Housing Wealth Effects in Japan:
Evidence based on Household Micro data

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1. INTRODUCTION

- A substantial number of studies have highlighted the positive correlation between housing price growth and aggregate consumption in developed economies, most notably in the U.S. and the U.K.

  Reported correlations (housing value vs. consumption growth):

  0.4 for the U.S. (1970-2012), 0.7 for the U.S. (2000s),

  0.7 for the U.K. (1970-2006), and 0.54 for Japan (1984-2013).

- However, the correlation observed in aggregate data does not necessarily warrant a causal relationship (from housing prices to consumption) and may simply reflects the macroeconomic factors such as business cycles.

1. INTRODUCTION (CONT.)

- A number of studies in several developed countries have utilized micro data to investigate whether a positive correlation can still be observed after controlling for the aggregate factors.

- In the presentation today, I would report the result of our study that examined the extent to which household consumption responded to changes in housing wealth, using micro data covering almost 500,000 households in Japan over an extended period from 1983 to 2012.

- Regarding the housing wealth effect, while many empirical studies are carried out in other developed countries, especially in the U.S., studies on Japan are limited probably due to the lack of usable micro data.

1. INTRODUCTION (CONT.)

- We would explore the following two issues (questions) empirically:

① Extent to which household consumption in Japan is affected by changes in the value of housing wealth.

② Factors that caused co-movements in housing wealth values and household consumption.

- For that purpose, we have constructed a micro-based dataset that combines highly reliable diary-based household expenditure data obtainable from the *Family Income and Expenditure Survey* (FIES) and housing wealth data estimated for each individual household in the FIES.

2. RELATED LITERATURE AND DATA CONSTRUCTION

- Attanasio and Weber (1994) proposed to compare the marginal propensity to consume (MPC) out of housing wealth for young household and that for elderly households, as a strategy to identify the factors behind the co-movement of land prices and consumption.

  If MPC for the elderly ＞ MPC for the young,
  it supports the pure wealth effect (PI/LC) hypothesis.

  If MPC for the elderly ≦MPC for the young,
  it supports the collateral hypothesis, or the third factor explanations.

2. RELATED LITERATURE AND DATA CONSTRUCTION（CONT.）

2.1 Earlier studies

- The results of the previous studies in Europe and the US appear to vary largely depending on the country and methodology used in the analyses.
  - ✓ Campbell & Cocco (2007), a pseudo-panel based study on UK supports the pure effect.
  - ✓ Cooper (2013) on the US, and Windsor et. al. (2015) on Australia, both are panel-based analyses, support the collateral effect hypothesis.
  - ✓ Attanasio & Waber (1994), and Attanasio et. al. (2009), cross-section studies on the UK supports the third factor explanation.
- The size of the obtained MPC estimates also varies among studies.
  - ✓ No or insignificant responses(≒ 0). Skinner (1989) for the U.S., Browning et al.(2013) for Denmark.
  - ✓ Not large economically but statistically significant responses (～0.03). Disney et. al. (2010) for the U.K., and Alalay et. al. (2014) for Australia and Canada.
  - ✓ Large and statistically significant responses (0.03～0.07). Mian et. al. (2013) and Cooper (2013) for the U.S.

2. RELATED LITERATURE AND DATA CONSTRUCTION（CONT.）

- ➢ Number of studies on Japan is limited, and consensus has not been obtained yet.

- ✓ Dekle (1994) and Ogawa (1996), both are on the prefecture-based panel data, have lead to the opposite conclusion.（the former accepts the pure wealth effect hypothesis, and the latter rejects it.)

- ✓ Hori and Shimizutani (2004) used a micro-data from the Japanese Panel Survey of Consumers (JPSC), but failed to obtain significant results.

- ✓ More recently, Naoi (2014a, b) used micro data from "the Japanese household panel survey (JHPS / KHPS)", which has been implemented since 2004, and obtained a wealth elasticity estimate close to 1 percent.

2. RELATED LITERATURE AND DATA CONSTRUCTION（CONT.）

2. 2 Data

- In the analysis below, we used the micro data from the FIES 1983-2012.

- To the best of our knowledge, this is the first micro-data based empirical study on the housing wealth effects in Japan during the extended period, which includes the bubble period when the asset prices fluctuated grossly.

- ✓ From the FIES, in addition to the monthly income and expenditure (for six months) for individual households, we can obtain financial assets holdings for non-single person households.

- ✓ The number of households included in the constructed dataset is about 500,000, of which 360,000 are home owners and 140,000 are renters.

2. RELATED LITERATURE AND DATA CONSTRUCTION（CONT.）

2. 2 Data (Cont.)

- Though there is no item equivalent to the value of real assets or housing wealth in the FIES, we can roughly specify the address of the residence of individual households (e.g. Kunitachi-shi Naka 2).

- In addition, we can obtain information about their house, such as the ownership, floor area (in square meters), site area, the structure of the building (wooden, concrete, …), the year of building construction, etc.

- We will use the information above to estimate the value of housing wealth for individual households, and utilize the estimated variable to investigate housing wealth effects.

Value of the land portion of residence

＝Site area ×Land price at the "Land Market Value Publication" point closest to the specified address

Value of the building portion of residence

＝Floor area ×Building cost ×(1- Depletion rate) ^Year after construction

2. RELATED LITERATURE AND DATA CONSTRUCTION（CONT.）

➢ The sample statistics of the data including the estimated housing wealth value are as follows.

Variable	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
	Homeowners			**Renters**		
Total consumption	358,870	301	172	138,791	249	136
Nondurable consumption	358,870	138	49	138,791	113	41
Annual income	358,870	695	451	138,791	547	287
Housing wealth (a)=(b)+(c)	358,870	3,258	4,007	138,791	0	0
House value (b)	358,870	467	703	138,791	0	0
Land value (c)=(d)*(e)	358,870	2,791	3,895	138,791	0	0
Land price per square meter (d)	358,870	15	19	138,791	18	22
Land area (square meters) (e)	358,870	235	184	138,791	0	0
Capital gain (land)	358,870	-2	785	138,791	0	0
1983-1991	102,105	248	1,237	46,033	0	0
1992-2012	256,765	-101	466	51,219	0	0
Financial wealth	151,654	1,822	2,327	52,095	736	1,137
Net financial wealth	151,654	1,247	2,734	52,095	635	1,214
Age of household head	358,870	55	13	138,791	43	13
# of working household members	358,870	1.5	1.0	138,791	1.4	0.7
Family size	358,870	3.3	1.3	138,791	3.3	1.1
# of household members aged 65 and over	358,870	0.6	0.8	138,791	0.2	0.5
# of household members aged 15 and younger	358,870	0.6	1.0	138,791	1.1	1.0
Male dummy (household head)	358,870	0.9	0.2	138,791	0.9	0.3

- ✓ Average annual income of households is about 7 million yen for homeowners and 5.5 million yen for renters.
- ✓ Average asset value of housing wealth for homeowner households is about 32.6 million yen (86% of which are land).
- ✓ Annual capital gains/losses for homeowner households is almost zero when averaging the whole period.
- ✓ By dividing the period, average annual capital gain were 2.5 million yen during the bubble period (until 1991).

3. METHODOLOGY

- Run regressions based on the standard PI/LC hypothesis, which considers consumption is determined by the level of the permanent income (≡ human capital + financial assets + real assets).

- For the non-human capital part, we used the estimated value of housing wealth for real assets (HW), and reported numbers in the FIES for financial assets (FW). For the human capital part, we used information such as household income, job type of household's head, etc. as proxy variables.

$$C_i = \beta_0 + \beta_1 HW_i + \beta_2 FW_i + \beta_3{}' Z_i + \varepsilon_i,$$

C: household cons., HW: housing wealth, FW: financial wealth, Z: control variables.

- And as other control variables, we included age of household's head, number of family members, number of young family members, prefecture dummy, year dummy, month dummy, and cohort dummy, etc.

3. METHODOLOGY (CONT.)

- Need to note that the obtained coefficients may be distorted due to the existence of some omitted variables in the cross-section regression of the specification above. At least three possibilities.

① If households who just bought houses are included in the sample, estimated MPCs are likely to be biased positively due to the hike of durable goods expenditures after the house purchases.

← We removed homeowner households that live in a house of less than one year from its construction from our sample to cope with the problem.

3. METHODOLOGY (CONT.)

- Three sources of possible biases (cont.):

② When permanent income is affected by factors that we cannot control, positive correlation between the housing wealth value and the error term leads to a positive bias in our MPC estimates.

  ← We can mitigate the problem by limiting our sample to the retired households, since their human capitals are generally small.

  ← Or, we can deal with the problem by running pseudo panel regression.

③ Heterogeneous preferences among households may lead to a negative bias. (Thrifty households suppress today's consumption to accumulate wealth.)

  ← Employing the pseudo-panel analysis will eliminate this problem.

3. METHODOLOGY（CONT.）

- While the pseudo-panel analysis allows us to eliminate the biases caused by the time-invariant unobserved factors, we end up with a much smaller sample by constructing the panel from our cross-sectional data.

- Moreover, in the studies on the U.K., a cross sectional analysis by Attanasio (2009) and a pseudo-panel based analysis by Campbell and Cocco (2007) had reached conflicting findings.（The former supports the third factors, and the latter supports the pure effects.）

- In the following, we first run cross-sectional regressions (while recognizing the possibility of biases) and then run pseudo panel regressions to confirm the robustness of our findings.

4. RESULTS

4.1 Cross-section regressions

Table Cross-section regresson results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Nondurable consumption			Aged 65 or older	Total consumption			Aged 65 or older
Housing wealth	0.0010*** (0.000034)	0.0012*** (0.000079)	0.0012*** (0.000089)	0.0014*** (0.000091)	0.0033*** (0.00013)	0.0035*** (0.00027)	0.0036*** (0.00030)	0.0033*** (0.00032)
Housing wealth * Young			-0.00037*** (0.00013)				-0.00157*** (0.00048)	
Net financial wealth		0.0012*** (0.00006)	0.0012*** (0.000063)	0.0013*** (0.00010)		0.0076*** (0.00028)	0.0080*** (0.00029)	0.0078*** (0.00046)
Net financial wealth * Young			-0.00024 (0.00024)				-0.00457*** (0.0010)	
MPC out of HW for Young			0.00086*** (0.0001)				0.00205*** (0.0004)	
N	497,661	203,749	203,749	54,573	497,661	203,749	203,749	54,573
Adj. R-sq	0.357	0.351	0.352	0.283	0.280	0.299	0.300	0.270

- ✓ Obtained MPCs are all statistically significant and slightly more than 0.001 for nondurable consumption, 0.003-0.004 for total consumption. (columns (1) & (5))

4. RESULTS (CONT.)

4.1 Cross-section regressions（Cont.）

- ✓ When adding financial assets to explanatory variables, the MPC estimates hardly change, while the number of observations grossly gets smaller. (columns (2) & (6))

  => Estimated coefficients seem not to be largely distorted even when we do not include financial assets as an explanatory variable.

- ✓ MPC looks significantly smaller for the young (less than 40 y.o.）households. (columns (3) & (7))

  => PI/LCH based pure wealth effects.

4. RESULTS (CONT.)

4.1 Cross-section regressions（Cont.）

- ✓ Even when we narrowed the sample households to those with heads whose age is 65 or older, the results do not change substantially. (columns (4) & (8))

  ＝＞ Biases caused by changes in human capital that cannot be observed directly seem not to be serious.

- ✓ While MPCs are estimated all significantly, magnitudes of the obtained coefficients look smaller if compared with those in the earlier studies for the developed countries.

  ＝＞ We will carry out a pseudo-panel based analysis below to cope with the possibility that miscellaneous preferences/idiosyncrasies of individual household is giving a negative bias.

4. RESULTS(CONT.)

4.2 Pseudo-panel regressions

- To control household idiosyncratic factors (fixed effect), we construct 38 cohort groups consisting of 19 birth year groups and 2 regional districts (special wards & ordinance cities vs. others).

  By the latter regional division, we can effectively utilize the regional differences in asset price fluctuations during the bubble period.

$$\Delta \ln C_{i,t+1} = \beta_0 + \beta_1 r_{t+1} + \beta_2 \Delta \ln HW_{i,t+1} + \beta_3 \Delta \ln Z_{i,t+1} + \varepsilon_{i,t+1}$$

  Regressions are on a first-difference basis.

  Subscript i stands for a cohort. r is the interest rate.

- We do not include financial assets in the explanatory variables to ensure sufficient number of observations in each cohort group, assuming that correlation between the financial assets and housing assets is not so large.

4. RESULTS(CONT.)

4.2 Pseudo-panel regressions（Cont.）

- Since $\Delta \ln HW$ can be divided into the land price change ($\Delta \ln P$) and the house ownership change ($\Delta \ln Q$), and the latter is considered to be endogenous, we tried the formula of the following form to deal with the endogeneity problem.

$$\Delta \ln C_{i,t+1} = \beta_0 + \beta_1 r_{t+1} + \beta_2 \Delta \ln P_{i,t+1} + \beta_3 \Delta Z_{i,t+1} + \varepsilon_{i,t+1}$$

- As robustness checks, we also tried several alternative specifications that did not take logarithms of the variables.

$$\Delta C_{i,t+1} = \beta_0 + \beta_1 r_{t+1} + \beta_2 (\Delta P_{i,t+1}) \bar{Q}_i + \beta_3 \Delta Z_{i,t+1} + \varepsilon_{i,t+1},$$
$$\Delta C_{i,t+1} = \beta_0 + \beta_1 r_{t+1} + \beta_2 (\Delta P_{i,t+1}) Q_{i,t} + \beta_3 \Delta Z_{i,t+1} + \varepsilon_{i,t+1},$$

4. RESULTS(CONT.)

4.2 Pseudo-panel regressions（Cont.）

Table Pseudo-panel regresson results (log-difference specification)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Δln(ND)		Δln(C)		Δln(ND)		Δln(C)	
Δln(Housing wealth)	0.024***	0.053***	0.041***	0.105***				
	(0.0087)	(0.013)	(0.015)	(0.021)				
Δln(Housing wealth)		-0.054***		-0.114***				
* Young		(0.016)		(0.026)				
Δln(Price)					0.022*	0.035***	0.069***	0.102***
					(0.011)	(0.012)	(0.018)	(0.020)
Δln(Price)						-0.045***		-0.114***
* Young						(0.017)		(0.028)
MPC (β×C/HW)								
Housing wealth	0.0013		0.0049		0.0012		0.0082	
Old		0.0026		0.0111		0.0017		0.0108
Young		-0.0001		-0.0020		-0.0009		-0.0027
N	962	962	962	962	962	962	962	962
Adj. R-sq	0.319	0.338	0.288	0.313	0.314	0.328	0.290	0.308

- ✓ Results do not change even with the Δln$P$ based regressions.

- ➢ Table on the left shows the results of the pseudo-panel regressions, and those when the explanatory variable ΔlnHW are replaced by ΔlnP. Estimated coefficients are elasticities.
- ✓ Lower part of the table shows the MPCs converted from the elasticity coefficients.
- ✓ While the estimates look slightly larger, they are basically the same as those of cross section regressions.
- ✓ By age group, while the estimates for elderly households become larger, those for young households turn zero or negative.

4. RESULTS(CONT.)

4.2 Pseudo-panel regressions（Cont.）

Table Pseudo-panel regresson results (first-difference specification)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	ΔND		ΔC		ΔND		ΔC	
Δ(Price)*Qbar	0.00083**	0.00089**	0.0059**	0.0063***				
	(0.00037)	(0.00038)	(0.0013)	(0.0013)				
Δ(Price)*Qbar * Young		-0.0011		-0.0068**				
		(0.00073)		(0.0027)				
Δ(Price)*Q(-1)					0.00099**	0.00101**	0.0068***	0.0069***
					(0.0004)	(0.0004)	(0.0014)	(0.0014)
Δ(Price)*Q(-1) * Young						-0.0011		-0.0064
						(0.0011)		(0.0043)
N	968	968	968	968	968	968	968	968
Adj. R-sq	0.311	0.321	0.297	0.309	0.312	0.322	0.301	0.310

- ✓ Regardless of whether or not we take logarithm of the explained variable, the results do not change very much.
- ✓ The MPC is roughly 0.001 - 0.007, and the obtained MPC is larger for the elderly households.

Therefore, the results of the pseudo-panel regressions are basically the same as those of the cross section regressions.

4. RESULTS(CONT.)

4.3 Further evidence: homeowners vs. renters

- Regressions so far were on all sample households, following the procedure of the earlier studies. However, a more prudent method to examine housing wealth effects may be to estimate MPCs for homeowners and renters separately.

- While higher land prices may encourage renters to save more in order to be able to afford their own home in the future, they may have the opposite effect, i.e., if renters feel that buying a home is out of reach, they may give up saving for a home.

- Therefore, we run regressions separately for homeowner households and renter households as a robustness check for our wealth effect estimates.

4. RESULTS(CONT.)

4.3 Further evidence: homeowners vs. renters (cont.)

Table Cross-section regresson results: Homeowners only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Nondurable consumption				Total consumption			
				Aged 65 or older				Aged 65 or older
Housing wealth	0.00082***	0.00095***	0.00099***	0.00114***	0.0028***	0.0027***	0.0028***	0.0025***
	(0.000035)	(0.000078)	(0.000085)	(0.000092)	(0.00014)	(0.00027)	(0.00029)	(0.00033)
Housing wealth * Young			-0.00046***				-0.0015***	
			(0.00014)				(0.00055)	
Net financial wealth	No	Yes	Yes	Yes	No	Yes	Yes	Yes
MPC out of HW for Young			0.00053***				0.00126***	
			(0.00012)				(0.00049)	
N	358,870	151,654	151,654	49,264	358,870	151,654	151,654	49,264
Adj. R-sq	0.314	0.303	0.303	0.270	0.263	0.282	0.282	0.255

- ✓ Coefficients obtained for the cross-section regressions only with the homeowner households are significant but slightly smaller than the corresponding estimates with the all households. Further, as before, the MPCs are larger for the older households.

4. RESULTS(CONT.)

4.3 Further evidence: homeowners vs. renters (cont.)

Table Cross-section regresson results: Renters only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Nondurable consumption				Total consumption			
				Aged 65 or older				Aged 65 or older
Housing wealth	0.00019***	0.00021**	0.00040***	0.000092	0.0016***	0.0011***	0.0016***	0.00025
	(0.000049)	(0.000085)	(0.00011)	(0.00027)	(0.00035)	(0.00030)	(0.00040)	(0.00082)
Housing wealth * Young			-0.00040***				-0.0010**	
			(0.00013)				(0.00049)	
Net financial wealth	No	Yes	Yes	Yes	No	Yes	Yes	Yes
MPC out of HW for Young			0.000001				0.00053	
			(0.00010)				(0.00038)	
N	138,122	51,875	51,875	5,276	138,122	51,875	51,875	5,276
Adj. R-sq	0.372	0.373	0.374	0.262	0.305	0.324	0.325	0.310

Note: The independent variable of the regressions in this table, i.e., Housing wealth, are average housing wealth in the city where renters reside.

- ✓ Obtained MPC estimates for renters are smaller, though they are still positive and statistically significant for the old households. MPCs for the young households are close to zero.

4. RESULTS(CONT.)

4.3 Further evidence: homeowners vs. renters (cont.)

- It is also possible to confine our sample households to homeowners and create pseudo-panel data.
- While I won't report the results to save space, we could obtain the coefficients which are statistically significant and similar to those obtained under the sample including renters.
- In sum, the estimation results remain largely unchanged even when we exclude renters from the sample both in the cross-section and in the pseudo-panel regressions.
- Our main finding still holds that the most plausible explanation for the observed co-movement between housing wealth and household consumption in Japan appear to be the pure wealth effects.

4. RESULTS (CONT.)

4.4 Macroeconomic implications

- Based on the parameters obtained and the magnitude of land price fluctuations, how much could the housing wealth effects account for business cycles in Japan during the bubble period?

Table Contribution of changes in land prices to household consumption

Period	Rate of change in land prices (a)	Rate of change in consumption		Explained share (d)=100*((b)/(c))
		Explained (b)=(a) * Elasticity (El.=0.069 from col.(7) of T3)	Actual (c)	
1986-1991	154%	10.6%	33.8%	31%
1991-1994	-41%	-2.8%	8.9%	n.a.

Average rate of annual change in land prices × Estimated Elasticity

= Consumption fluctuations caused by the changes in land prices

Column (d) reports the share of consumption changes that can be explained by the land price fluctuations.

5. CONCLUSION

Our study examined to what extent household consumption responds to changes in housing wealth using Japanese microdata (from the FIES) covering 500,000 households over the period from 1983 to 2012, including the bubble period.

- Findings are summarized as follows:

① There are statistically significant housing wealth effects in Japan, i.e., households with greater housing wealth spend more.

5. CONCLUSION (CONT.)

Findings are as follows (cont.):

② MPC is about 0.001 for nondurable consumption, and 0.004 for total consumption. Obtained estimates look smaller than those reported in other developed countries.

③ Estimates for older households were larger than those for younger households, consistently with the pure wealth effect (PI/LC) hypothesis.

④ Findings appear to be quite robust. We obtain basically the same results from the cross-section analyses and quasi-panel analyses, and irrespective of whether MPCs were estimated with/without the renter households.

5. CONCLUSION (CONT.)

- Future tasks include the following:

① Elucidation of reasons why the MPC for Japanese households looks relatively smaller than that obtained for other developed countries. (e.g. Illiquid real estate markets in Japan may account for the smaller effects.)

② Examination of the possibility that housing wealth effects are nonlinear. (e.g. The wealth effects may become smaller when the asset price fluctuations are large like those during the bubble period.)

③ Comparison between the self-report based subjective asset values and the neighboring transaction price based objective asset values. (We relied on the latter, simply because of the data availability. However, in evaluating wealth effects, the former could be more relevant.)

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