

Abenomics, the housing market, and consumption*

By Joshua K. HAUSMAN, Takashi UNAYAMA, and Johannes F. WIELAND**

Abstract

Household spending in Japan rose less during Abenomics than hoped. We explore to what extent this is explained by Japanese housing market institutions. These institutions meant little pass-through of lower long-term interest rates to rates paid on the mortgages of existing homeowners. Consistent with the small mortgage interest rate response, microdata from the Family Income and Expenditure Survey show no evidence that homeowners with mortgages increased consumption relative to homeowners without mortgages or relative to renters.

JEL Classification Codes: D15, E21, E52, R21

Keywords: Abenomics, Monetary Policy, Consumption, Housing Investment, Interest Rate Pass-through

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アベノミクス、住宅市場と消費

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<要旨>

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Keywords : アベノミクス、消費、住宅市場、金融政策、金利パススルー

1 Introduction

Abenomics has in many respects succeeded. Over the five years from 2013 to 2017, overall GDP growth in Japan averaged 1.3 percent per year; per working age person (age 15-64), it averaged 2.5 percent. The latter was 40 percent more rapid than growth in the U.S. over the same period.¹ Output growth has been accompanied by low unemployment and positive inflation. Despite these favorable developments, Abenomics has not led to robust household spending growth. Consumption have grown much more slowly during Abenomics than output as a whole. This is despite a decrease in long-term nominal and real interest rates of roughly a percentage point.

In this paper, we explore how unique features of the Japanese housing market may explain the puzzling lack of a household spending response to monetary expansion. The remainder of the introduction discusses how a recent literature suggests that expansionary monetary policy increases consumption by lowering interest rates and thus stimulating the housing market. This literature, however, generally focuses on the U.S. and the UK. In the next section, we document large differences in housing and housing finance in Japan, differences that almost certainly matter for monetary policy transmission.

In section 3, we turn to the reaction of the Japanese housing market to Abenomics. While nominal rates on new fixed-rate mortgages fell after 2012 by roughly a percentage point, low levels of refinancing and housing stock turnover, and weak pass-through to variable rate mortgages, meant that monetary expansion delivered little benefit to existing homeowners. Between 2012 and 2016, the effective interest rate on all mortgage debt in Japan fell only 15 basis points. In section 4, we use household consumption microdata to examine the evolution of income and consumption of homeowners and renters during Abenomics. Consistent with the small mortgage interest rate response, we find no evidence that homeowners with mortgages increased consumption relative to homeowners without mortgages or relative to renters. We conclude in section 5 by considering what implications our findings may have for monetary policy in Japan.

Our work contributes to and is motivated by a growing literature on housing and its importance for the propagation of monetary policy. One strand of this literature emphasizes the transmission of monetary policy to consumption through mortgage interest rates. Wong (2016) shows that consumption responses to monetary policy easing are concentrated among young homeowners who refinance their mortgage loans. Di Maggio, Kermani, Keys, Piskorski,

¹ GDP data for Japan come from the Cabinet Office National Accounts. U.S. GDP data are from FRED series GDPCA. Working age population data for Japan and the U.S. are from FRED series LFWA64TTJPA647N and LFWA64TTUSA647N. For further details on economic progress during the Abenomics period, see Hausman, Unayama, and Wieland (2018).

Ramcharan, Seru, and Yao (2017) find large consumption responses of households whose mortgage interest rate is reset. Beraja, Fuster, Hurst, and Vavra (2017) show that consumption responses to quantitative easing (QE1) in the U.S. were stronger in regions with higher home equity where more homeowners were able to refinance. Finally, Berger, Milbradt, Tourre, and Vavra (2018a) and DeFusco and Mondragon (2018) show that the importance of refinancing for U.S. monetary policy transmission introduces potential state dependence in monetary policy effectiveness.

Another strand of the literature examines monetary policy transmission through the housing market that operates in ways other than through changes in direct interest payments. First, both through changes in policy rates and aggregate demand effects, monetary policy will generally affect house prices, which in turn can impact consumption. Mian, Rao, and Sufi (2013) estimate significant marginal propensities to consume (MPCs) out of housing wealth during the Great Recession. Aladangady (2017) interacts changes in long-term interest rates with house price elasticities to instrument for local house price booms; he estimates an MPC out of housing wealth of around 0.05, a figure consistent with standard incomplete market models (Berger, Guerrieri, Lorenzoni, and Vavra, 2018b). Monetary policy also affects aggregate income, and a household's MPC may depend on the household's housing position. Cloyne, Ferreira, and Surico (2016) find that relative to homeowners without mortgage debt, mortgaged households have significantly higher MPCs out of an increase in income from an expansionary monetary policy shock.

Taken together, the recent literature on housing and monetary policy shows that there are multiple channels through which expansionary monetary policy is expected to stimulate the housing market and then consumption. The above referenced papers, however, rely on data from the U.S. and the UK. Less is known about how housing market institutions in other countries may shape the consumption response to monetary policy. We help to fill this gap by examining the Japanese experience during Abenomics. We are not the first to look at the interaction between housing and monetary policy in Japan. In particular, Muellbauer and Murata (2010) consider how monetary policy affects land prices and consumption in Japan, the U.S., and the UK. Like us, they conclude (p. 211) that “the household part of the [monetary] transmission process is far weaker [in Japan] than in the U.S. or UK.” Kawaguchi (2009) looks at the long-run behaviour of the Japanese housing market and its behaviour during business cycles. We differ from these prior papers in our use of household-level consumption data, and in our specific focus on the transmission of monetary policy to household consumption during Abenomics. We believe Abenomics to be a particularly useful case study because it came with a large, exogenous monetary policy shock.

2 The Japanese housing market

Table 1 compares the housing market in Japan with that in the U.S. and the UK. We focus on those aspects of housing and housing finance that are most likely to have mattered for the Japanese economy's response to expansionary monetary policy during Abenomics.² Panel A shows basic data about the frequency, type, and price of homes sold. It shows that the housing market in Japan differs from that in the U.S. and the UK in three crucial ways. First, there are fewer residential sales per person in Japan (rows 1 and 2). Second, whereas in the U.S. and the UK the housing market is overwhelmingly a market for existing homes, in Japan it is mostly a market for new homes. Roughly 85 percent of residential purchases in Japan are of new dwellings (row 3). The preference for new construction in Japan is reflected in a large number of housing starts: whether measured per person or per existing dwelling, housing starts in Japan are roughly double U.S. and UK levels (rows 5 and 6). This is striking given that Japan's population, unlike that in the U.S. and UK, is declining. One consequence of the preference for new construction is that the housing stock in Japan is markedly newer than that in the U.S. and, particularly, the UK (row 7).

Table 1 – Housing and housing finance in Japan, the U.S., and the UK

	Japan	U.S.	UK	
Panel A				
1	Numbers of residential units sold, 2013	1,149,000	5,359,500	1,133,820
2	Per 1000 people	9.0	16.8	17.7
3	New units share (%)	85.3	8.2	12.7
4	Number of housing starts (units, 2016)	909,000*	1,174,000	186,000
5	Per person * 1000	7.2	3.6	2.8
6	As a share of all dwellings (%)	1.5	0.87	0.66
7	Share of dwelling units built after 1980 (%)	65	44	24
8	Share of dwelling units vacant (%)	14	10	3
9	Average price of new, detached single-family house, greater Tokyo / northeast U.S. / southeast England 2016 (\$s)	\$ 457,372	\$ 579,200	\$ 632,372
10	Average price of apartment in Tokyo (23 wards) / Manhattan / Inner London (2016)	\$ 610,068	\$ 2,051,225	\$ 714,815
11	Per square foot	\$ 861.2	\$ 1,712	-
Panel B				
1	Total amount of mortgage debt 2017 (\$s, billions)	\$ 1,677	\$ 9,926	\$ 1,580
2	Per person	\$ 13,234	\$ 30,501	\$ 23,929
3	As a share of GDP (%)	34.6	51.2	61.2
4	Share of mortgages that are fixed rate 2015 (%)	44	96	45
5	Refinancing share of new mortgages 2015 (% of dollar volume)	15	46	30
6	Time horizon over which 25% of households change address (years)	5	2	
7	Long-horizon, fixed mortgage rate 2016 (nominal, %)	1.38	3.65	3.04
8	Long-horizon, fixed mortgage rate 2016 (real, %)	1.11	2.08	0.25

Sources: See data appendix. *This is the figure from Mitsui Fudosan Co., *Japanese Real Estate Statistics*, 2017, p. [5]-18 for 2016. Data from the Ministry of Land, Infrastructure, Transport and Tourism suggest that 909,000 is the number of housing starts in 2015.

² For a more in depth description of the Japanese housing market, see Kobayashi (2016) and Moriizumi (2017).

Of more importance for household consumption, the desirability of new relative to existing houses means that houses rapidly depreciate. Koo and Sasaki (2008) (p. 5) estimate that “Japanese residential dwellings lose all economic value within 15 years after construction.” Similarly, a Ministry of Land, Infrastructure, Transport and Tourism (MLIT) report finds that houses fully depreciate in 20-25 years.³ The cost of demolition means houses more than 15 (or 20-25) years old have negative value: vacant land is worth more. A consequence is that absent large increases in land prices, home sales tend to come at a loss for the seller. We provide an illustrative example in table 2. Despite a substantial land price increase, in this example the household loses 38 percent of the purchase price when selling the house 15 years after the purchase date. In practice, the situation for Japanese households can be much worse, since residential land prices fell in all but three years between 1992 and 2017.⁴ Koo and Sasaki (2008) report survey results showing that in 2007, 79 percent of home sales occurred with a loss; more than half of sales came with a loss of greater than 10 million yen (approximately \$85,000 at 2007 exchange rates). And 2007 was an unusually good year in that land prices slightly rose.

Table 2 – Hypothetical house purchase and sale

	Purchase, year t	Sale, year t+15
Land value	\$ 200,000	\$ 250,000
Structure value	\$ 200,000	\$ 0
Total	\$ 400,000	\$ 250,000
Loss		\$ 150,000

Another implication of the rapid depreciation of structures in Japan is that they are often simply abandoned, leading to a problem of vacant houses.⁵ The percent of dwellings vacant in Japan is much higher than that in the UK although not than that in the U.S. (line 8). Relative to the U.S, however, in Japan, vacant houses appear to be a more salient characteristic of the housing market. This may reflect the expectation that population decline in Japan will lead to a rapid increase in the number of vacant houses, with corresponding adverse effects on neighborhoods and municipal finances.

A final distinguishing feature of Japanese housing is its relative affordability, even in large cities. The average price of a newly-built house in greater Tokyo is roughly \$450,000. And even in central Tokyo, the typical apartment is sold for \$600,000. Per square foot, apartments

³ See MLIT, p. 11.

⁴ Mitsui Fudosan Co., *Japanese Real Estate Statistics*, 2017, pp. [1]-2 and [1]-3

⁵ See, for example, Financial Times (<https://www.ft.com/content/79297b7e-24c6-11e5-bd83-71cb60e8f08c>).

in central Tokyo are half the cost of those in Manhattan. While a declining population reduces pressure on the nationwide housing market, population decline does not directly explain low Tokyo house prices; the population of Tokyo continues to rise as it attracts people from elsewhere in Japan.⁶ A more likely explanation is the relatively laxity of zoning regulations. Construction in Tokyo can increase to meet demand in a way that is impossible in London, New York, and many other north American cities.⁷ Zoning is the subject of national not municipal policy, reducing the impact of NIMBYism on project approval. And rather than specifying particular uses (residential, commercial, industrial), zoning specifies a maximum nuisance level (e.g. heavy industry) and then allows anything that is less of a nuisance to be built in the area. So whereas an area of New York might be zoned for industry with residential housing forbidden, an area of Tokyo zoned for industry would permit residential housing to be built.⁸ The difference in zoning regime has dramatic results; in 2014, there were more housing starts in the city of Tokyo (population 13.3 million) than in all of England or all of California.⁹

Lax zoning implies the potential for expansionary monetary policy to increase house construction. Thus one might expect that expansionary monetary policy in Japan would have large effects on residential investment. Such an effect is, however, not obvious during Abenomics. From 2012 to 2017, residential investment rose a healthy 11 percent. But this increase is sensitive to the exact time period used for measurement; between the fourth quarter of 2012 and the second quarter of 2018, residential investment fell one percent.

Panel B of table 1 compares the system of housing finance in Japan with that in the U.S. and the UK. The first row shows that when benchmarked to GDP or population, the mortgage market in Japan is relatively small. Row 4 shows that like the UK, but unlike the U.S., more than half of mortgages in Japan are adjustable rate. One might expect this to lead to immediate and large positive effects of expansionary monetary policy in Japan on household resources available for consumption. But we shall see that this is not the case.

Row 5 shows that as a share of the total mortgage market, refinancing activity is far less important in Japan than it is the U.S. and UK. This conclusion is not a function of the specific year chosen; the share of mortgage volume for refinancing did rise to 25 percent in fiscal year 2016 in Japan, but this is still only about half the average refinancing share in the U.S. from 2013-2016.¹⁰ Thus as a way in which monetary policy shocks are transmitted to households, refinancing is likely to be a relatively unimportant channel in Japan.

⁶ See *Japanese Real Estate Statistics*, 2017, pp. [4]-14 and [4]-15.

⁷ See <https://nextcity.org/daily/entry/japan-shows-the-way-to-affordable-megacities> and Financial Times (<https://www.ft.com/content/023562e2-54a6-11e6-befd-2fc0c26b3c60>).

⁸ <http://urbankchoze.blogspot.com/2014/04/japanese-zoning.html> and the official summary of Japanese land use planning at <https://www.mlit.go.jp/common/000234477.pdf>.

⁹ Financial Times (<https://www.ft.com/content/023562e2-54a6-11e6-befd-2fc0c26b3c60>).

¹⁰ MLIT survey of private financial institutions and Mortgage Bankers Association, Annual Mortgage Origination Estimates.

Even if homeowners do not refinance, existing homeowners will receive new market mortgage rates if they move to a new house and obtain a new mortgage. Row 6 shows that this occurs much less often in Japan than in the U.S. In Japan, roughly 25 percent of households change address every five years; in the U.S. this share of households moves every two years.¹¹ This comparison likely understates the difference between the two countries, since homeowners in Japan are particularly unlikely to move; only 2 percent of homeowners in 2013 had moved in the previous 5 years from another owned home.¹² The final two rows of table 1 compare nominal and real new mortgage interest rates across the three countries. In nominal terms, rates are lower in Japan. In real terms, however, lower expected inflation means that rates in Japan are higher than those in the UK.

In sum, mortgage finance in Japan relative to that in the U.S. and the UK is characterized by its small overall size, low level of refinancing activity, and infrequent household moves. In other respects (e.g. the share of fixed rate mortgages and the level of real interest rates) the Japanese mortgage market is similar to the U.S. and / or UK markets.

3 Abenomics and the housing market

The so-called first arrow of Abenomics consisted of dramatic efforts at monetary easing by the Bank of Japan (Hausman and Wieland, 2014, 2015). The result was a decline in long-term nominal government bond yields of roughly a percentage point. Figure 1 shows, however, there was very little effect on the average (effective) mortgage interest rate. This average mortgage interest rate is the ratio of total mortgage interest paid (in yen) to the total stock of household mortgage debt (in yen), as calculated in Yoneta (2018). This is the average mortgage rate across new and existing mortgages.¹³

As figure 1 shows, the effective mortgage rate fell just 15 basis points between 2012 and 2016. This small decline occurred despite a 90 basis point decline in the 10-year government

¹¹ The figure for Japan comes from the Seventh National Survey on Migration, conducted in 2011; that for the U.S. comes from Bachmann and Cooper (2014).

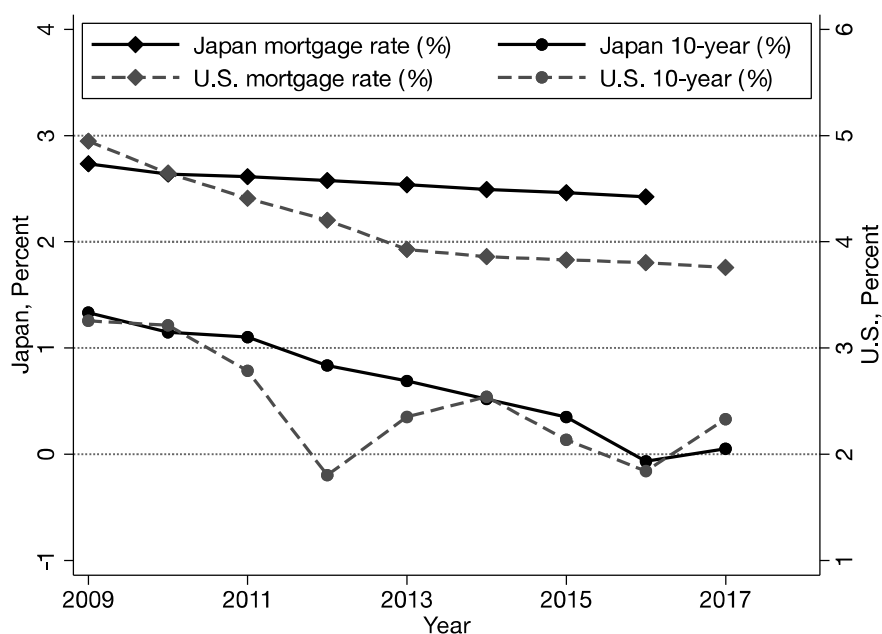
¹² See the Housing and Land Survey of the Statistics Bureau.

¹³ While both interest paid and the mortgage balance are, in principle, included in the System of National Accounts (SNA), we cannot directly use the official SNA data. This is first because FISIM, which are hypothetical payments for use of financial services are included in the interest paid on mortgages (called Housing Loan). The second problem is that the total mortgage balance is not available separately from other debt such as debt held by unincorporated companies and car loans.

To address these issues, Yoneta (2018) constructs both interest paid and the total mortgage balance following the estimation method manual for the annual SNA (ESRI, 2018). The underlying information comes from the individual financial statements of mortgage lenders such as banks, the Government Housing Loan Corporation, and credit associations. He confirms that his measure of interest paid matches the official data without FISIM, since this official series was available until 2003.

bond yield, the solid black line with circle markers.¹⁴ For comparison, figure 1 shows the effective mortgage rate from the U.S. national accounts along with the U.S. 10-year government bond yield. Reflecting more refinancing and / or more frequent moves, in the U.S. these two rates declined together in the decade following the collapse of the housing bubble.

Figure 1 – Effective mortgage interest rate



Sources: Japan-see text. U.S.: National Accounts. 10 year government bond yields for Japan and the U.S. are from FRED series IRLTLT01JPA156N and IRLTLT01USA156N.

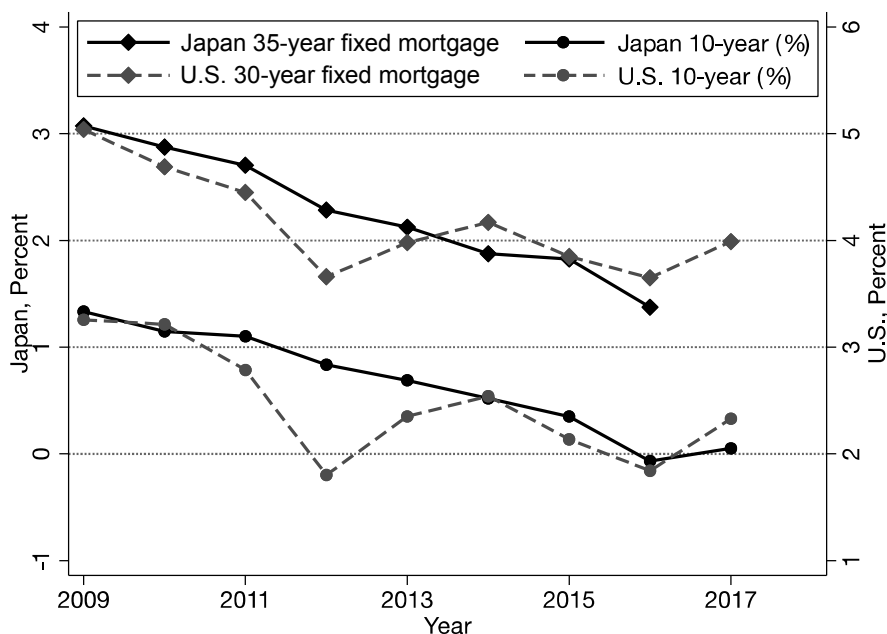
In contrast to the average mortgage interest rate on new and existing mortgages in Japan, the rate on new mortgages alone reacted as one would expect to an expansionary monetary policy shock. Figure 2 graphs the 35-year fixed rate mortgage rate associated with the so-called “Flat35” program. Rates fell 91 basis points between 2012 and 2016, matching the decline in the 10-year government bond yield. This shows that the divergence between the 10-year government bond yield and the average mortgage interest rate cannot be explained by abnormal behaviour in the government bond market. If the 10-year government bond yield were behaving abnormally relative to private market yields, we would not see such a close association with new mortgage rates.

Figure 2 shows the rate for just one, fixed-rate mortgage type. But extensive anecdotal

¹⁴ The decline in long-term government bond yields is a continuation of a pre-Abenomics trends. The extent to which lower yields were *caused* by Abenomics is not obvious from the figure. Some evidence of a causal effect is suggested by the analysis of announcement effects of expansionary monetary policy actions in Hausman et al. (2018). There we show that such announcements were associated with falling government bond yields.

evidence suggests that other types of new mortgage rates have also fallen.¹⁵ Again for comparison, the figure shows data for the U.S. As in Japan, the rate on new fixed rate mortgages appears to roughly move along with the 10-year government bond yield.

Figure 2 – New mortgage interest rate



Sources: The mortgage interest rate for Japan (“Flat35”) is from Mitsui Fudosan “Japanese Real Estate Statistics” 2017 edition, p. [4]-43. That for the U.S. is from FRED series MORTGAGE30US.

The divergence between the behaviour of new and existing mortgage rates in Japan likely reflects the low volume of refinancing activity and infrequent household moves discussed above. Less obviously, it also reflects the fact that the rates on existing variable rate mortgages have fallen much less than those on new fixed rate mortgages; this is because rates on existing variable mortgages are indexed to short-term prime rates that have changed little (Egawa, 2015). More precisely, the rate paid in period t on a variable rate mortgage obtained in period j ($j \leq t$) is

$$v_{j,t} = \text{prime}_t + 1 - ps_j, \tag{1}$$

where prime_t is the short-term prime rate, and ps_j is a preferential spread offered to new borrowers (all in percent).¹⁶ During Abenomics, expansionary monetary has had the expected

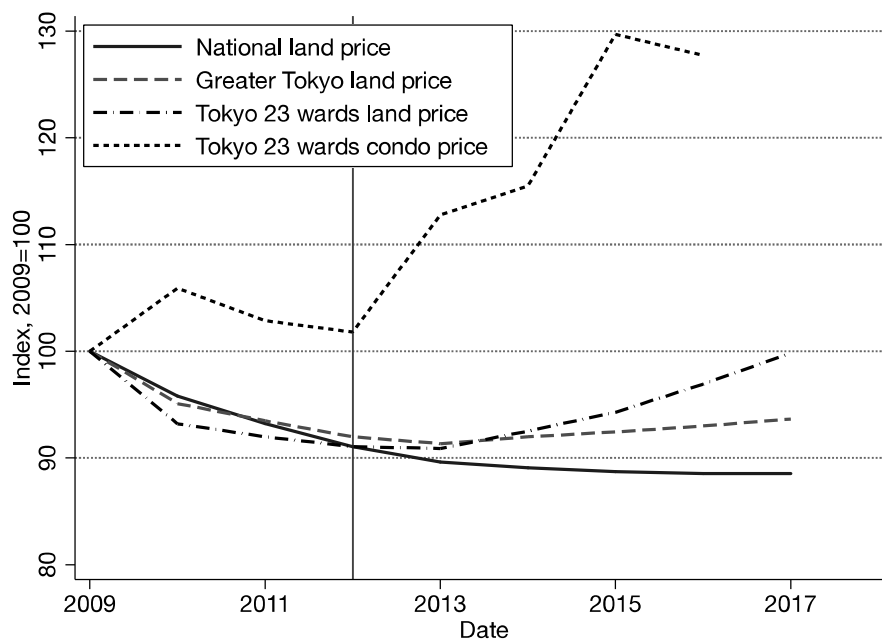
¹⁵ See, for instance, Wall Street Journal (<https://www.wsj.com/articles/japans-central-bank-moves-hit-home-on-housing-1471001395>).

¹⁶ See https://www.rieti.go.jp/en/columns/a01_0490.html for further details on this mortgage structure and its relevance to Abenomics.

effect on new variable mortgage rates as it led to larger preferential spreads. But the short-term prime rate has been unchanged since January 2009,¹⁷ and hence those with existing variable rate mortgages have not benefited from lower interest rates. Put differently, banks in Japan have developed a mechanism by which they are able to compete in offering lower rates on *new* variable rate mortgages without passing on the lower rates to existing mortgage holders.¹⁸

The lack of a response of existing mortgage rates may be quantitatively important for explaining consumption behaviour in Japan. Had the effective mortgage rate on all mortgage debt fallen 90 basis points (like the 10-year yield) instead of 15 basis points between 2012 and 2016, households would have had 0.26 percent of GDP more income available for consumption in 2016. That this effect is not even larger reflects the fact emphasized above (table 1, panel B) that the mortgage market in Japan is much smaller as a share of GDP than that in the U.S. or UK. The effect would also grow larger if one extended this thought experiment to the years before Abenomics; figure 1 shows that the divergence between changes in the effective mortgage rate and changes in government bond yields began before Abenomics.¹⁹

Figure 3 – House prices



Note: The vertical line indicates 2012, the year that Abenomics began. Sources: Land/condo prices are from Mitsui Fudosan" Japanese Real Estate Statistics" 2017 edition, pp. [1]-3, [1]-6, and [2]-30.

¹⁷ <https://www.boj.or.jp/en/statistics/dl/loan/prime/prime.htm/>.

¹⁸ When variable rate mortgages were introduced in 1981, regulation dictated that the variable rate be indexed to the prime rate. Even after deregulation of mortgage rate setting in 1997, banks continued to index variable rate mortgages to the prime rate. The preferential spread system, allowing new and existing variable mortgage rates to differ, became widespread beginning about 2005.

¹⁹ The history of mortgage interest rate pass through before Abenomics is well worth investigation, but is beyond the scope of this paper, given our specific focus on the impact of Abenomics.

Monetary policy may affect consumption via the housing market not only through its effect on mortgage interest rates, but also through its effect on land prices. Figure 3 shows four measures of nominal residential land and house prices in Japan since 2009. In Japan as a whole, land prices have continued to fall during Abenomics, though at a slower rate. In Greater Tokyo and, particularly, the central 23 wards, land prices have risen during Abenomics. More striking is the behaviour of Tokyo condominium prices which rose 25 percent between 2012 and 2016. The International Monetary Fund (2017) (p. 20) judges Tokyo and Osaka condominium prices to be “moderately overvalued.” The broad picture is one in which monetary policy is working as one would expect: land and housing prices are rising as interest rates fall. Price increases are, however, relatively restrained, since lax zoning and a declining total population mean that new units can be supplied to meet demand.

4 Abenomics, Consumption, and Housing

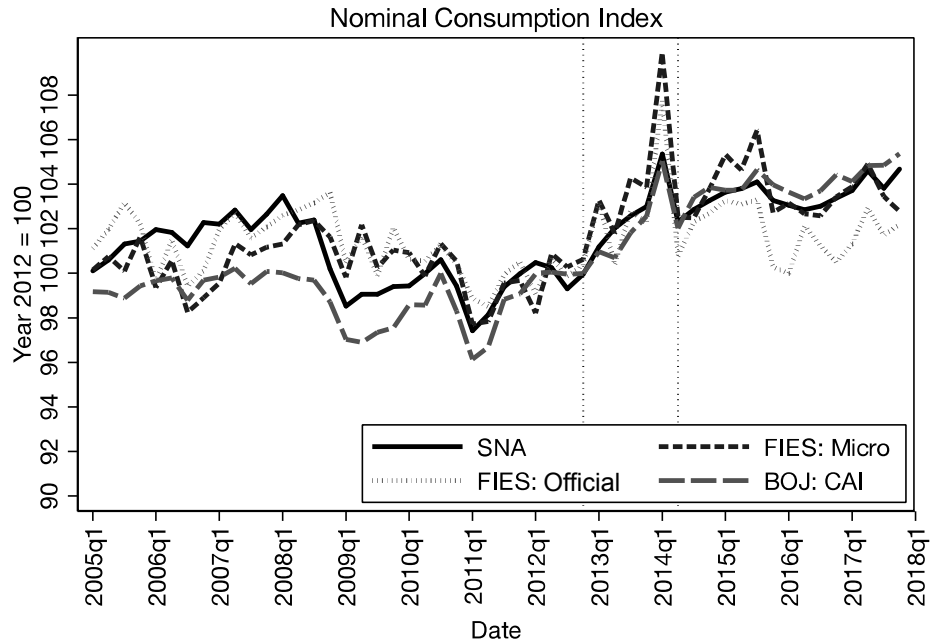
We are ultimately interested in the housing market because of its potential to help us understand lackluster consumption growth during Abenomics. As we discuss more fully in Hausman and Wieland (2015) and Hausman et al. (2018), consumption growth during Abenomics has been slow both in absolute terms and relative to expectations. The national accounts show that whereas real GDP grew 6.6 percent between 2012 and 2017, private consumption grew just 2.6 percent. The Bank of Japan’s real consumption activity index (travel balance adjusted) shows even slower consumption growth, only 0.5 percent in total between 2012 and 2017.

As discussed in the introduction, we would normally expect monetary policy to raise consumption in part through its effect on homeowners: lower interest rates (e.g. from refinancing) can directly increase income available for consumption, and higher house and land prices should raise wealth and collateral. Together these effects would be expected to increase the consumption of Japanese homeowners, particularly those with a mortgage, relative to renters.

We investigate whether this occurred with microdata from the Family Income and Expenditure Survey (FIES). The FIES is a monthly panel survey in which households participate for six consecutive calendar months, and approximately one-sixth of households enter the survey each month. The roughly 8,000 households that are interviewed in each month are expected to record all expenditure and income in a diary. In addition, household demographics and retrospective yearly income are collected in the first interview. In the third interview, households are asked about their assets and liabilities, including mortgage debt. We use FIES data from January 2005 through December 2017. While the FIES surveys single- and mul-

ti-person households, we focus on two-or-more person households since the data are better quality (Unayama, 2018). In addition, following Wong (2016), we limit the sample to households whose head is aged 25-79 and is not self-employed.

Figure 4 – Total consumption measures



Note: The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. *Sources:* National Accounts, the FIES, and the Bank of Japan.

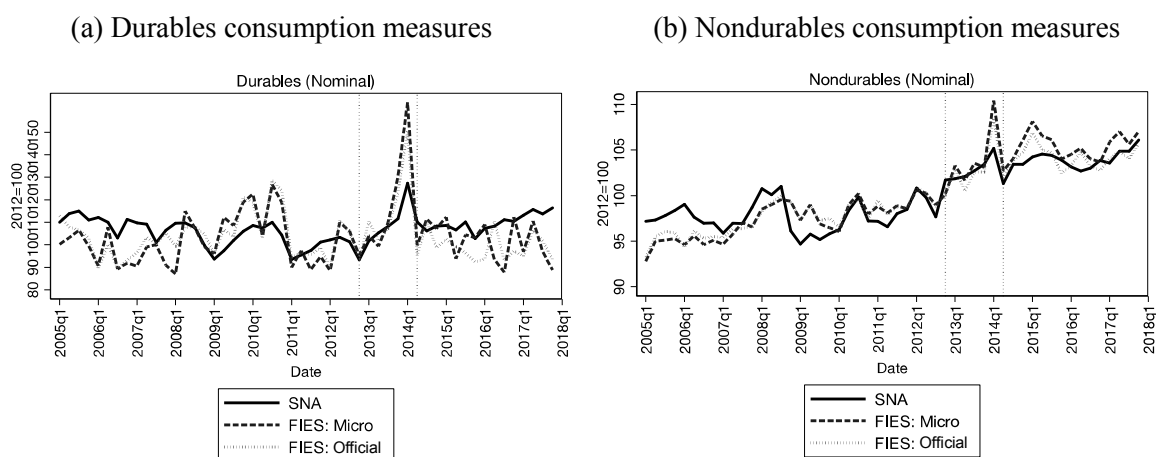
We first verify that the microdata from the FIES do a reasonable job of matching aggregate consumption trends. Figure 4 shows that they do. The figure compares the path of consumption measured in the FIES microdata with consumption as measured in the national accounts (SNA), the official published FIES data, and the Bank of Japan consumption activity index (BOJ: CAI). The FIES microdata generally closely track consumption in the national accounts and the Bank of Japan index, although consumption as measured in the FIES microdata is more volatile.²⁰

To better understand reported consumption in the FIES microdata, figure 5 compares the path of durables and nondurables consumption in the FIES data with that in the national accounts. As is well-known, durables are poorly measured in the FIES (Unayama, 2018, section

²⁰ A striking feature of the figure is the much larger increase in measured consumption in the FIES data in advance of the April 2014 consumption tax increase. This likely reflects the fact that FIES is a demand side measure while the national accounts and Bank of Japan consumption indicators are supply side measures. Thus insofar as higher consumer demand before the consumption tax increase was reflected in lower inventories rather than more production of consumer goods, one would expect to see a larger effect in the FIES data. The larger effect in the FIES data may also reflect the fact that it excludes imputed rents and medical costs paid by health insurance, categories of consumption unlikely to respond to an expected consumption tax increase. Crucial for our work, the FIES consumption measure also excludes mortgage interest payments.

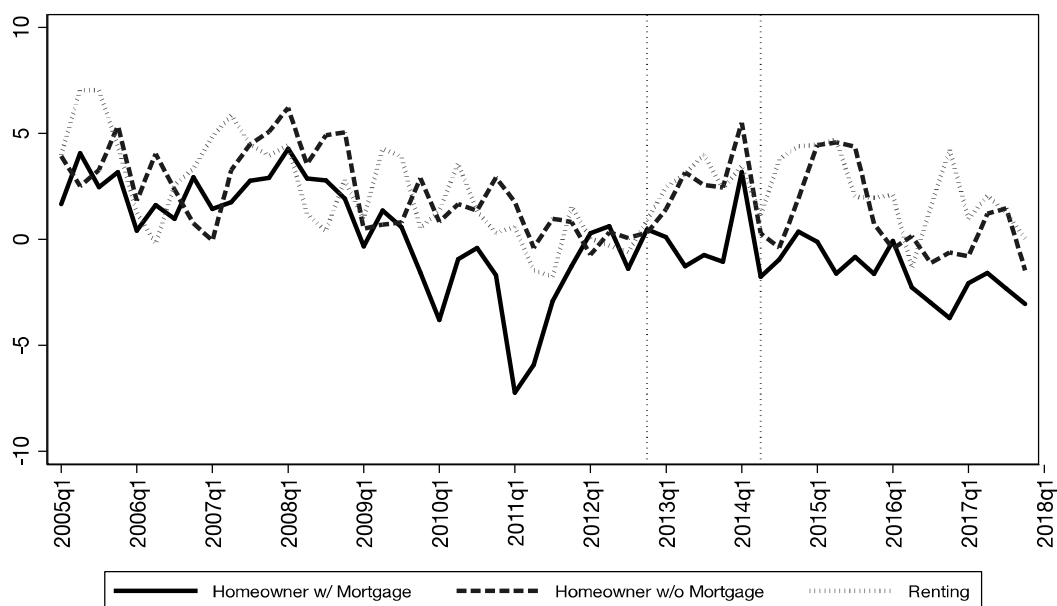
2.5). Figure 5(a) shows that this leads to a volatile series that only approximately matches the national accounts. By contrast, the correspondence is much closer for nondurables. Thus our analysis primarily focuses on nondurables, though given their obvious interest we also examine total expenditures in our regression analysis below.

Figure 5 – Durables and Nondurables



Note: The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. *Sources:* National Accounts and FIES.

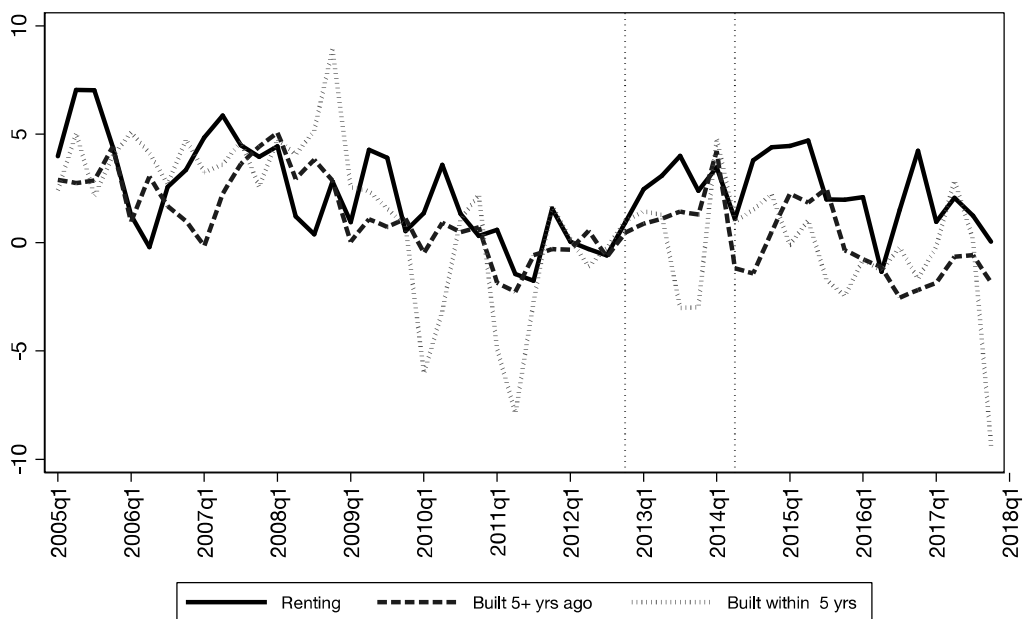
Figure 6 – Nondurable consumption by homeownership category



Notes: The figure shows seasonally-adjusted log nondurable consumption indexed to 0 in 2012. The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. *Sources:* The FIES.

We begin our exploration of the effect of Abenomics on different homeownership groups in figure 6. This shows the path of consumption since 2005 for three different home ownership groups: (1) homeowners with a mortgage, (2) homeowners without a mortgage, and (3) renters. It is difficult to discern any marked divergence between homeowners and renters or among homeowners with and without mortgages during Abenomics.²¹ The finding here matches what we found two years ago in Hausman and Wieland (2015), where we used aggregate data from the FIES. That we do not observe obvious heterogeneity in the consumption of these different homeownership groups likely reflects the institutional features of the Japanese housing market discussed above; that lower interest rates were not passed through to households with existing mortgages can explain why the consumption of homeowners with mortgages did not increase relative to that of homeowners without mortgages or renters. The relatively small reaction of land prices to Abenomics may explain the lack of an increase in the consumption of homeowners as a whole relative to renters.

Figure 7 – Nondurable consumption by house age

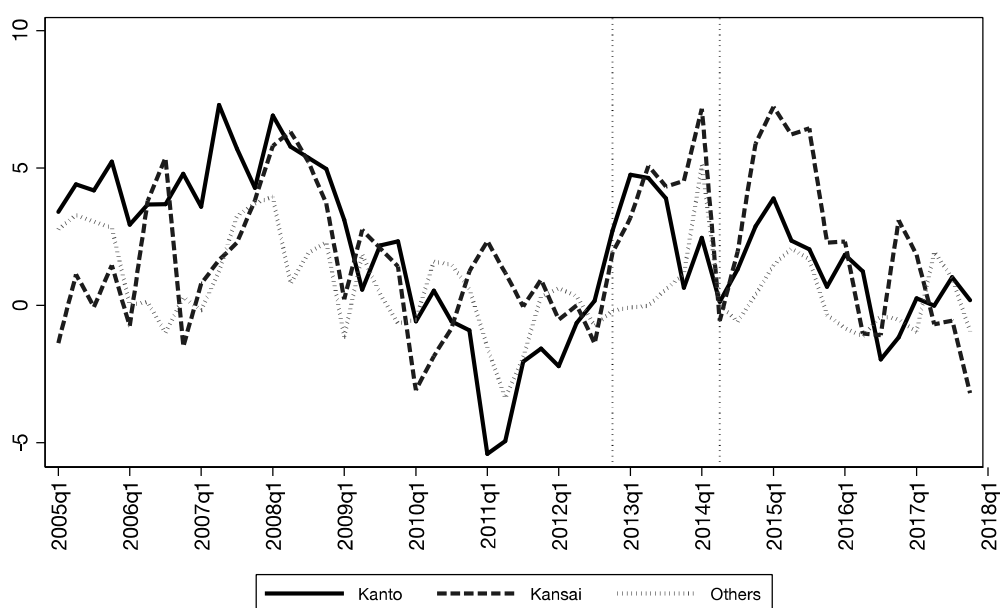


Notes: The figure shows seasonally-adjusted log nondurable consumption indexed to 0 in 2012. The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. *Sources:* The FIES.

²¹ This matches our findings in Hausman et al. (2018) in which we look at consumption growth heterogeneity across other household groupings, including age and household liability to income ratio. In contrast to the specific focus of the present paper on housing, our goal in Hausman et al. (2018) is to broadly describe and understand the factors driving consumption during Abenomics. We find no obvious heterogeneity among household groups, suggesting that monetary policy transmission to households did not occur in the expected way.

We documented in section 3 that while lower interest rates had little pass-through to existing mortgages, they did pass-through to new mortgage rates. Thus one would expect that households who obtained a mortgage during Abenomics would be able to consume more than households who obtained a new mortgage before Abenomics. We examine this possibility in figure 7, which shows log nondurable consumption of renters, homeowners living in houses built five or more years ago, and homeowners living in houses built less than five years ago. Given the preference in Japan for new homes, house age is a good (and the best available) proxy for when the house was purchased. Despite lower rates on new mortgages, we see no evidence of increased consumption among the new homebuyer population during Abenomics. Importantly, however, this may reflect compositional changes; for instance, perhaps lower new mortgage rates led lower-income households to purchase homes after 2012. This is one reason we move from graphical to regression analysis below.

Figure 8 – Nondurable consumption by region

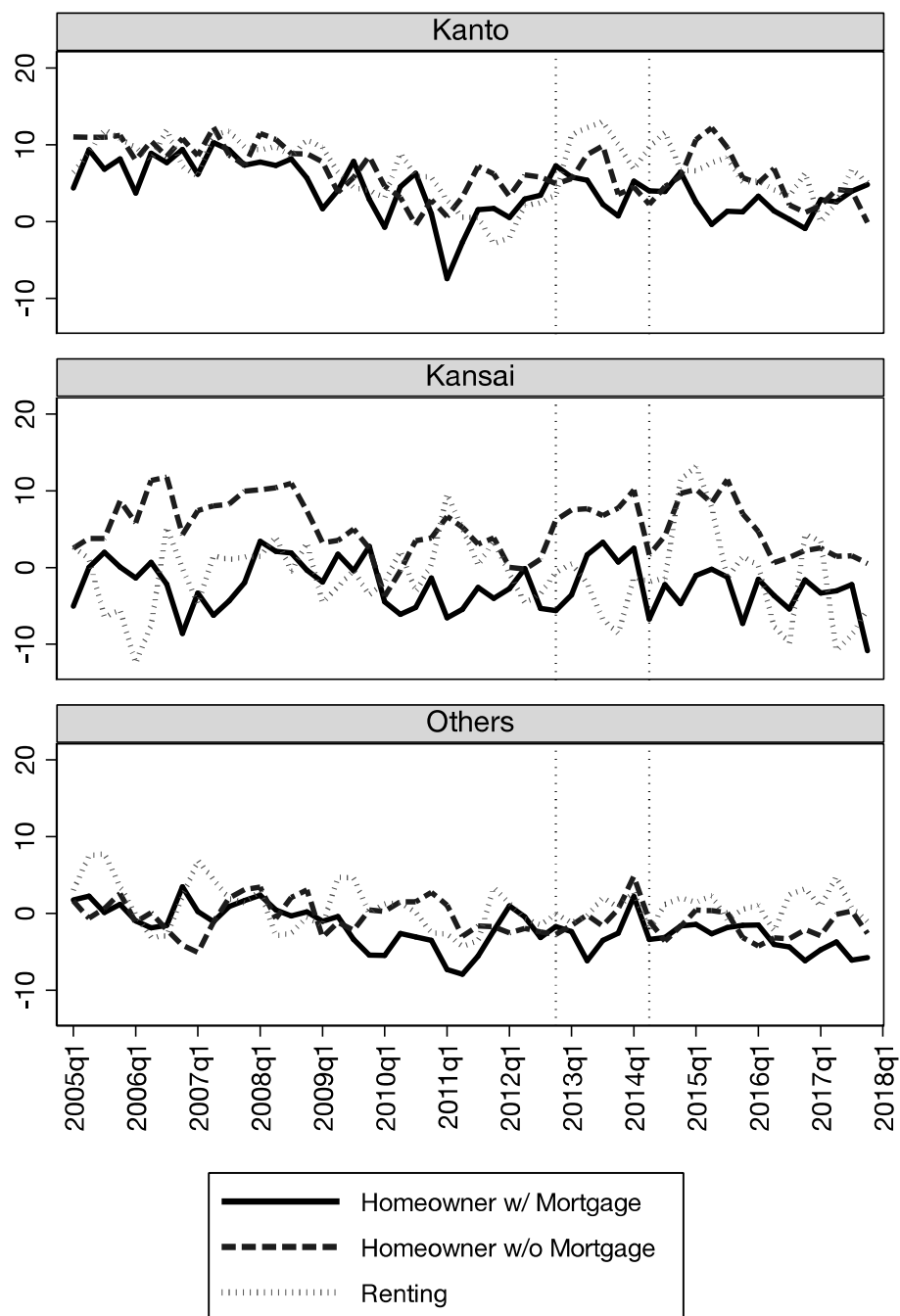


Notes: The figure shows seasonally-adjusted log nondurable consumption indexed to 0 in 2012. The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. *Sources:* The FIES.

A notable feature of the Japanese housing market during Abenomics is variation in land price trends across regions (figure 3). While prices continued to fall in the country as a whole, they rose in greater Tokyo. Thus it is natural to explore whether the trajectory of consumption differed across regions. Figure 8 shows no obvious differences in the path of consumption during Abenomics in Kanto (the region including Tokyo), Kansai (the region including Osaka), and the rest of the country. Since house price movements would be expected to affect home-

owners most, figure 9 shows the path of consumption by region and homeownership category. Again, there is no clear evidence of heterogeneity. The lack of heterogeneity fits with Hori and Niizeki's (2017) finding of very small MPCs out of housing wealth in Japan.

Figure 9 – Nondurable consumption by region and homeownership group



Notes: The figures shows seasonally-adjusted log nondurable consumption indexed to 0 in 2012. The vertical lines indicate the beginning of Abenomics in 2012Q4 and the increase in the consumption tax from 5 to 8% in 2014Q2. Sources: The FIES.

4.1 Regression analysis

To control for obvious confounders such as changes to the income and age of homeowners, we move from a graphical analysis to regressions using the FIES micro data. We estimate specifications of the form

$$\begin{aligned} \text{Consumption}_{i,t} = & \beta_0 + \beta_1 \text{Abenomics}_t + \beta_2 \text{Homeowner w/ mortgage}_{i,t} \\ & + \beta_3 \text{Homeowner w/o mortgage}_{i,t} \\ & + \beta_4 \text{Homeowner w/ mortgage}_{i,t} \times \text{Abenomics}_t \\ & + \beta_5 \text{Homeowner w/o mortgage}_{i,t} \times \text{Abenomics}_t + \gamma' X_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (2)$$

“Abenomics” is a dummy variable equal to 1 beginning in December 2012. “Homeowner w/ mortgage” is a dummy variable for whether or not the household is a homeowner with a mortgage, and “Homeowner w/o mortgage” is a dummy variable for whether or not a household is a homeowner without a mortgage. The omitted category is renters. We are interested in β_4 and β_5 , which show whether homeowners with mortgages and without mortgages had consumption patterns different from each other and from renters during Abenomics. In particular, if $\beta_4 - \beta_5$ is greater than zero, then homeowners with mortgages saw more consumption growth during Abenomics than those without.

Specification (2) is not a panel regression. Each household i is observed for only six months. This makes controls in the regression — the $X_{i,t}$ — important, given possibly changing characteristics of households over time. All of our specifications control for monthly dummies and an indicator for how many times a household has been interviewed. The latter controls for “survey fatigue” in the FIES; over time, households become tired of reporting all transactions, so reported consumption tends to fall over the six months that a household is interviewed (Unayama, 2018, pp. 60-61). In addition to these controls, we include a time trend, the age of the household head and its square, log household income, and log number of household members.

Table 3 reports our regression results. The dependent variable is log nondurables consumption, as in the figures above. We weight using sample weights. Column (1) is our most parsimonious specification; we include only home ownership status and our basic list of control variables.²²

The positive coefficient on Abenomics indicates that nondurable consumption expenditure of renters (the omitted category) was 1.15 percent (0.0115 log points) higher during the Abenomics period than before. By contrast, the negative coefficient on Abenomics interacted

²² In these regressions, we do not control for land price changes. Doing so does not change our conclusions. Results are available upon request.

with the homeownership with mortgage dummy implies that the consumption of homeowners with mortgages increased less than that of renters. The large positive coefficient on the interaction of Abenomics with the homeownership without mortgage dummy shows that (conditional on the controls) homeowners without a mortgage consumed more than either renters or homeowners with a mortgage. The latter comparison fits with the visual evidence in figure 6. Higher consumption growth of homeowners without a mortgage relative to those with a mortgage stands in stark contrast to existing studies of the U.S. and the U.K. that find large positive effects of monetary policy on the consumption expenditures of homeowners with mortgages (Wong, 2016; Cloyne et al., 2016).

Table 3 – OLS Regressions by Home Ownership

	Dependent variable: Log of Nondurables (weighted)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
abenomics=1	1.15 (0.85)		-2.89 (16.6)		1.18 (0.85)		1.11 (0.97)	
abenomics=1 × Home w/ Mortg	-0.24 (0.75)	-0.19 (0.75)	-0.72 (0.77)	-0.66 (0.77)	-0.92 (1.11)	-0.82 (1.11)	0.92 (0.95)	0.94 (0.95)
abenomics=1 × Home w/o Mortg	3.13*** (0.82)	3.19*** (0.82)	-0.074 (0.92)	0.0050 (0.92)	-0.058 (1.90)	0.034 (1.90)	3.12*** (1.02)	3.16*** (1.02)
abenomics=1 × age			0.022 (1.00)	0.015 (1.00)				
abenomics=1 × age ²			0.13 (1.92)	0.14 (1.92)				
abenomics=1 × age × age ²			0.00024 (0.012)	0.00017 (0.012)				
abenomics=1 × Built 5+ yrs ago					3.30* (1.86)	3.27* (1.86)		
abenomics=1 × Home w/ Mortg × Built 5+ yrs ago					-2.46 (2.11)	-2.49 (2.11)		
abenomics=1 × Re- gion=1							0.38 (1.37)	0.31 (1.37)
abenomics=1 × Re- gion=2							-0.85 (1.96)	-0.88 (1.96)
abenomics=1 × Home w/ Mortg × Region=1							-3.21* (1.65)	-3.11* (1.65)
abenomics=1 × Home w/ Mortg × Region=2							-0.46 (2.29)	-0.45 (2.29)
abenomics=1 × Home w/o Mortg × Region=1							-1.34 (1.69)	-1.26 (1.70)
abenomics=1 × Home w/o Mortg × Region=2							2.25 (2.23)	2.26 (2.23)
TimeFE	No	Yes	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	780,570	780,570	780,570	780,570	780,570	780,570	780,570	780,570

Notes: The sample is monthly from 2005 through 2017. When we include a variable in an interaction term, we also include the non-interacted level. Region 1 is Kanto (which includes greater Tokyo), region 2 is Kansai (which includes Osaka). The omitted category is all other regions of Japan. Standard errors (in parentheses) are clustered by date and household. * p < 0.1, ** p < 0.05, *** p < 0.01.

In column (2) we add time fixed effects to our regression. With time fixed effects we cannot separately identify an effect of Abenomics alone. The addition of time fixed effects has only a small impact on our estimates of the consumption of homeowners with and without a mortgage. In columns (3) and (4) we interact Abenomics with the age of the household head. While we lose statistical significance, the coefficients continue to suggest higher consumption growth among homeowners without a mortgage during Abenomics.

In columns (5) and (6) we test whether the consumption expenditure response varies by age of building. As discussed above, age of building is a good proxy for when a house was purchased. Since the rate for new fixed rate mortgages fell steeply during Abenomics (figure 2), larger impacts on consumption would be expected for those who purchased their house after Abenomics began. The negative coefficient on the triple interaction with whether a house was built more than 5 years ago is weak evidence for such an effect. The negative coefficient means that during Abenomics, homeowners with mortgages living in older houses consumed less than homeowners with mortgages living in new houses (conditional on age and income). Given that house age is a good proxy for when a mortgage was obtained, this result is consistent with the lack of a decline of interest rates on existing mortgages relative to the decline of interest rates on new mortgages.

Unfortunately, while economically large the coefficient on the triple interaction in columns (5) and (6) is not statistically significant. Thus it is difficult to draw firm conclusions about the size of this effect.²³

Finally, in columns (7) and (8) we test for whether the consumption response varies by region. Region 1 is Kanto (which includes greater Tokyo), region 2 is Kansai (which includes Osaka). The omitted category is all other regions of Japan. While not statistically significant, the coefficients on the triple interactions generally indicate no higher consumption of homeowners with or without mortgages in the region including Tokyo where land prices rose.

Table 4 reports the same set of specifications but with total expenditure as the dependent variable. While not as well measured as nondurables alone, the inclusion of durables could be important, given that Cloyne et al. (2016) finds larger percentage differences in durables than in nondurables consumption between homeowners with and without mortgages. In practice, however, results with total expenditure are broadly similar to those for nondurables.

In sum, the regression results confirm the results of the graphical analysis. Consistent with limited pass-through to the mortgage rates paid by households with existing mortgages, we see no evidence that Abenomics led to a relative increase in consumption for homeowners with mortgages.

²³ The measurement error from proxying mortgage age with building age implies that our estimates likely understate the economic and statistical significance of the mortgage age effect.

Table 4 – OLS Regressions by Home Ownership

	Dependent variable: Log of Total Expenditure (weighted)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
abenomics=1	1.81** (0.86)		-0.79 (16.4)		1.84** (0.86)		1.40 (0.97)	
abenomics=1 × Home w/ Mortg	-1.27 (0.82)	-1.23 (0.82)	-1.92** (0.82)	-1.88** (0.82)	-2.33** (1.19)	-2.24* (1.19)	-0.28 (1.01)	-0.26 (1.02)
abenomics=1 × Home w/o Mortg	1.97** (0.87)	2.02** (0.87)	-1.77* (0.97)	-1.71* (0.97)	-2.34 (2.08)	-2.25 (2.08)	2.00* (1.08)	2.04* (1.08)
abenomics=1 × age			-0.19 (0.99)	-0.20 (0.99)				
abenomics=1 × age2			0.75 (1.89)	0.77 (1.89)				
abenomics=1 × age × age2			-0.0045 (0.012)	-0.0046 (0.012)				
abenomics=1 × Built 5+ yrs ago					4.48** (2.04)	4.44** (2.04)		
abenomics=1 × Home w/ Mortg × Built 5+ yrs ago					-3.17 (2.31)	-3.19 (2.31)		
abenomics=1 × Region=1							1.35 (1.26)	1.30 (1.26)
abenomics=1 × Region=2							0.74 (1.78)	0.72 (1.78)
abenomics=1 × Home w/ Mortg × Region=1							-2.92* (1.63)	-2.84* (1.63)
abenomics=1 × Home w/ Mortg × Region=2							-1.20 (2.16)	-1.20 (2.16)
abenomics=1 × Home w/o Mortg × Region=1							-1.00 (1.69)	-0.95 (1.70)
abenomics=1 × Home w/o Mortg × Region=2							0.74 (2.15)	0.76 (2.15)
TimeFE	No	Yes	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	780,570	780,570	780,570	780,570	780,570	780,570	780,570	780,570

Notes: The sample is monthly from 2005 through 2017. When we include a variable in an interaction term, we also include the non-interacted level. Region 1 is Kanto (which includes greater Tokyo), region 2 is Kansai (which includes Osaka). The omitted category is all other regions of Japan. Standard errors (in parentheses) are clustered by date and household. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5 Conclusion

Abenomics has in many respects succeeded, but household consumption growth has been disappointing. In this paper, we argue that low consumption growth can be in part explained by Japanese housing market institutions. Along several dimensions, the Japanese housing market is different from those in the U.S. and UK; most importantly for monetary policy, low levels of refinancing, infrequent household moves, and the structure of variable rate mortgages slow the transmission of interest rate movements to existing mortgagors. This may explain why despite

a percentage point decline in the 10-year government bond yield and the 35-year fixed new mortgage rate, the average rate on the stock of mortgages in Japan fell just 15 basis points between 2012 and 2016. Unsurprisingly given limited pass-through to existing mortgagors, we see no disproportionate increase in the consumption of homeowners with mortgages during Abenomics. This is in stark contrast to the findings of Cloyne et al. (2016) and Wong (2016) who use household-level data for the UK and the U.S., and find that homeowners with mortgages respond to monetary policy more than homeowners without mortgages.

Our results suggest the need for further research on the interaction between housing market institutions and monetary policy. Much of the academic, English-language literature on monetary policy uses data for the U.S. and UK. But given large differences in housing market institutions across countries, empirical results from the U.S. and the UK may have limited applicability to other countries.

For Japan, the most obvious policy implication of our work is that any given change in monetary policy may have less effect on consumption than in the U.S. or the UK. This is likely to be particularly problematic at the zero lower bound where the scope for large interest rate changes is limited. Thus, the structure of housing market institutions ought to be of interest to monetary policymakers. Reforms that increased interest rate pass-through to households with existing mortgages could make the zero lower bound less costly for Japan.

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A Data appendix

Table 1

- Residential units sold
 - Japan: Ministry of Land, Infrastructure, Transport and Tourism. See http://www.mlit.go.jp/statistics/details/t-jutaku-2_tk_000002.html. Data on existing home sales (used to compute new unit share) is from Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [2]-39.
 - U.S.: Sum of existing home sales from FRED series EXHOSLUSM495S, and new single-family home sales from the Census. U.S. data are for 2014, not 2013.
 - UK: UK Property Transaction Statistics, 21 November 2017 release, table 2. Data are for the 2013-2014 fiscal year (1 April 2013 to 31 March 2014). New sales are estimated as net additional dwellings minus demolitions. Data are from the 16 November 2017 “Housing Supply; net additional dwellings, England: 2016-17.” These data are for England only, so the ratio of new units sold to all units sold is computed for England only.
 - Per 1000 people: population data are from the October 2017 *World Economic Outlook*.
- Housing starts
 - Units (row 4): Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [5]-18.
 - Total number of dwellings (for computing starts / dwellings, row 6): Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [5]-18. Total number of dwellings is as of 2013 in Japan, 2015 in the U.S., and 2014 in the UK.
- Dwelling units built after 1980
 - Data for all countries are from Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [5]-16.
 - Data for Japan are through September 2013.
 - Data for the U.S. are through 2015.
 - Data for the UK are through 2013.
- Dwelling units vacant
 - Data for Japan and the U.S. are from Mitsui Fudosan Co., Ltd *Japanese Real Estate Sta-*

tistics, 2017, p. [5]-16.

- Data for Japan are for 2013.
- Data for the U.S. are for 2015.
- Data for the UK are for 2015 and are for England only; they are the ratio of total vacant units from Ministry of Housing, Communities, and Local Government table 615 divided by total dwellings in table 125.
- House prices
 - Japan: Price of new, detached single-family house is for the greater Tokyo area only. The source is Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [2]-35. The price of a condo in central Tokyo (23 wards) total and per square foot is from Mitsui Fudosan Co., Ltd *Japanese Real Estate Statistics*, 2017, p. [2]-30.
 - U.S: New detached single family house price for the Northeast is from the Census, “Characteristics of New Single-Family Houses sold”, sales price table. The price of an apartment in Manhattan is from <https://www.elliman.com/pdf/1a67b1d92427c5c724bbabbcf2a385795100843c>
Data are for the first quarter of 2016.
 - Data for the UK are for the first half of 2015 and are for all detached houses, not only new. The price shown is the simple average of prices in London, the outer metropolitan area, and the outer South East. The source is Nationwide Building Society, <https://www.nationwide.co.uk/about/house-price-index/download-data#xtab:regional-quarterly-series—by-property-age-group-data-available-from-1991-onwards>
Data on inner London apartment prices are from <http://landregistry.data.gov.uk/app/ukhpi/explore>
- Mortgage volume
 - Japan: Total amount of mortgage debt in Yen in March 2017 is from the Japan Housing Finance Agency, http://www.jhf.go.jp/about/research/loan_zandaka.html. For all countries, population and nominal GDP are from the October 2017 World Economic Outlook.
 - U.S.: Amount of mortgage debt of households and nonprofit organizations in Q1 2017 from FRED series HMLBSHNO.
 - UK: Total household property debt is for 2010-2012, and is from Office of National Statistics, “The Burden of Financial and Property Debt, Great Britain, 2010-2012.” This summarizes data from the Wealth and Assets Survey. For conversion to dollars, we use the exchange rate from FRED series USUKFXUKA.
- Share of mortgages that are fixed rate
 - Japan: Data are for the 2015 fiscal year. The source is <http://www.mlit.go.jp/common/001174891.pdf>

- U.S.: Data are for 2016. See Freddie Mac.
http://www.freddiemac.com/perspectives/sean_becketti/20170410_homebuyers_communities_fixed_mortgage.page
- UK: See Cloyne et al. (2016), p. 20.
- Share of mortgages refinanced
 - Japan: Data are for the 2015 fiscal year and are from MLIT. These data only cover the private financial institutions surveyed by MLIT.
 - U.S.: Data are from the Mortgage Bankers Association.
 - UK: Data are from the Financial Conduct Authority Mortgage Lending Statistics.
- Time horizon over which 25 percent of households change address
 - The figure for Japan comes from the Seventh National Survey on Migration, conducted in 2011.
 - The figure for the U.S. comes from Bachmann and Cooper (2014).
- Mortgage interest rate
 - Japan: The nominal rate is from *Japanese Real Estate Statistics*, 2017, p. [4]-43. The real rate is the nominal rate minus the 10-year inflation swap rate (Bloomberg series JYSWIT10).
 - U.S.: The nominal rate is from FRED series MORTGAGE30US. The real rate is the nominal rate minus the 10-year breakeven inflation rate derived from TIPS (FRED series T10YIE.)
 - UK: The nominal rate is the Bank of England series for a 10 year, 75 percent LTV fixed rate mortgage. The real rate is the nominal rate minus 10-year spot implied inflation from the Bank of England Yield Curve data.