Do Lifelong Experiences of Land and Housing Prices Affect Homeownership in Japan?

April 25, 2021

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Abstract

Using Japanese household data, this paper finds that experiencing land or housing price growth has a positive impact on homeownership. The results are consistent with the belief channel—namely, experiencing price growth affects homeownership by influencing expectations of returns from housing investment.

Keywords Experience, Land prices, Housing Prices, Homeownership

JEL codes D83, D84, R21

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I thank my colleagues at the International Monetary Fund (IMF), especially Toru Kaihatsu, Yosuke Kido, Tomohide Mineyama, Yudong Rao for constructive discussions. This analysis relies mainly on the Japan Household Panel Survey/Keio Household Panel Survey (JHPS/KHPS), which was provided by the Keio University Panel Data Research Center. I am grateful to the Keio University Panel Data Research Center for providing us with these data.

1 Introduction

Buying a home is one of the most important decisions for individuals. Housing investment is also important for the macroeconomy because it drives economic fluctuations, with outstanding aggregate mortgage loans amounting to about one third to one half of GDP in advanced economies. Among the possible drivers of homeownership, this paper examines land or housing price growth, using Japan's household data. It is plausible, for example, to think that if one has experienced a period of high land or housing price growth, he or she may expect higher returns from housing investment (or his or her risk preference may change) and be more likely to be a homeowner.

Economists have paid little attention to the potential impact of price experience on housing investment, whereas regarding stock investment, Malmendier and Nagel (2011) reported that in the United States, those who have experienced high stock returns in their lifetime are more likely to participate in stock investment. The exception is Malmendier and Steiny (2017), who briefly tested if experiencing house price growth affected the homeownership decision using European data. However, they focused on the impact of experiencing inflation rather than experiencing house price growth, and did not analyze, for example, the mechanisms through which experiencing house price growth affects the homeownership decision.

In this light, using data on aggregate land and housing prices in Japan and the Japan Household Panel Survey/Keio Household Panel Survey (JHPS/KHPS) data, this paper conducts a more comprehensive analysis than Malmendier and Steiny (2017), including robustness tests and examination of the drivers of homeownership. This paper starts by testing the impact of experiencing aggregate price growth of *land* on *house* ownership in Japan, and then analyzes the effect of experiencing aggregate price growth of *housing* (which covers both land and building). A key reason for focusing on the prices of land rather than housing is a unique characteristic of housing markets in Japan, where the building part of the housing depreciates very rapidly and markets for used housings are very thin. The majority of households, therefore, may not view spending on the building part of a house as investment but rather as durable consumption, making expectations of land price growth, rather than housing price growth, a more important determinant of housing investment. If so, and if the experience of past price growth forms expectations of future price growth, experiencing land price growth could better explain homeownership than experiencing housing price growth. In Japan, land also enjoyed a special status through the collapse of the housing price bubble in the early 1990s. Until then, a "land myth" that land prices would never decline existed in Japan (e.g., Ito (1993)).

This paper makes three main contributions. First, the paper finds that in Japan, experiencing land or housing price growth has a positive impact on homeownership. The estimates imply that a one percentage point increase in experiencing real land or housing price growth may raise the probability of homeownership by [1–3] percentage points. The size of the estimates varies with the price index, but the statistical significance of the results is robust with respect to the choice of the price index. Analysis exploiting the panel structure of the data suggests that the results are not subject to individual-specific unobservable fixed factors. Second, the paper compares results using Japanese data with those using US data and finds no clear evidence of the effects on homeownership of the "land myth" that was said to exist in Japan. Finally, this paper examines the mechanisms through which experiencing price growth affects homeownership and presents results consistent with the belief channel—namely, experiencing price growth affects homeownership by influencing expectations of returns (or risk) from housing investment. The analysis using US data also provides evidence consistent with the belief channel. These results, however, do not rule out the possibility of an alternative preference channel.

The structure of the paper is as follows. The next section presents a literature review, Section 3 describes the data, and Section 4 presents the econometric model and reports the results, followed by conclusions.

2 Related Literature

This paper is related to two adjacent areas of research on homeownership: i) effects of social influence on homeownership and ii) impact of own experiences on expectations of returns and risk from housing investment.

In the first area, Pan and Pirinsky (2015) identified evidence of social influence in home purchases within ethnic groups, and Bayer, Mangum, and Roberts (2021) found a positive impact of nearby housing investment activity on the likelihood that an individual purchases a home. More recently, Bailey, Cao, Kuchler, and Stroebel (2018) found that those whose geographically distant friends experiencing larger home price increases are more likely to purchase a home when they are connected through Facebook. Although not a purely empirical study, using an experimental method, Baddeley (2011) also confirmed social influence on the demand for homes, by showing that one's willingness to pay for a home is affected by others' decisions.

In the second area of the effects of own experiences on expectations, Kuchler and Zafar (2019) found that own experiences of recent local home prices affect expectations about future aggregate home price changes in the United States using the US Survey of Consumer Expectations (SCE). Armona, Fuster, and Zafar (2019) reached a similar conclusion using the same data set. Before these studies, Nagel (2012) also reported that households' experiencing local home price growth influenced their expectations of home price growth. Lastly, Adelino, Schoar, and Severino (2018) reported that the decision to become a homeowner correlates with the perceptions of home price risk, and that households update home price risk in response to past local home price changes.

These findings are consistent with the view that own experiences affect expectations (belief channel), but do not exclude the possibility that own experiences may affect preferences such as risk aversion (preference channel). It is, however, generally challenging to distinguish these two channels (e.g., Schildberg-Horisch (2018)). For example, Malmendier and Nagel (2011) reported that households' stock investment behavior in the United States is consistent with the belief channel, but they were not able to rule out the possibility of the preference channel.

A question not addressed by the studies above is whether *own* experience of prices affects the *decision* to become a homeowner, whereas among studies of stock investment, Malmendier and Nagel (2011) reported that for the United States, those who have experienced high stock returns in their lifetime are more likely to own stocks. An exception is Malmendier and Steiny (2017) who partially addressed this gap, by examining the impact of experiencing house price growth on homeownership with European data using the methodology proposed by Malmendier and Nagel (2011). While they found a positive impact of experiencing house price growth on homeownership, they focused on the impact of experiencing inflation rather than house price growth, and did not conduct comprehensive robustness tests or analyze the mechanisms by which experiencing house price growth affects the homeownership decision.

3 Data

This section describes the JHPS/KHPS data and Japanese aggregate land and housing price data used in this paper.

3.1 JHPS/KHPS Data

This paper uses JHPS/KHPS data in Japan, which are annual panel data covering detailed demographic variables as well as household-level economic variables (e.g., income, wealth). The KHPS and JHPS were initially conducted separately; the former started in 2004, while the latter started in 2009. In 2014, the KHPS and JHPS were merged into a single survey.

There are two major advantages of using the JHPS/KHPS data. First, it has a panel structure, allowing us to control for individual-specific fixed factors. The second advantage is its large sample size, with [30,635] observations for the main specification below, the JHPS/KHPS is the longest panel dataset for Japan.

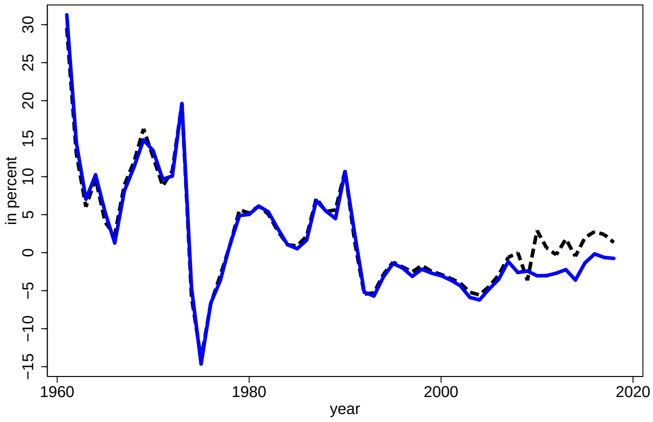
3.2 Land and Housing Price Data

The analysis uses data on aggregate real residential land or housing prices in Japan. Data on nation-wide real residential land prices are available from 1955, while that on real housing prices are from 1960.[1] This long times-series dataset allows us to calculate lifelong experienced real residential land (or housing) price growth for a large number of the households in the JHPS/KHPS data. This is an important advantage because this limits the number of observations that are dropped from the final dataset for the regression analysis due to missing observations of lifelong experienced price growth.

Figure 1 shows that the annual growth rates of real residential land prices (solid line) and real housing prices (dashed line) move in parallel. More formally, regressing real housing price growth on real residential land price growth gives a highly significant

[1] The former is from Japan Real Estate Research Institute, and the latter is from OECD (originally from the Japanese Ministry of Land, Infrastructure, Transport and Tourism).

Figure 1 Real Residential Land Price Growth (solid line) vs Real Housing Price Growth (dashed line) (in percent)



Notes: Real residential land prices are calculated using whole country Urban Land Price Index (source: Japan Real Estate Research Institute) and CPI. Real housing prices are from OECD (originally from the Japanese Ministry of Land, Infrastructure, Transport and Tourism).

coefficient of the latter at 0.93. The high correlation is driven by the fact that a large portion of housing value is land value in Japan. According to households' responses in the JHPS/KHPS data, the average share of land value in total house value is about 64 percent.

For each respondent in the JHPS/KHPS data, this paper calculates the lifelong weighted average of i) real residential land price growth and ii) real housing price growth. Specifically, this paper follows Malmendier and Nagel (2011) and assumes that the weighted average for respondent i in year t takes the following form:

$$A_{i,t}(\lambda) = \sum_{k=1}^{age_{i,t}-1} w_{i,t}(k,\lambda) G_{t-k}, \tag{1}$$

where $w_{i,t}(k,\lambda)$ is the weight and G_{t-k} is the real price growth (in percent) in year $t-k$. The function form of $w_{i,t}(k,\lambda)$ is

$$w_{i,t}(k,\lambda) = \frac{(age_{i,t}-k)^{\lambda}}{\sum_{k=1}^{age_{i,t}-1}(age_{i,t}-k)^{\lambda}}, \tag{2}$$

where λ governs the shape of $w_{i,t}$. A positive λ implies heavier weights for more recent growth rates, whereas a negative λ implies the opposite ($\lambda = 0$ implies equal weights for all past years). For example, if $\lambda = 1.0$ and the age is 40 years, the weight assigned to one year ago is 5.0 percent, while that assigned to 10 years ago declines to 3.8 percent.

3.3 Summary Statistics

Table 1 reports means over the period 2005–2019 for the combined JHPS/KHPS and residential land price data.[2] The share of households owning a house (mean of the dummy of owning a house) rises as the main earner in the household ages over time. The three economic variables—weighted average of real residential land price growth, real household income, and real household net worth—deteriorated following the global financial crisis that started in 2008. As the main earner ages over time, the family size shrinks while the health condition of the main earner worsens.

4 Econometric Analysis

This section presents the econometric model and reports the empirical results.

4.1 Econometric Model

With the weighted average introduced in Section 3.2, this paper estimates the following equation, while also searching for the values of λ that minimize the sum of the squared residuals ($= \epsilon_{i,t}^2$) across households (across i):

$$DHouseOwn_{i,t} = \beta_0 + \beta_1 A_{i,t}(\lambda_{land}) + \beta_2 I_{i,t}(\lambda_{inf}) + \beta_3 Z_{i,t} + \epsilon_{i,t}, \tag{3}$$

where $DHouseOwn_{i,t}$ is the dummy indicating whether household i owns a house in year t, $A_{i,t}(\lambda_{land})$ is the weighted average of real residential land price growth and β_1 attached to $A_{i,t}(\lambda_{land})$ is the coefficient of primary interest. Past experience of inflation rates may also positively affect the decision to own a house because owning a house is a hedge against higher inflation. Following Malmendier and Steiny (2017), to control for this effect I add the weighted average of inflation rates $I_{i,t}(\lambda_{inf})$ which has the same function form as $A_{i,t}(\lambda_{land})$ (equation (1)), while allowing different values of λs for real land price growth and inflation rates ($\lambda_{land} \neq \lambda_{inf}$).

$Z_{i,t}$ is a vector of controls comprising real household income in the previous year ($y_{i,t-1}$), real household net worth in year t ($rnetworth_{i,t}$) (both deflated by the 2018 CPI for Japan), and other controls, including the age of the main earner, age squared, dummy variables denoting the sex of the main earner and marriage status, family size, 11 occupation dummies of the main earner[3], dummy variables denoting the health condition of the main earner is good and the main earner smokes, and year dummies.

[2] Table 1 does not report means in 2004 because the sample for that year is small, but the regression analysis below uses data for 2004 as well.

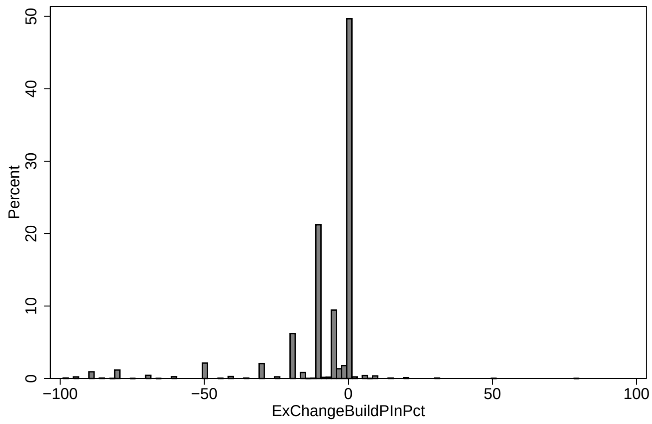
[3] The 11 occupations are agriculture, forestry, or fishery worker; mine worker; salesperson; service worker; manager; clerical worker; transportation or communications worker; manufacturing, construction, maintenance, or freight worker; information technology engineer; specialized or technical worker excluding IT engineer; public safety employee.

Table 1 Means of Key Variables

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
dummy of owning house	0.44	0.50	0.50	0.52	0.52	0.54	0.55	0.54	0.55	0.57	0.57	0.58	0.61	0.62	0.60
Weighted real residential land price growth (in percent): $\lambda = 0$	0.36	0.24	0.04	0.00	-0.19	-0.28	-0.33	-0.51	-0.57	-0.57	-0.65	-0.65	-0.62	-0.63	-1.09
real household income in the previous year (10k yen)	678	703	707	730	723	726	741	744	736	758	742	774	765	769	747
real household net worth (10k yen)	1310	1430	1490	1470	1400	1390	1500	1350	1360	1480	1570	1600	1690	1730	1700
age (main earner)	37.3	38.6	39.1	40.1	40.1	41.1	42.3	42.5	43.6	44.9	45.9	47.0	48.1	48.9	46.0
dummy of male (main earner)	0.78	0.76	0.77	0.75	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.76
dummy of marriage	0.70	0.71	0.70	0.72	0.71	0.72	0.73	0.73	0.73	0.75	0.74	0.75	0.76	0.76	0.72
family size	3.54	3.62	3.63	3.63	3.52	3.55	3.53	3.46	3.45	3.44	3.35	3.33	3.35	3.32	3.25
dummy of good health (main earner)	0.29	0.26	0.25	0.25	0.27	0.28	0.21	0.17	0.18	0.16	0.14	0.14	0.14	0.13	0.16
dummy of smoking (main earner)	0.48	0.45	0.41	0.39	0.41	0.39	0.34	0.34	0.34	0.30	0.29	0.29	0.28	0.27	0.25
Number of observations (respondents)	973	1,055	1,495	1,396	2,523	2,423	2,288	2,567	2,414	2,381	2,239	2,129	1,988	1,935	2,810

Notes: The sample is JHPS/KHPS 2005–2019 (figures in 2004 are omitted here because the sample for that year is small, but the regression analysis below uses data in 2004 as well). Real income in the previous year and real net worth are measured using 2018 prices (CPI).

Figure 2 Histogram: Expectation of 1-Year Nominal Change in Building Price (in percent)



Notes: The source is JHPS/KHPS 2004–2019, and the data cover households that own a house.

4.2 Main Results

The analysis starts with land prices and then shifts to housing prices. A key reason for focusing on land prices is the unique characteristics of Japanese housing markets: the building part of the housing depreciates very rapidly and markets for used housings are very thin. Indeed, in the JHPS/KHPS, on average households that own housing expect the price of their building to decline by 8.0 percent over the next year. Figure 2 plots the distribution of the JHPS/KHPS house owners' 1-year forward expectations of nominal changes in the building price, confirming that only 1 percent of the households that own a house expect the price of the building part of their house to rise nominally over the next year (49 percent of the households expect the building price to decline and 50 percent of them expect no price change).

In equation (3), the coefficient of the weighted average of real residential land price growth is positive and statistically significant at the 1 percent level (first column of Table 2). The estimate of λ_{land} is -0.77 and that of λ_{inf} is -1.81.[4] The estimated coefficient of the weighted average implies that a one percentage point increase in the lifelong weighted average of real residential land price growth raises the likelihood of owning a house by 2 percent. When using the dummy of owning either a house or a condominium ($DHomeOwn$) as the dependent variable (instead of the dummy of owning a house $DHomeHouse$), the coefficient of the weighted average remains significant but the statistical significance declines with larger standard deviations. This is not a preferred specification because residential land price growth may be less relevant for owners of a condominium than for owners of a house because the share of land value is lower for a condominium.[5]

[4]The standard errors are 0.31 and 0.51, respectively.

[5]In Japan, the building part generally depreciates more slowly for a condominium than for a house. This may also

Table 2 Impact of Experiencing Real Residential Land Price Growth (Japan)

VARIABLES	(1) OLS *DHouseOwn* λs at solution	(2) OLS *DHomeOwn* λs at solution
Weighted ave. of real residential land price growth (λ_{land} at solution)	0.018	0.017
	(0.006)***	(0.008)**
Weighted ave. of inflation rates (λ_{inf} at solution)	0.012	0.014
	(0.004)***	(0.005)**
Observations	30,635	30,635
R-squared	0.195	0.218

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The sample is JHPS/KHPS 2004–2019. The dependent variable is the dummy of owning a house (*DHouseOwn*) in the first column and the dummy of owning either a house or a condominium (*DHomeOwn*) in the second column. Robust standard errors, which are estimated under the assumption that residuals of the same household are correlated across years, are reported in parentheses. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

The results are robust to the choice of the land price index. In housing investment, in principle *residential* land prices must be more relevant than *overall* land prices, but households may not distinguish them carefully (for example, if one hears about land prices through news reports, he or she may not be able to identify if they are referring to residential or overall land prices). Table 3 reports that using overall land price growth, instead of residential land price growth used so far, gives significant coefficients on the weighted average.[6] The first column of the table reports the results when using the dummy of owning a house as the dependent variable. The second column presents the results when changing the dependent variable to the dummy of owning either a house or a condominium (*DHomeOwn*), although this is not a preferred specification as noted earlier (in the case of the second column of Table 2).

The analysis also confirms that experiencing real *housing* price growth has a positive impact on the decision to own a house. The sample size is smaller than when using real residential (or overall) land data because the data on real housing prices are available for a shorter period. In the first column of Table 4, the coefficient of the weighted average of real housing price growth is 0.004 and significant at the 1 percent level. The size of this coefficient is smaller than that reported in the first column of Table 2, (0.018). This is consistent with the argument (in the introductory section) that experiencing land price growth may be a more powerful predictor of homeownership.

The real housing price data used here cover prices of condominiums, as well as those of land and houses. Therefore, it may make more sense to use the dummy of owning either a house or a condominium as the dependent variable. The second column of Table 4 reports that when using this dummy, the coefficient of the weighted average of real

reduce the relative importance of land price growth for a condominium by increasing the importance of the price of the building part.

[6]Data on overall land price growth are from Japan Real Estate Research Institute, like those on residential land price growth.

Table 3 Impact of Experiencing Real Land Price Growth (Japan)

VARIABLES	(1) OLS $DHouseOwn$ λs at solution	(2) OLS $DHomeOwn$ λs at solution
Weighted ave. of real land price growth (λ_{land} at solution)	0.024	0.018
	(0.007)***	(0.008)**
Weighted ave. of inflation rates (λ_{inf} at solution)	0.017	0.018
	(0.005)***	(0.007)***
Observations	30,635	30,635
R-squared	0.196	0.218

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is JHPS/KHPS 2004–2019. The dependent variable is the dummy of owning a house ($DHouseOwn$) in the first column and the dummy of owning either a house or a condominium ($DHomeOwn$) in the second column. Robust standard errors, which are estimated under the assumption that residuals of the same household are correlated across years, are reported in parentheses. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

housing price growth is higher than that reported in the first column of the table. The coefficient implies that a one percentage point increase in the lifelong weighted average of real housing price growth raises the probability of owning a home (either a house or a condominium) by about 1.2 percent.

4.3 Robustness

So far, the results are robust to different price indexes (real residential land price, overall real land price, and real housing price). This subsection investigates the robustness of the results further, taking advantage of the panel structure of the data.

The analysis in Section 4.2 may be affected by individual-specific unobservable factors. In particular, a household may purchase a home expecting favorable future income and wealth developments (e.g., promotion, inheritances from parents in the near future), but the analysis so far has not controlled for such expectations. The panel structure of the JHPS/KHPS data allows us to address this issue by including future income and wealth variables.

The results do not change much after including future income and wealth variables. When adding future income and wealth variables over two years (i.e., $y_{i,t}$, $y_{i,t+1}$, $rnetworth_{i,t+1}$, $rnetworth_{i,t+2}$), the coefficient of the weighted average of price growth is significant across specifications although the sample size decreases (first three columns of Table 5). Adding further future variables ($y_{i,t+2}$ and $rnetworth_{i,t+3}$) does not change the results much (not reported here).

Unobservable factors are not limited to future financial variables, and the fixed effects (FE) estimation can control for unobservable fixed factors generally. The last three columns of Table 5 report that FE estimation gives similar results, implying that the results in Section 4.2 are robust after controlling for unobservable fixed factors.

Table 4 Impact of Experiencing Real Housing Price Growth (Japan)

VARIABLES	(1) OLS $DHouseOwn$ λs at solution	(2) OLS $DHomeOwn$ λs at solution
Weighted ave. of real housing price growth (λ_{house} at solution)	0.004	0.012
	(0.001)***	(0.006)**
Weighted ave. of inflation rates (λ_{inf} at solution)	0.009	0.016
	(0.003)***	(0.005)***
Observations	25,256	25,256
R-squared	0.203	0.229

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The sample is JHPS/KHPS 2004–2019. The dependent variable is the dummy of owning a house ($DHouseOwn$) in the first column and the dummy of owning either a house or a condominium ($DHomeOwn$) in the second column. Robust standard errors, which are estimated under the assumption that residuals of the same household are correlated across years, are reported in parentheses. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

4.4 Discussion about Mechanisms

This subsection discusses the mechanisms through which experience of price growth affects homeownership. There are two possible channels:

- Belief channel. Information on experiencing real land or housing price growth may be used to form expectations of returns from housing investment.
- Preference channel. Experiencing real land or housing price growth may affect preferences (e.g., risk aversion).

While the JHPS/KHPS data do not allow us formally to test one channel against another, the results below do not contradict the belief channel.

If one forms expectations of returns from housing investment using information on experiencing real land or housing price growth and then decides whether to own a home based on the expected returns, this decision made by those who have expertise in housing markets may be less likely to be affected by the experienced price growth. This is because such people have good information about housing markets, independent of their own experience of price growth. To test this hypothesis, I consider the dummy indicating that the main earner in the household works in the real estate industry, and include the interaction term of this dummy and the weighted average of price growth (the dummy itself is also included as a control). If this hypothesis holds, the coefficient of the interaction term should be negative.

Although the results are not strong, they are consistent with the hypothesis that those with expertise in housing markets are less likely to be affected by the experienced price growth. The first column in Table 6 reports that when using the dummy of owning a house as the dependent variable, the coefficient of the dummy of working in the real estate industry interacted with the weighted average of real residential land price growth

Table 5 Testing Robustness (Japan)

VARIABLES	(1) OLS $DHouseOwn$	(2) OLS $DHouseOwn$	(3) OLS $DHomeOwn$	(4) FE $DHouseOwn$	(5) FE $DHouseOwn$	(6) FE $DHomeOwn$
Weighted ave. of real residential land price growth	0.0190			0.0279		
	(0.0075)**			(0.0057)***		
Weighted ave. of inflation rates	0.0136			0.0119		
	(0.0047)***			(0.0034)***		
Weighted ave. of real land price growth		0.0257			0.0392	
		(0.0094)***			(0.0068)***	
Weighted ave. of inflation rates		0.0183			0.0185	
		(0.0061)***			(0.0044)***	
Weighted ave. of real house price growth			0.0147			0.0138
			(0.0072)**			(0.0059)**
Weighted ave. of inflation rates			0.0181			0.0127
			(0.0064)***			(0.0049)***
Household income $y_{i,t}$	0.0050	0.0050	0.0069	0.0038	0.0038	0.0045
	(0.0009)***	(0.0009)***	(0.0011)***	(0.0005)***	(0.0005)***	(0.0007)***
Household income $y_{i,t+1}$	0.0033	0.0033	0.0048	0.0031	0.0031	0.0030
	(0.0009)***	(0.0009)***	(0.0012)***	(0.0005)***	(0.0005)***	(0.0007)***
Net worth $rnetworth_{i,t+1}$	0.0013	0.0013	0.0012	0.0008	0.0008	0.0008
	(0.0002)***	(0.0002)***	(0.0002)***	(0.0001)***	(0.0001)***	(0.0001)***
Net worth $rnetworth_{i,t+2}$	0.0008	0.0008	0.0007	0.0005	0.0005	0.0005
	(0.0003)***	(0.0003)***	(0.0002)***	(0.0001)***	(0.0001)***	(0.0001)***
Observations	17,545	17,545	14,436	17,545	17,545	14,436
R-squared	0.2003	0.2007	0.2374			
Number of panelid				3,085	3,085	2,553

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is JHPS/KHPS 2004–2019. The dependent variable is the dummy of owning a house ($DHouseOwn$) in the first, second, fourth, and fifth columns and the dummy of owning either a house or a condominium ($DHomeOwn$) in the rest of the columns. λs estimated in Table 2 are used for the first and fourth columns, those in Table 3 are used for the second and fifth columns, and those in Table 4 are used for the third and last columns. Robust standard errors, which are estimated under the assumption that the residuals of the same household head are correlated across years, are reported in parentheses. Household income and net worth are deflated by 2018 prices (CPI) and measured in millions of yen. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

Table 6 Effect of Expertise in Housing Markets (Japan)

VARIABLES	(1) OLS $DHouseOwn$	(2) OLS $DHouseOwn$	(3) OLS $DHomeOwn$
Dummy of real estate ind. × weighted ave. of real price growth	-0.006	-0.011	-0.051
	(0.015)	(0.017)	(0.027)*
Weighted ave. of real residential land price growth	0.018		
	(0.006)***		
Weighted ave. of real land price growth		0.024	
		(0.007)***	
Weighted ave. of real house price growth			0.013
			(0.006)**
Dummy of real estate ind. × weighted ave. of inflation rates	0.026	0.029	0.027
	(0.014)*	(0.016)*	(0.017)
Weighted ave. of inflation rates	0.012		
	(0.004)***		
Weighted ave. of inflation rates		0.016	
		(0.005)***	
Weighted ave. of inflation rates			0.016
			(0.005)***
Dummy of real estate ind.	-0.131	-0.144	0.041
	(0.095)	(0.088)	(0.128)
Observations	30,635	30,635	25,256
R-squared	0.196	0.196	0.230

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: The sample is JHPS/KHPS 2004–2019. The dependent variable is the dummy of owning a house ($DHouseOwn$) in the first two columns and the dummy of owning either a house or a condominium ($DHomeOwn$) in the last column. λs used for the three columns in this table are those estimated in Tables 2, 3, and 4, respectively. Robust standard errors, which are estimated under the assumption that residuals of the same household are correlated across years, are reported in parentheses. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

is indeed negative but insignificant. The coefficient of the interaction term is consistently negative in other specifications (see second and third columns in Table 6). The negative coefficient of the interaction term is significant when using the dummy of owning a house or a condominium $DHomeOwn$ (as the dependent variable) and the weighted average of real housing price growth (third column of the table).

4.5 Comparison with US Results

This subsection compares the results above with those using US data and discusses whether the effects of the "land myth" remain in Japan. As we will see, this paper does not find clear evidence of the effects of the "land myth."

For the United States, this paper uses the Panel Study of Income Dynamics (PSID), which are the most appropriate data for making this comparison as it is household panel data (just like the JHPS/KHPS). The analysis below uses PSID 1999–2019 (see the appendix for more details about the data).

When using data on aggregate residential land prices (and the PSID), the coefficient of their weighted average is highly significant as in the case of using Japanese data

Table 7 Impact of Experiencing Real Residential Land Price Growth (US)

VARIABLES	(1) OLS *DHomeOwn* λs at solution	(2) FE *DHomeOwn* λs at solution
Weighted ave. of real residential land price growth (λ_{land} at solution)	0.015	0.018
	(0.004)***	(0.003)***
Weighted ave. of inflation rates (λ_{inf} at solution)	0.036	0.026
	(0.006)***	(0.005)***
Observations	60,348	60,348
R-squared	0.443	
Number of id		12,875

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is PSID 1999–2019. The dependent variable is the dummy of owning a home (either a house or a condominium) (*DHomeOwn*). Robust standard errors, which are estimated under the assumption that residuals of the same head are correlated over time, are reported in parentheses. Control variables are household real income in the previous year; household real net worth in the current year; household head's age; age squared; dummy variables denoting the sex of the household head, marriage, whether the household head is white, and whether the household head has a college degree; number of children in the household; eight household head occupation dummies (professional and technical workers, managers (not self-employed), managers (self-employed), clerical and sales workers, craftspersons, operatives and laborers, farmers and farm laborers, and service workers); five region dummies identifying household location (northeast, north-central, south, west, and others (Alaska and Hawaii)) interacted with time dummies; and dummies indicating the household head's health condition (excellent, very good, good, or fair) and whether the household head is a smoker. Household real income and household real net worth are in logs because their distribution is more skewed than that in the Japanese data (JHPS/KHPS data).

(JHPS/KHPS).[7] As the dependent variable, the regression uses the dummy of owning a home (either a house or a condominium) because the PSID does not identify ownership of a house or a condominium. The OLS and FE coefficients on the weighted average of real residential land price growth are positive and significant (Table 7). These estimates are comparable to the coefficient of the weighted average obtained using Japanese data (second column of Table 2) because the definitions of the dependent and key independent variables are the same in both cases. The estimates using the PSID are similar to those obtained using Japanese data and reported in the second column of Table 2 (0.017).

The regression using aggregate *house* prices also gives positive results.[8] The coefficient of the weighted average of real house price growth is positive and significant (Table 8). Although the definitions of the housing price data are not identical between Japan and the United States,[9] the coefficient of the weighted average reported in the first column of Table 8 could be compared with that in the second column of Table 4 (0.012), and the former is higher, failing to provide support for the "land myth" in Japan.

[7]Data on residential land prices are available from 1930. The methodology used to construct the data on residential land prices is described in Davis and Heathcote (2007) and the updated data prepared by the authors are available at `https://www.aei.org/historical-land-price-indicators/`.

[8]Data on real house prices are available since 1913. Real house price data are produced using US CPI and Shiller's nominal house price data available at `http://www.econ.yale.edu/~shiller/data/Fig3-1.xls`. While the latter is available from 1890, the former is available from 1913.

[9]While both Japanese and US house price data cover prices of housing including land, only the Japanese data capture prices of condominiums (US data do not).

Table 8 Impact of Experiencing Real House Price Growth (US)

VARIABLES	(1) OLS *DHomeOwn* λs at solution	(2) FE *DHomeOwn* λs at solution
Weighted ave. of real house price growth (λ_{house} at solution)	0.038	0.028
	(0.007)***	(0.005)***
Weighted ave. of inflation rates (λ_{inf} at solution)	0.034	0.029
	(0.006)***	(0.005)***
Observations	63,506	63,506
R-squared	0.439	
Number of id		13,516

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is PSID 1999–2019. The dependent variable is the dummy of owning a home (either a house or a condominium) (*DHomeOwn*). Robust standard errors, which are estimated under the assumption that residuals of the same head are correlated over time, are reported in parentheses. For descriptions of the control variables, see notes to Table 7).

As shown below, the US data also provide results that are consistent with the belief channel. The US SCE allows us to investigate more thoroughly (than Japan's JHPS/KHPS data) the mechanisms through which experiencing price growth affects the homeownership decision because the SCE collects information on households' perceptions about investing in housing and their expectations of future home prices.[10] The analysis below uses only the SCE as a cross-sectional data because each household remains in the sample for only up to 12 months, by focusing on the most recent observations for each household (see Table 13 for more details about the SCE data).

Regression analysis using the SCE suggests that the perception that buying property is a good investment has a positive impact on home purchases and that experiencing house price growth drives such a perception. The first column of Table 9 reports that regressing the homeownership dummy on the dummy indicating the perception that buying property in the respondent's zip code is a good investment (very good investment or somewhat good investment) gives a positive but insignificant coefficient of the latter dummy.[11] However, when restricting the sample to renters (those who were renters one year before the survey) and changing the dependent variable to the dummy of a home *purchase* during the past year, the coefficient of the dummy indicating that buying property is a good investment becomes statistically significant (second column of Table 9). The last column of the table reports that the perception that buying property is a good investment is driven by experiencing aggregate real house price growth.

[10]The data source is the SCE, © 2013–2020 Federal Reserve Bank of New York (FRBNY). The SCE questions are available without charge at http://www.newyorkfed.org/microeconomics/sce and may be used subject to license terms posted there. FRBNY disclaims any responsibility or legal liability for this analysis and interpretation of the SCE data.

[11]Specifically, the SCE asks the following: *"If someone had a large sum of money that they wanted to invest, would you say that relative to other possible financial investments, buying property in your zip code today is: 1. A very good investment; 2. A somewhat good investment; 3. Neither good nor bad as an investment; 4. A somewhat bad investment; 5. A very bad investment."*

Table 9 Motivation for Owning/Purchasing Home (US)

VARIABLES	(1) OLS *DHomeOwn*	(2) OLS *DHomePurchase*	(3) OLS Dum that buying property is good λs at solution
Dummy indicating that buying property is a good investment	0.007	0.047	
	(0.010)	(0.014)***	
Weighted ave. of real house price growth (λ_{house} at solution)			0.054
			(0.017)***
Weighted ave. of inflation rates (λ_{inf} at solution)			-0.018
			(0.007)***
Observations	6,744	2,045	6,657
R-squared	0.229	0.108	0.033

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is SCE 2014–2019. The dependent variable is the dummy of owning a home in the first column, the dummy of a home purchase in the second column, and the respondent thinks that buying property in his/her zip code today is a good investment (either a very good investment or a somewhat good investment). Robust standard errors are reported in parentheses. λs are estimated to minimize the sum of the squared residuals in equation (3). Control variables not reported in the table are the log of family income over the past year (deflated with US CPI), age, age squared, dummy variable of the sex of the respondent, dummy variable denoting marriage, dummy variable indicating whether the respondent is white, number of children in the household, dummy variable indicating whether the household head has a college degree, and four region dummies identifying the household location (Northeast, Midwest, South, and West) interacted with time dummies.

Does experiencing house price growth form the perception that buying property is a good investment through the belief channel (i.e., by affecting expectations of returns from housing investment) or the preference channel? As a first step to addressing this question, the first three columns of Table 10 confirm that all of the following expectation variables of home price growth (reported by the SCE) have a positive impact on the perception that buying property is a good investment: i) expectations of 1-year home price growth (in percent), ii) expectations of 1-year home price growth in *two years* (in percent), iii) expectations of five-year home price growth *in the respondent's zip code* (in percent).

Now, regressing each of these expectation variables on experiencing aggregate house price growth gives a positive coefficient. The coefficient is positive in all cases and significant in the two two cases (last three columns of Table 10).[12] These results are consistent with the belief channel (experiencing house price growth affects expectations of home price growth).

5 Conclusions

This paper finds that in Japan, experiencing land or housing price growth has a positive impact on homeownership. The results are not sensitive to price indexes and are not

[12]For house prices, nominal values used as expectation variables are reported in nominal terms.

Table 10 Role of Price Expectations (US)

VARIABLES	(1) OLS Dum that buying property is good	(2) OLS Dum that buying property is good	(3) OLS Dum that buying property is good	(4) OLS Exp. of 1-yr price growth λ at solution	(5) OLS Exp. of 1-yr price growth in 2 yrs λ at solution	(6) OLS Exp. of 5-yr price growth in resp zip (annualized) λ at solution
Exp. of 1-yr home price growth (in pct)	0.0026 (0.0009)***					
Exp. of 1-yr home price growth in *2 yrs* (in pct)		0.0022 (0.0008)***				
Exp. of 5-yr home price growth *in resp's zip* (annualized, in pct)			0.0067 (0.0011)***			
Weighted ave. of nominal house price growth (λ at solution)				1.058 (0.472)**	0.241 (0.270)	1.222 (0.440)***
Observations	6,657	6,657	4,971	14,305	11,988	4,971
R-squared	0.0326	0.0324	0.0412	0.034	0.036	0.012

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: The sample is SCE 2014–2019 for the third and last columns and SCE 2013–2019 for the rest of the columns. The dependent variable is the dummy that the respondent thinks that buying property in his/her zip code today is a good investment (either a very good investment or a somewhat good investment) in the first three columns, the expectation of 1-year nominal home price growth in the fourth column, the expectation of 1-year nominal home price growth *two years from now* in the fifth column, and the expectation of 5-year nominal home price growth *in the respondent's zip code* (annualized) in the last column (the last three variables expressed in percentage terms). Robust standard errors are reported in parentheses. For the last three columns, λ is estimated to minimize the sum of the squared residuals, using data on US aggregate nominal house price growth. For a description of the control variables not reported in the table, see notes to Table 9).

subject to individual-specific unobservable fixed factors. The paper finds similar results for the United States.

The results using Japanese (and US) data are consistent with the belief channel—namely, experiencing price growth affects homeownership by influencing expectations of returns from housing investment, but do not rule out the possibility of an alternative preference channel. An area of future research, therefore, is identifying more precisely the mechanisms through which experience of land or housing price growth affects homeownership. Household surveys on motivations for homeownership, if conducted, would allow us to undertake such research.

A Appendix

A.1 Importance of Idiosyncratic Information

This subsection reports that in Japan, idiosyncratic information (information households obtain locally) is more important than the experience of aggregate price growth for homeowners to form their expectations of price growth of the land or housing they own. This is in contrast with the finding in the main text that the experience of aggregate price growth has a positive impact on homeownership.

In principle, once a household becomes a homeowner, its expectations of price growth of the land or housing it owns could be less influenced by the experience of aggregate land or housing price growth. This is because when a household becomes a homeowner, generally it has better access to idiosyncratic information on the price of its property. For example, it may obtain such information when paying local property tax and when receiving flyers advertising properties in the neighborhood.

Indeed, using the JHPS/KHPS data, I find no evidence of a positive impact of experiencing aggregate price growth on households' expectations of price growth of their land or housing, which supports the notion that access to idiosyncratic information is more important than experience of aggregate price growth. Specifically, the first column of Table 11 reports that when using expected price growth over the next year (in percent) of land the household owns as the dependent variable, the coefficient of the weighted average of aggregate residential land price growth is negative. Changing the main independent variable to the weighted average of aggregate *overall* land price growth again gives a negative coefficient of this variable (second column of the table). The last column examines the impact on the expected price growth of housing (not just land but also the building) the household owns, which does not have a positive impact on the weighted average of aggregate housing price growth.

A.2 US Data

This subsection describes some details of the US PSID and SCE used in the main text.

A.2.1 PSID

The PSID is household panel data for the United States commencing in 1968, covering both financial and demographic variables in a comprehensive manner. This paper employs PSID 1999–2019 waves because, since 1999, the PSID has reported net worth every two years, which is a key control variable needed to estimate equation (3) (before 1999, net worth was reported every five years (1984, 1989, 1994)).

Table 12 reports the means of the key variables in the PSID data used in the main text. As shown, as the household head ages over time, the proportion of homeowners (mean of the dummy of owning a home) gradually declines. The weighted average of real residential land price, real income, and real net worth all declined sharply in 2011 following the global financial crisis.

Table 11 Price Expectations of Those Who Own a House (Japan)

VARIABLES	(1) OLS Expected land price growth (in pct) λ at solution	(2) OLS Expected land price growth (in pct) λ at solution	(3) OLS Expected house price growth (in pct) λ at solution
Weighted ave. of nominal residential land price growth (λ at solution)	-0.040 (0.023)*		
Weighted ave. of nominal land price growth (λ at solution)		-0.051 (0.024)**	
Weighted ave. of nominal house price growth (λ at solution)			-0.305 (0.388)
Observations	13,124	13,124	9,611
R-squared	0.012	0.013	0.019

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is those who own a house (not a condominium) in JHPS/KHPS 2004–2019. λ is estimated to minimize the sum of the squared residuals. Robust standard errors, which are estimated under the assumption that residuals of the same household are correlated across years, are reported in parentheses. Control variables not reported in the table are variables in $Z_{i,t}$ in Section 4.1.

A.2.2 SCE

The SCE is a monthly survey of a rotating panel over the period 2013–2019, which collects information including households' expected increases in home prices, as well as standard financial and demographic variables. The analysis in the main text employs the SCE only as a cross-section because each household remains in the sample for only up to 12 months. The most recent observations for each household are used for the analysis in this paper. While most variables are available over the period 2013–2019, among the key variables the following two variables are available only over 2014–2019: dummy variable indicating the respondent thinks that buying property in his/her zip code today is a good investment (either a very good investment or a somewhat good investment), and the expectation of 5-year nominal home price growth *in the respondent's zip code* (annualized).

The means of the key variables for the period 2014–2019 are summarized in Table 13. Unlike in the PSID, the average age of the respondents does not rise over time, reflecting the cross-sectional nature of the SCE data.

Table 12 Means of Key Variables (US PSID)

	1999	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019
dummy of owning home	0.71	0.72	0.72	0.72	0.71	0.69	0.67	0.65	0.65	0.64	0.64
Weighted real residential land price growth (in percent): $\lambda = 0$	4.06	3.82	4.16	4.39	4.48	3.55	2.76	2.19	2.41	2.75	2.91
real household income in the previous year (in 1,000 US dollar)	67.3	69.9	66.8	68.9	67.4	66.8	62.1	62.1	60.9	62.0	62.1
real household net worth (in 1,000 US dollar)	208.6	219.2	218.2	255.9	289.0	286.8	231.3	220.9	244.6	244.0	247.1
age (household head)	43.3	44.4	44.8	45.5	46.1	47.1	47.5	48.0	48.7	49.0	49.2
dummy of male (household head)	0.78	0.77	0.77	0.76	0.75	0.75	0.74	0.74	0.73	0.72	0.73
dummy of marriage	0.63	0.61	0.60	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.52
number of children	1.04	0.97	0.93	0.89	0.88	0.82	0.78	0.77	0.74	0.75	0.78
dummy of white (household head)	0.64	0.64	0.62	0.66	0.65	0.66	0.65	0.64	0.63	0.61	0.61
dummy of excellent health (household head)	0.26	0.24	0.24	0.22	0.22	0.20	0.18	0.18	0.16	0.16	0.15
dummy of very good health (household head)	0.35	0.35	0.35	0.34	0.36	0.35	0.36	0.36	0.37	0.36	0.35
dummy of good health (household head)	0.27	0.29	0.28	0.31	0.29	0.31	0.31	0.30	0.31	0.32	0.33
dummy of fair health (household head)	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.14
dummy of smoking (household head)	0.24	0.24	0.23	0.23	0.21	0.21	0.19	0.18	0.17	0.16	0.15
Number of observations	4,490	4,826	5,174	5,312	5,546	5,442	5,573	5,716	5,788	6,095	6,386

Notes: Real income in the previous year and real net worth are measured using 2015 prices (CPI).

Table 13 Means of Key Variables (US SCE)

	2014	2015	2016	2017	2018	2019
dummy of owning home	0.74	0.71	0.73	0.72	0.74	0.73
dummy indicating that buying property in respondent's zip code is a good investment	0.59	0.62	0.62	0.62	0.68	0.65
expectation of 1-year nominal home price growth (in percent)	5.79	4.95	4.87	5.22	5.07	4.18
expectation of 1-year nominal home price growth *2 years from now* (in percent)	5.64	4.97	4.94	5.15	4.71	4.56
expectation of 5-year nominal home price growth *in respondent's zip code* (annualized, in percent)	2.76	2.78	2.01	2.19	2.40	2.20
real household income over the past year in the previous year (in 1,000 US dollar)	58.2	55.3	57.4	56.6	57.5	54.4
age (respondent)	50.3	50.6	50.9	50.7	51.2	51.7
dummy of male (respondent)	0.51	0.52	0.54	0.50	0.53	0.53
dummy of marriage	0.67	0.65	0.66	0.63	0.64	0.62
dummy of white (respondent)	0.85	0.84	0.84	0.84	0.86	0.84
number of children	0.85	0.72	0.83	0.81	0.72	0.75
Number of observations	1,138	1,170	1,035	1,128	1,110	1,076

Notes: Real income over the past year is measured using 2015 prices (CPI).

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