Some psychological effects?

Conclusion

이사 사유-생활비 마련을 위해 기존 주택을 처분함(%)

■ 비은퇴자 ■ 은퇴자



Conclusion

주택연금 가입자 수, 2007-2017

(단위 : 명)

