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How Do House Prices Affect Consumption Patterns Across Categories?*

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This study examines the extent to which house prices may affect consumption patterns across categories. For this purpose, we merge house price data with transaction data between 2012 and 2016, provided by a major credit card company in South Korea. We find a positive relationship between house prices and overall consumption, but great heterogeneity across consumption categories. Results imply that the change in house price accounts for 25% of the change in total consumption. Moreover, such effects of house price change quantitatively vary by consumption categories, from 0.15% to 46.08%.

JEL Classification: E31, E21, D12
Keywords: House Price, Consumption Category, Wealth Effect, Role of Debt

I. Introduction

The boom and bust of house prices have drawn attention from academic researchers and practitioners (Abowd and Vilhuber, 2012; Knoll et al., 2017; Garriga et al., 2019). Such attention is not surprising considering the fact that places to stay are necessary for living and houses are popular means of savings for households in many countries (Tracy and Schneider, 2001). Literature in economics has examined the determinants of house price and its implications for

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economic outcomes, including consumption (Muellbauer and Murphy, 1997; Case et al., 2005) and employment (Midrigan and Philippon, 2011; Mian and Sufi, 2014).

This study aims to contribute to this vast literature by examining the extent to which house price may affect consumption patterns across different categories. In theory, house price not only affects the overall consumption but also the allocation of resources across consumption categories due to heterogeneous demand elasticity. Despite the ample studies on the link between house price and consumption, no studies have examined the effects of house prices across consumption categories, to the best of our knowledge.

We rely on three sources of information to create a panel dataset. One is the transaction data between 2012 and 2016, provided by a major credit card company in South Korea. Another is the information of mortgage loans provided by the Korea Credit Bureau (KCB). The last source is the house price data provided by Korea's Ministry of Land, Infrastructure, and Transport (MOT, herein). The MOT provides transaction prices of condominiums, referred to as "apartments" in South Korea. Although the MOT data do not contain other types of house, such as single-family houses, this data limitation is not critical for our study, because in South Korea, condominiums account for 61% of houses (Population and Housing Census) and are thus suitable for approximating district-level house prices.

We construct a panel dataset by merging the three sources at the level of district and calendar year. In our data, districts are defined the same as the administrative units, among which 112, mutually exclusive, cover the entire South Korea, except for Kangwon and Jeju Provinces. In our main empirical specifications, we use district-level changes of house prices over time to identify the effects of house prices on overall and category-specific consumptions. We find a positive relationship between house prices and the overall consumption, but great heterogeneity across consumption categories. We conduct a back-of-the-envelope calculation to analyze the effect of house price change on consumption growth rate. Our calculation shows that the house price change accounts for 25% of the change in total consumption. Such effects vary substantially across categories, from 0.15% in drinking places to 46.08% in hobby, entertainment, and leisure.

For robustness check, we use an instrumental variable approach for identification. Our main specification assumes that conditional on district-fixed effects and other controls, the changes of house prices are uncorrelated with the random shocks affecting consumptions. In theory, the two can be correlated, for example, due to omitted variables. To address this possibility, we follow the methods used in Saiz (2010) to construct instrumental variables. Specifically, we use the variations across districts in the share of land constraining housing supply because of either geographical characteristics or regulations. Our instruments are found strong predictors of house prices, and the results qualitatively remain the same.

In addition to the aforementioned studies, our work is related to empirical studies

examining the mechanisms accounting for the positive effect of house prices on consumption. In theory, wealth and collateral effects may account for the positive effects of house prices on consumption. Debates still exist on which of the two effects may be dominant. Recent empirical studies appear to support the latter as a main mechanism. For example, Iacoviello (2004), Campbell and Cocco (2007), and Berger et al. (2017) found that wealth effects are difficult to account for the effect on consumption because a rise in house prices is either offset by the future cost of renting or cannot affect budget constraints. Consistent with these recent studies, we also find that collateral effects may strongly affect consumption. Specifically, our empirical results show that changes in house prices affect districts with a larger share of residents facing borrowing constraints more positively than their counterparts.

There exists a sizable amount of empirical studies examining South Korea data. Examples include Kim (2003), Lee (2004), Song (2014), Choi et al. (2015), and Park (2019). All of them examined consumption elasticity with respect to house prices; however, the estimated results greatly vary (See Table A1 in Appendix for summary of each paper).[1] Different from these studies, we focus on heterogeneity across consumption categories and examine the implications of house prices for corresponding industries.

A number of studies have investigated the relationship between income and consumption categories (Van Soest and Kooreman, 1987; Harmon, 1988; Paulley et al., 2006; Hughes et al., 2008). Income elasticities vary by consumption categories from −0.75 to 2.10 (See Table A2). Especially, Souleles (1999) found that durable consumption may have a larger elasticity with respect to income than non-durable consumption. Consistent with these recent studies, we can disaggregate consumption spending into total consumption and 14 consumption categories and estimate elasticity with respect to house prices across consumption categories.

The remainder of our paper proceeds as follows. In Section II, we present the empirical framework. Section III describes the data. We present our empirical results in Section IV, while in Section V, we discuss the robustness of our findings. Section VI concludes our work.

II. Empirical Framework

We estimate the effect of house prices on consumption by estimating the regression model below:

[1] For example, the estimated consumption elasticity ranges from 0.064 (Choi et al., 2015) to 0.23 (Kim, 2003).

$$\Delta C_{i,t+1} = \beta_o + \beta_1 \Delta C_{i,t} + \beta_2 \Delta W_{i,t+1} + X\beta' + \varepsilon_{i,t+1},$$

where subscripts i and t are for ith district and tth year, respectively; $\Delta C_{i,t+1}$ is the change in the logarithm of consumption spending between years t and $t+1$; and $\Delta W_{i,t+1}$ is the change in the logarithm of house prices between years t and $t+1$. Controlling variable X includes four variables, namely, changes in the logarithm of labor incomes $\Delta Y_{i,t}$, real interest rate r_{t+1}, regional loan-to-value (LTV), and the share of homeowners $owner_{i,t+1}$.[2]

The key parameter of interest is β_2, which measures the consumption elasticity to house prices. That is, 1% point increase in house prices (i.e., 1 unit increase in $\Delta W_{i,t+1}$) leads to a β_2% points increase (or decrease) in consumption. The identification assumption is that conditional on control variables, $\Delta W_{i,t+1}$ is uncorrelated with random shocks, $\varepsilon_{i,t+1}$. In our robustness check, we relax this assumption by using an instrumental variable approach. Qualitatively the results remain the same. The details will be discussed in Section V.

We choose our control variables in line with existing studies. The lagged consumption growth rate ($\Delta C_{i,t}$) captures the possible persistency in consumption growth rates found in various studies, often examining the habit persistence hypothesis. Examples include Flavin (1981), Campbell and Mankiw (1989), Lettau and Ludvigson (2001), Singh and Ullah (1976), Boldrin et al. (2001), and Carroll (2004).

Changes in income ($\Delta Y_{i,t}$) can affect consumption changes (See Campbell and Cocco, 2007). Following Choi et al. (2015), we allow for the possibility that LTV can affect consumptions. We further include a share of homeowners to consider heterogeneity in the response of consumption to house prices between homeowners and renters. Park (2019) showed that the effects of house prices on consumption are significantly positive for homeowners, whereas insignificant for renters in South Korea.

III. Data

3.1. Credit Card Data

We obtain a district-level panel dataset from Shinhan Card Co. The data provider (the credit card company) is the largest credit and debit card company in Korea in terms of the number and amount of transactions. Our dataset is

[2] Interest rate is widely known for its effect on business cycles, influencing consumption as a result (Campbell and Cocco, 2007; Aladangady, 2017; Park, 2019). To address this possibility, we include real interest rates using the Bank of Korea data (http://ecos.bok.or.kr/) as an explanatory variable.

representative of credit card transactions in Korea in terms of coverage. The unit of observations is district by year by consumption categories. Districts are defined by administrative units called "Shi/Gun/Gu" levels, whereas calendar months range from January 2012 to December 2016.[3] A total of 47 categories exist in the following 14 consumption groups: (1) automobile supplies and services, (2) department stores, (3) food and beverage, (4) home appliances, (5) clothing and fashion accessories, (6) furniture and interior design, (7) refueling, (8) online and home shopping, (9) accommodation, (10) restaurants, bakeries, and coffee shops, (11) drinking places, (12) hobby, entertainment, and leisure, (13) living services, and (14) cosmetics and beauty.

The dataset includes the total amount of money spent on each consumption category by those who reside in the corresponding district in a calendar year. For comparison across districts and time, we calculate per capita consumption spending by dividing the total amount by the number of residents in each district based on the Population and Housing Census. We further convert the nominal per capita consumption to a real one using regional consumption price index (Statistics Korea).[4]

The rationale of using this credit card data for our analysis is notable. Existing studies have used various nationally representative datasets. Examples include the Korea Labor and Income Panel Study, the Public Finance Panel data, the Household Trends Survey, and the Household Finance and Welfare Survey. In comparison with these datasets, our dataset allows us to use variations of house prices across more narrowly defined geographical units, namely, districts. The former two datasets, surveyed by the Korea Labor Institute and the Korea Institute of Public Finance, contain limited number of households, omitting a sizable share of districts in their survey (Kim, 2009). The Household Trends Survey classifies South Korea into "Shi/Do," which is not based on the district level. The Household Finance and Welfare Survey surveyed by the Statistics Korea includes a considerably large number of households (20,000), but only has nine consumption categories.

Another benefit of our dataset is that the information is based on actual transaction not on consumer surveys. As a result, information quality of consumption spending is not subject to the selection in survey participation, recollection errors, or any behavioral biases that can emerge during surveys.

Of course, our credit card dataset is not fully representative in terms of South Korean consumers or the coverage of household consumptions, because our dataset comes from only one credit card company and consumers may systematically divide their spending between credit cards and other means of payment. However, our

[3] The credit card company excludes information from two provinces, Gangwon and Jeju.

[4] Data are available at http://kosis.kr/index/index.do.

data are from the largest credit card company, and the card users are evenly distributed across geographic regions over the entire country.[5]

3.2. House Prices and Key Control Variables

We use the transaction data of condominiums, available from the MOT. The dataset includes the location, size, and floor of a corresponding condominium traded in a given month. For comparability, we include the information of condominiums that have existed since 2010 and exclude the transaction of condominiums located in the first, second, and the top floors because their prices are often considerably lower than the comparable units located in different floors. We then calculate the average of house prices traded in a given month and district.

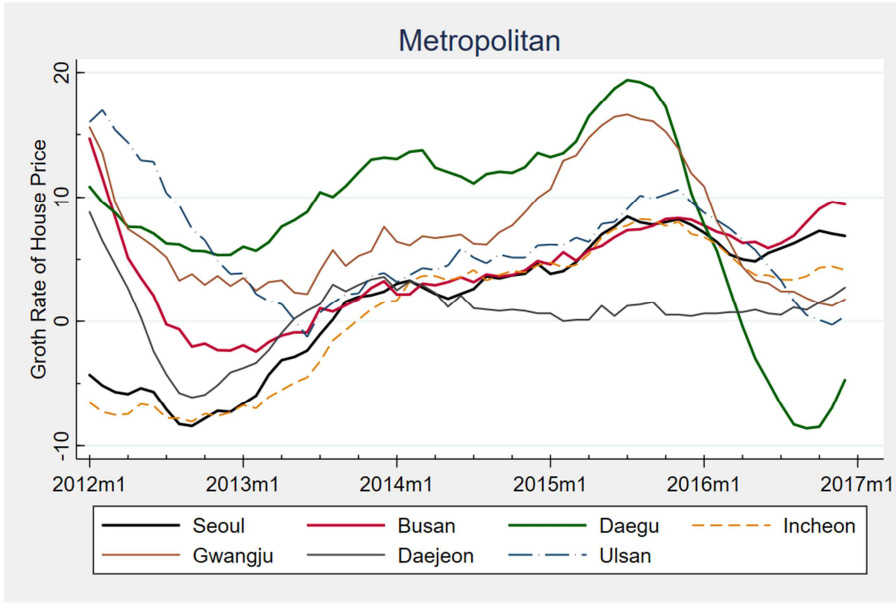
Figure 1 describes growth rate of house price across regions. Our sample period includes boom and bust in terms of house price. For example, the house price of Seoul decreased in 2012 and 2013 but started recovering in the late 2013, recording positive growth rates since 2014. We attempted to be careful in selecting the sample period to include growing and declining periods.

We control for the leverage level for each district. The KCB provides the information of outstanding mortgage loans. We construct a variable measuring district-level LTV ratios by aggregating the total outstanding loans to district levels and then dividing it by the median house price in the corresponding district. Labor earnings are obtained from Tax Statistics. The Tax Statistics report labor earnings at the district levels starting 2016. Given that no district-level labor earnings are available prior to 2016, we use income growth rates at the "Shi/Do" level. The effects of house prices may vary across households depending on whether they own houses. The MOT provides the share of people living in their own houses at the "Shi/Do" levels. We include this variable as controls in our empirical analysis. We deflate the house price and labor earning variables using a consumption price index.

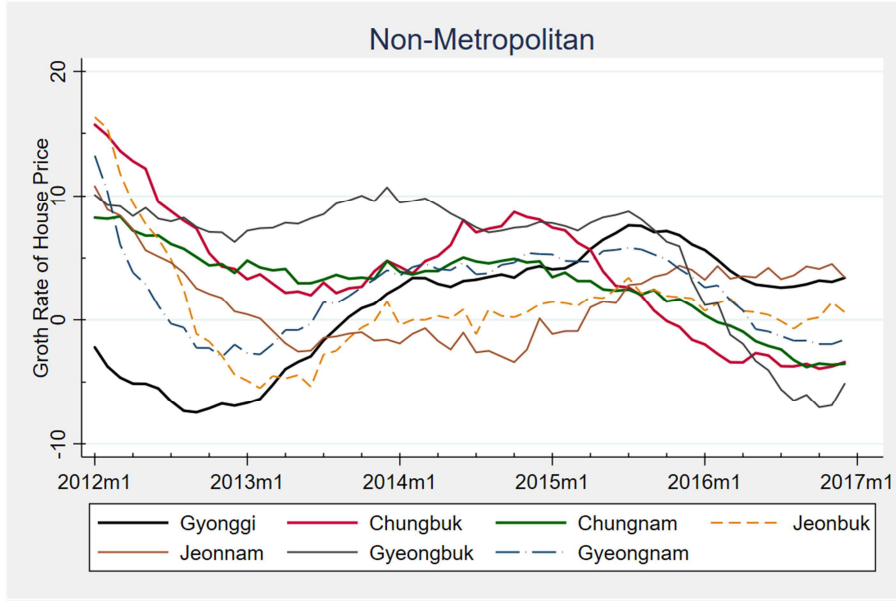
[5] Four major credit card companies account for 62% of the credit card users in South Korea, and they provide comparable sets of products. As for the latter, researchers report that total credit card usages are a good proxy for total consumptions (see Kim and Yeom, 2015). For this reason, we conclude that the advantage of our dataset outweighs the weaknesses.

[Figure 1] Growth rate of house price across regions

Panel A: Metropolitan areas



Panel B: Non-metropolitan areas



Note: Annual growth rate
Source: Korea Appraisal Board, Transaction-based Price Indices, Author Calculation

3.3. Summary Statistics

Table 1 reports the summary statistics. Panel A shows statistics on the growth rate of consumption, house prices, and income variable. The average of the annual consumption growth rates is 3.53% between 2012 and 2016. The average annual growth rates of house prices is 1.59%, which is lower than the growth rate of consumption. However, the standard deviation of house prices is larger than the consumption's and the distribution of the growth rate widely varies, as decreases and increases range from −17% to 21% across the districts. The average annual income growth rate is 2.53%. As a shown in Panel B, the average LTV is 38%.[6] The share of homeowner is 54% on average, which is relatively low in Seoul and the metropolitan areas in Korea.

[Table 1] Summary Statistics

	Average (1)	S.D. (2)	Min (3)	Max (4)
Panel A				
Consumption annual growth rate (%)	3.53	2.82	−8.69	10.65
- Wholesale and retail trades	3.11	2.99	−10.01	10.69
- Accommodation and food services	5.81	3.55	−8.57	15.03
- Sports, amusement, and other services	1.49	3.66	−10.13	9.82
House price annual growth rate (%)	1.59	5.77	−17.11	20.59
Income annual growth rate (%)	2.53	1.30	−1.14	5.32
Panel B				
LTV (%)	38.51	9.70	21.34	85.00
Share of homeowners (%)	52.54	8.29	40.20	73.40

Note: The sample is restricted to 112 districts for which we have data on the value of consumption and LTV. All statistics reported for each variable in the 560 samples are used in the study. These districts represent 81.2% of the total South Korea population in 2016. The annual growth rate of each variable is a real value at 2015.

Table 2 describes the annual growth rate and share of each category. For the purpose of simplicity, we reclassify the 14 categories into the following three groups: (1) wholesale and retail trades, (2) accommodation and food services, and (3) sports, amusement, and other services. In this process, we closely match the consumption categories to three-digit industries in the 9th Korean Standard Industrial Classification. Wholesale and retail trade account for 66% of the consumption. The

[6] Above 80% of LTV proportions are Gimcheon-si at KyeongBuk and Youngcheon-si at KyeongBuk, Youngam Jeonnam. LTV is calculated as the total amount of financial mortgage loans on houses; it is address-based and used by the median of actual transaction apartment price. Using LTV might generate some discrepancy between the real data and the data used in this study. The Korea Housing Finance Corporation reported that the average Korea LTV is 46.5% as of late 2013.

[Table 2] Category-Specific Consumption

Consumption Category	Sector Classification (KSIC)	Share (%)	Annual growth rate (%)
		(1)	(2)
Panel A. Wholesale and retail trade		**65.55**	**3.11**
- Automobile supplies and services	Sale of motor vehicle parts and accessories (452)	2.77	12.4
- Department store	Retail sale in non-specialized stores (471)	4.39	2.04
- Food and beverage	Retail sale of foods, beverages and tobacco (472)	22.98	3.93
- Home appliance	Retail sale of household electrical appliances (473)	3.46	2.59
- Clothing and fashion accessories	Retail sale of textiles, clothing, footwear and leather goods (474)	3.76	−1.18
- Furniture and interior design	Retail sale of other household equipment (475)	1.00	2.53
- Refueling	Retail sale of fuels (477)	12.11	−3.93
- Online and home shopping	Retail sale not in stores (479)	19.08	8.68
Panel B. Accommodation and food service activities		**22.69**	**5.81**
- Accommodation	General accommodation (551)	1.02	1.40
- Restaurants, bakery and coffee	Restaurants and mobile food service activities (561)	20.21	7.38
- Drinking places	Drinking places and non-alcoholic beverages places (562)	1.46	−6.16
Panel C. Sports, amusement, and other personal services activities		**7.76**	**1.49**
- Hobby, entertainment and leisure	Sports services (911), Amusement parks and recreation activities (912)	4.63	0.24
- Living service	Other personal service activities (969)	0.63	13.65
- Cosmetic and beauty	Personal care services(961), Retail sale in other goods (478)	2.50	1.71

three categories, namely, (1) food and beverage, (2) restaurants, bakeries, and coffee shops, (3) online and home shopping, account for 63% of the consumption. The average of the annual growth rate is the highest for accommodation and food services (5.81%) and the lowest for sports, amusement, and other services (1.49%). The average annual growth rate for the wholesale and retail trades is 3.11%.

Among the detailed categories, the growth rate of living services (e.g., real estate, wedding, funeral, and laundry) is the highest (13.65%), followed by automobile supplies and services (12.40%). Conversely, drinking places (−6.16), refueling, and clothing and fashion accessories (−1.18%) show negative annual growth rates. Home appliances and furniture and interior design represent the durable consumptions, the recorded annual growth rates of which are 2.59% and 2.53%, respectively. These growth rates are slightly lower than that of food and beverage (3.93%).

IV. Results

4.1. Estimation

Overall Consumption

Column 1 of Table 3 presents the main results. The estimated coefficient of changes in house prices is 0.057 and is statistically significant at the 1% level. Thus, a 1% point increase in the rate of house prices leads to an increase in the consumption rate (0.057% points). It is also close to the average of the results of latest studies, such as Choi et al. (2015) and Park (2019), which also used the sample period similar to the present study. Our result implies that the change in house price accounts for 25% of the change in total consumption.

The remaining coefficients are estimated all positive and statistically significant at the 1% or 5% level, except that of LTV. The effect of change in income on the consumption growth rate is statistically positive. Consistent with the habit persistence hypothesis, the lagged variable of consumption growth positively affects the consumption growth rates.

Real interest rate has a positive influence on consumption, suggesting that the income effect is greater than the substitution effect. Thus, an increase in income leads to an increase in consumption, not that an increase in interest rate leads to more savings and less consumption. A positive correlation between interest rates and consumption adequately shows decreasing trends in interest rates and increasing consumption rates during the analysis periods.

An increase in LTV has a positive influence on consumption, but it is not

statistically significant.[7] Districts with higher proportions of homeowners who live in their own homes tend to have a higher response rate in consumption.[8] Consistent with existing studies (Flavin and Yamashita, 2002; Campbell and Cocco, 2007; Aladangady, 2017), an increase in house prices does not benefit renters who are likely net buyers of housing in the future.

To address the representativeness of condominium transaction data, we conduct a subgroup analysis focusing only on metropolitan areas (e.g., Seoul, Busan, and Daejeon), where condominium and house prices are highly correlated. We report the results in Table A4. For metropolitan areas, the elasticity of consumption to house price is 0.079 and is statistically significant at the 10% level, which is slightly higher than that of non-metropolitan areas.

[Table 3] Regression Baseline

	Total	Wholesale and retail trades	Accommodation and food services	Sports and other services
	(1)	(2)	(3)	(4)
$\Delta W_{i,t+1}$	0.057**	0.090***	0.008	−0.060**
	(0.026)	(0.028)	(0.033)	(0.028)
$\Delta Y_{i,t}$	0.333***	0.315***	−0.358***	0.443***
	(0.083)	(0.075)	(0.070)	(0.075)
r_{t+1}	3.810***	4.170***	4.979***	1.506***
	(0.447)	(0.502)	(0.459)	(0.547)
$LTV_{i,t}$	0.063	9.852**	−9.912*	−19.089***
	(0.040)	(4.535)	(5.520)	(7.010)
$owner_{i,t+1}$	0.288**	0.790***	−0.382***	−0.417**
	(0.135)	(0.149)	(0.138)	(0.161)
$\Delta C_{i,t}$	0.245***	0.035	0.073	0.015
	(0.077)	(0.045)	(0.048)	(0.048)
R^2	0.602	0.549	0.623	0.537
Mean of dep. var.	3.97	3.11	5.81	1.49
# of observations	560	560	560	560
(Group)	112	122	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district level are in parentheses. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

[7] We need be cautious in interpreting the effect of LTV on consumption, as the LTV may change due to house price appreciation/depreciation.

[8] We also conduct a subsample analysis for locations with higher ownership rates (above the mean) and lower ownership rates (below the mean). The magnitude of wealth effects is higher in locations with higher ownership rates (See Table A3).

[Table 4] Regression Results by Consumption Category

Variable	Wholesale and retail trade							
	Automobile service	Department store	Food	Appliance	Clothing	Furniture	Refueling	Online
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta W_{i,t+1}$	1.102***	0.117	0.075**	−0.302***	0.011	0.288***	0.048**	0.029
	(0.078)	(0.073)	(0.036)	(0.068)	(0.047)	(0.085)	(0.024)	(0.035)
$\Delta Y_{i,t}$	1.083***	−0.197	0.115	2.282***	0.559***	−0.328	−0.322***	0.659***
	(0.310)	(0.256)	(0.097)	(0.330)	(0.157)	(0.402)	(0.068)	(0.095)
r_{t+1}	12.944***	1.700	5.533***	5.523**	4.614***	12.696***	2.673***	1.826***
	(1.736)	(1.418)	(0.614)	(2.368)	(1.026)	(1.547)	(0.359)	(0.564)
$LTV_{i,t}$	83.714***	−4.244	1.913	5.244	4.202	53.080**	4.925	−3.429
	(27.030)	(18.196)	(7.108)	(14.185)	(11.363)	(21.946)	(4.611)	(4.568)
$owner_{i,t+1}$	4.417***	−0.340	0.271	2.052***	0.657**	0.986**	1.112***	0.182
	(0.567)	(0.530)	(0.188)	(0.523)	(0.257)	(0.390)	(0.130)	(0.159)
$\Delta C_{i,t}$	−0.026	0.030	−0.009	−0.128**	−0.047*	−0.090	0.002	−0.014
	(0.055)	(0.032)	(0.016)	(0.062)	(0.025)	(0.056)	(0.018)	(0.019)
R^2	0.569	0.362	0.609	0.271	0.350	0.249	0.407	0.303
Mean of dep.var.	12.40	2.04	3.93	2.59	−1.18	2.53	−3.93	8.68
# of observations	560	560	560	560	560	560	560	560
(Group)	112	112	112	112	112	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district-level are in parentheses. Symbols ***, **, * indicate the corresponding coefficient is statistically different than zero at the 1%, 5% and 10% level, respectively.

[Table 4] Regression Results by Consumption Category (Con't)

Variable	Accommodation and food service			Sports, amusement and other personal services		
	Accommodation	Restaurants	Drinking	Hobby	Living service	Cosmetic, beauty
	(9)	(10)	(11)	(12)	(13)	(14)
$\Delta W_{i,t+1}$	0.098*	−0.021	0.006	−0.129***	0.265***	0.009
	(0.050)	(0.033)	(0.043)	(0.031)	(0.100)	(0.036)
$\Delta Y_{i,t}$	−0.090	−0.424***	0.220	0.697***	−0.497	0.121
	(0.179)	(0.058)	(0.148)	(0.114)	(0.484)	(0.094)
r_{t+1}	4.394***	4.603***	7.617***	0.261	9.320***	3.469***
	(0.896)	(0.462)	(0.721)	(0.694)	(2.080)	(0.610)
$LTV_{i,t}$	−15.130*	15.764***	−6.572	39.448***	84.816**	−6.410
	(8.227)	(5.859)	(7.976)	(13.281)	(34.599)	(6.485)
$owner_{i,t+1}$	0.791**	−0.752***	0.854***	−1.045***	2.364***	0.235
	(0.314)	(0.143)	(0.210)	(0.219)	(0.649)	(0.191)
$\Delta C_{i,t}$	−0.001	0.029*	−0.025	−0.010	−0.097	0.003
	(0.039)	(0.015)	(0.022)	(0.021)	(0.090)	(0.019)
R^2	0.196	0.659	0.508	0.592	0.155	0.421
Mean of dep.var.	1.40	7.38	−6.16	0.24	13.65	1.71
# of observations	560	560	560	560	560	560
(Group)	112	112	112	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district-level are in parentheses. Symbols ***, **, * indicate the corresponding coefficient is statistically different than zero at the 1%, 5% and 10% level, respectively.

Results for Categories

Columns 2–4 show the effects of house prices on the three (broader) consumption groups defined by a one-digit level. For wholesale and retail sales, a 1% point increase in house prices leads to 0.09% points increase in consumption, and the estimated effect is statistically significant at the 1% significance level. However, accommodation and food services category is unaffected by house prices, and sports and other services category shows a negative coefficient.

We further examine the extent to which the elasticities vary across more narrowly defined categories. Table 4 reports the results for the 14 categories. There exists a substantial variation across categories. An estimated coefficient for durable consumption, such as automobile supplies and services, is over 1, which is a highly sensitive response. An estimated coefficient for food and beverage, furniture and interior design, refueling, accommodation, and living services ranges from 0.048 to 0.228. The consumption categories (e.g., department stores, clothing and fashion accessories, online and home shopping, and cosmetics and beauty) are found all positively but statistically insignificant. Although durable consumptions (e.g., automobile supplies and services and furniture and interior design) are more sensitive to house prices; whereas the responses of department stores, clothing and fashion accessories, online and home shopping, and cosmetics and beauty are considerably less sensitive.[9]

4.2. Implications

Measuring the Importance of House Price Effect

In this subsection, we conduct a back-of-the-envelope calculation to infer the effect of the recent house price change. We compute the change in consumption by interacting the estimated coefficient of the annual growth of house prices and the average annual growth rate of house price. Then, we calculate the proportion of this value to the actual consumption growth rate. For example, the change in house price (i.e., annual growth rate of house price at 1.59%) multiplied by the estimated elasticity of 0.057 results in 0.9063, which corresponds to about 25% of the total consumption growth (i.e., 3.53).

Table 4 reports the results for the 14 categories. The extent to which house price growth explains consumption growth varies substantially across the categories. Although the change in house price explains less than 1% of the consumption

[9] If the house price appreciation leads to more borrowing to finance durable consumption, then a positive correlation may exist between housing price and (housing-related) durable good consumption. Although this type of financing is common in the US (e.g., 2nd mortgage or HELOC), it is not the case in Korea.

growth in drinking places; restaurants, bakeries, and coffee shops; and online and home shopping categories, it accounts for about 15% for automobile supplies and services, home appliances, and furniture and interior design. Although the growth rate is relatively low for the hobby, entertainment, and leisure category, about 46% of the growth is explained by the house price growth.

[Table 5] Back-of-the-envelope Calculation

Category	Consumption		Sales	
	Growth rate (%)	Explanation (%)	Growth rate (%)	Explanation (%)
Automobile supplies and services	12.40	14.13	7.61	23.02
Department stores	2.04	9.12	4.4	4.23
Food and beverage	3.93	3.03	7.92	1.51
Home appliances	2.59	15.64	−1.16	41.39
Clothing and fashion accessories	−1.18	1.46	2.84	0.62
Furniture and interior design	2.53	18.10	5.7	8.03
Refueling	−3.93	1.90	−4.4	1.70
Online and home shopping	8.68	0.53	7.68	0.60
Accommodation	1.40	11.13	1.41	11.05
Restaurants, bakeries, and coffee shops	7.38	0.45	7.74	0.43
Drinking places	−6.16	0.15	6.37	0.15
Hobby, entertainment, and leisure	0.24	46.08	0.26	67.72
Living services	13.65	3.09	8.27	5.09
Cosmetics and beauty	1.71	0.84	6.68	0.21

Note: The average of the annual house price growth rate is 1.59%. Sales growth is calculated using the Economic Census 2010, 2015 of KOSIS.

We repeat the same procedure of a back-of-the-envelope calculation in sales, obtained from the Economic Census. Table 5 presents the results, which also show substantial variation across categories. The house price change accounts for less than 1% of the sales growth in drinking places; restaurants, bakeries, and coffee shops; and online and home shopping categories, a magnitude similar to that in the consumption growth. However, it accounts for about 23% of sales growth in automobile supplies and services and 41% in home appliances. Our finding suggests that the proportion of house price growth accounting for consumption and sales growth varies substantially across the different categories. Such heterogeneity in the response to house prices implies that the benefit of house price appreciation will be highly different across industries.

V. Discussions

5.1. Instrumental Variable Approach

This subsection examines the extent to which our identification assumption may affect the empirical results. Specifically, we assume that conditional on control variables, the change in house prices ($\Delta W_{i,t+1}$) is uncorrelated with random shocks ($\varepsilon_{i,t+1}$).

Mian et al. (2013) and Aladangady (2017) suggested the possibility that the three may be correlated due to omitted variables. For example, if individuals expect improvement in productivity in the future, then they may increase consumption ($\Delta C_{i,t+1}$) while the returns to capital, including houses, may also increase ($\Delta W_{i,t+1}$) (check if this is true). Another example is a shock in non-tradable industries. A sharp increasing rate in the consumption in non-tradable industries might lead to an increase in employment and wages at the relevant industry, which affects house prices. Finally, changes in demographic compositions and relative preferences might cause a consumption influence on house prices.

To address this concern, we follow the empirical strategy used in Glaeser et al. (2008), Saiz (2010), Chaney et al. (2012), and Aladangady (2017). These studies used factors that can affect house supplies to instrument house prices. Following Saiz (2010), we construct two variables that measure the difficulty in housing development due to geographical characteristics and regulatory restrictions. For the former, we calculate the share of land in a district that is occupied by mineral spring, river, and other internal water bodies. Note that the MOT defines the main usage of land in cadastral statistics.[10] Rose (1989) showed that a positive correlation exists between coastal constraint and house price growth. Moreover, Saiz (2010) found that restrictive geography, such as presence of steep-sloped terrain and internal water, is a strong predictor of house price growth rate. Given that our data do not have information about the slope of the terrain, we only consider internal water bodies as geographical constraints.

For the regulatory restrictions, we use the share of land in a district subject to conservations and public parks. The MOT classifies the main use of land into five categories, and the land whose main use is conservation and public parks is subject to the strictest scrutiny, preventing housing development. We use the information provided by the Korea Land and Housing Corporation to calculate the share of such land in a district.[11]

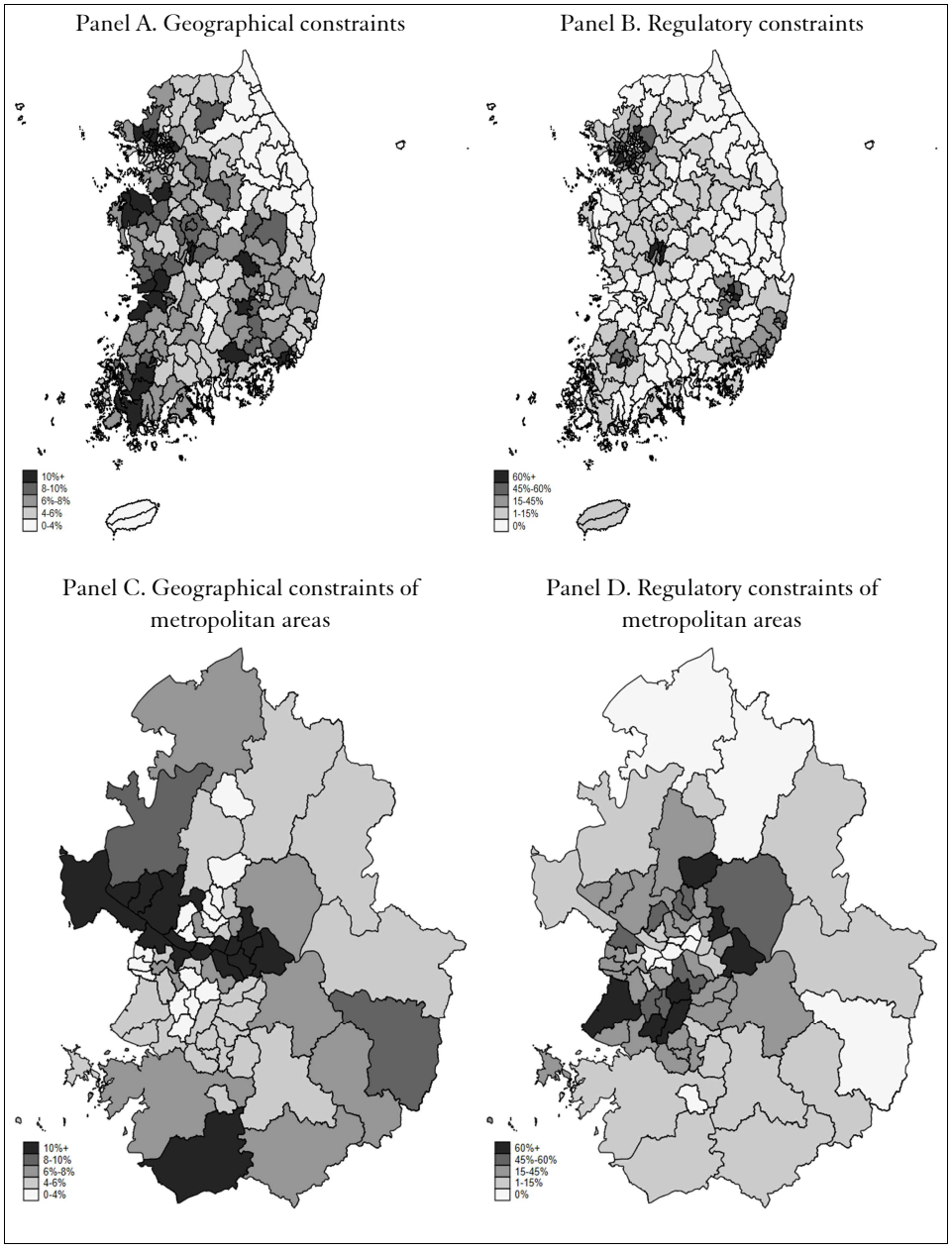
Figure 2 illustrates the large variations in the share of land subject to natural or regulatory restrictions for house supplies. The top panels cover the entire South

[10] Source: Statistics Korea, http://kosis.kr/index/index.do.

[11] Source: Statistics of Urban Planning at http://kosis.kr/index/index.do.

Korea, whereas the bottom panels show Seoul and Kyunggi Provinces. Darker shades indicate the districts where restrictions are applied to a large share of their land. Geographical constraints are shown all across South Korea, whereas regulatory restrictions are often observed in Seoul and other metropolitan areas.

[Figure 2] Instrumental Variable Measures: Geographical and Regulatory Constraints



Instrumental variables $r_{t+1}s_i^1$ and $r_{t+1}s_i^2$ are constructed from the interaction terms of interest rates and variables relevant to housing supply, such as geographical and regulatory constraints. The key assumption is that instruments $r_{t+1}s_i^1$ and $r_{t+1}s_i^2$ do not directly influence the increasing consumption rate. Accordingly, the covariance of instruments and $\varepsilon_{i,t+1}$ at Equation 3 should be zero, such that it will not have any effect on an increasing consumption rate. What the zero covariance infers is that consumption consequences should not be systematically swayed by changes in interest rates with respect to geographical and regulatory constraints.

[Table 6] IV Estimation Approach

Variable	First stage	IV estimation	IV estimation	IV estimation	IV estimation
	House price growth rate	Total	Wholesale and retail trades	Accommodation and food services	Sports and other services
	(1)	(2)	(3)	(4)	(5)
$r_{t+1}s_i^1$	0.316***				
	(0.047)				
$r_{t+1}s_i^2$	0.073***				
	(0.012)				
F-test	80.311				
p-value	(0.000)				
$W_{i,t+1}$		0.210***	0.260***	0.250***	−0.041
		(0.046)	(0.050)	(0.048)	(0.050)
$\Delta Y_{i,t}$	−0.718***	0.451***	0.449***	−0.143*	0.448***
	(0.134)	(0.076)	(0.065)	(0.086)	(0.080)
r_{t+1}	−3.199***	3.391***	3.747***	4.343***	1.483***
	(1.126)	(0.459)	(0.515)	(0.529)	(0.495)
$LTV_{i,t}$	−1.020***	0.209***	25.640***	12.898*	−17.818**
	(0.216)	(0.065)	(7.023)	(7.498)	(7.409)
$owner_{i,t+1}$	0.423*	−0.053	0.443***	−0.864***	−0.458***
	(0.250)	(0.125)	(0.148)	(0.156)	(0.162)
$\Delta C_{i,t}$	−0.257**	0.269***	0.058	0.140***	−0.002
	(0.128)	(0.064)	(0.039)	(0.044)	(0.041)
R^2	0.528	0.280	0.170	0.442	0.328
Mean of dep. var.	1.59	3.53	3.11	5.81	1.49
# of observations	560	560	560	560	560
(Group)	112	122	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district are in parentheses. Cragg Donald F-statistics value is 80.301 above the stated critical values. All specifications pass the Sargan test for overidentifying restriction. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

Column 1 of Table 6 shows the result of the first stage. The first two lines show that the instruments, namely, the interaction terms between the interest rate and housing supply constraints, significantly affect the changes in house price. In addition, the F-test for the instruments exceeds the Stock and Yogo (2002) critical value at the 10% level. These results imply that the instruments are relevant and strong.

The main results of regression with instruments are in Column 2. The estimated coefficient of changes in house prices is 0.210 and statistically significant at the 1% level. Thus, a 1% point increase in a rate of house prices leads to an increase in consumption rate by 0.210% points. Indeed, the estimates with instruments are greater than those of the OLS result (0.04%). Why the IV estimates should be larger than the OLS estimates is unclear. One possible explanation is that the instruments, which are relevant to the housing supply, may also control for some endogenous factors that may increase consumption but negatively affect the demand for housing. For example, Aladangady (2017) argued that the demographic composition or changes in preference may negatively affect housing demand.

Columns 3–5 show the effects of house prices on consumption categories defined by the one-digit level. For wholesale and retail sales, a 1% point increase in house prices leads to 0.26% point increase in consumption, and the estimated effect is statistically significant at the 1% level in Column 3. In Column 4, the accommodation and food services category is also affected by the house prices, whereas the OLS estimates are insignificant. Sports and other services category shows a negative coefficient that is statistically insignificant.[12]

We also repeat the IV regressions for the 14 consumption categories. The results are reported in Table A5. The variation is substantial and even larger than that observed in the OLS estimates.[13] An estimated coefficient for food and beverage; clothing and fashion accessories; furniture and interior design; refueling; accommodation; restaurants, bakeries, and coffee shops; drinking places; hobby, entertainment, and leisure; and living services ranges from −0.224 to 1.294. The coefficients for durable consumption, such as automobile supplies and services, furniture and interior design, and living services are over 1, which suggests highly sensitive response to house price changes. Food and beverage; restaurants, bakeries, and coffee shops; and drinking places categories, which are likely to be affected by local consumers, are indeed affected by house price changes. Consumption

[12] Cambell and Cocco (2007) and Kim et. al (2017) shows that the coefficients can be negative for young or non-owners (i.e., renters). The coefficients for hobby, entertainment, and leisure remain negative in IV. Such negative effects seem to be generated by certain items, which are more likely to be consumed by young and non-owners (e.g., ski, health, and leisure).

[13] The IV estimates vary from −0.224 to 1.809, whereas the OLS estimates vary from −0.129 to 1.102. The extent to which house prices account for the consumption growth across the categories also varies more in the IV (0.77%–79.14%) than in the OLS (0.15% –46.08%).

categories, such as department stores, home appliances, online and home shopping, and cosmetics and beauty, are all positive but statistically insignificant.

5.2. Alternative Specifications

Role of Debt

As discussed earlier, the changes in house prices can affect consumptions through wealth and collateral effects. Although measuring the relative importance of the two mechanisms is not our research goal, we conduct the following analysis in line with existing studies.

Following the methods provided by Zeldes (1989), Cooper (2009), Chen et al. (2010), and Johnson and Li (2010), we allow for the possibility that a change in house prices may have a differential effect on consumption depending on the LTV ratios. If collateral effects are important in our setting, then the districts with higher LTV level may largely be affected by house price changes. Mian et al. (2013) highlighted the heterogeneity in marginal propensity of consumption (MPC) with respect to leverage in response to finance shock. For example, districts with LTV of 90% have an MPC that is three times as large as the MPC of districts with only an LTV of 30%.

For this purpose, we classify districts into two: high and low LTV districts. We use the average LTV levels (38.5%) as the cutoffs for classification. Table 7 shows the results. The districts with high LTV levels show larger and stronger consumption responses as house prices increase. For example, districts with LTV above the average show a consumption elasticity of 0.196, which is statistically significant at the 1% level, whereas an estimated coefficient for places with LTV below average is positive yet not statistically significant.

These results suggest that people with higher elasticity of consumption may be more likely to borrow. The results are also consistent with the hypothesis emphasizing the role of debt. That is, districts with a higher LTV are places where people might struggle to borrow additional loans. Thus, the former may have responded more to an increase in house prices than the latter if the house price increase leads to an increase in collateral assets, relaxing the borrowing constraints.[14] For this reason, our results are in line with the main empirical results in Campbell and Cocco (2007), Lustig and van Nieuwerburgh (2010), and Atalay et al. (2016), proving the presence of relaxing effects with respect to borrowing constraints. Korean studies, such as Choi et al. (2016), have also found similar results.

[14] Alternatively, districts with a higher LTV may have decreased consumption more in response to house price decline due to the leverage effect.

[Table 7] Role of Debt

Variable	Total	Wholesale and retail trades	Accommodation and food services	Sports and other services
	(1)	(2)	(3)	(4)
$W_{i,t+1}$ x 1(LTV≥avg)	0.196***	0.226***	0.221***	0.073
	(0.058)	(0.068)	(0.058)	(0.051)
$W_{i,t+1}$ x 1(LTV<avg)	−0.002	0.034	−0.072***	−0.115***
	(0.025)	(0.025)	(0.026)	(0.027)
R^2	0.634	0.578	0.647	0.556
Mean of dep. var.	3.53	3.11	5.81	1.49
# of observations	560	560	560	560
(Group)	122	112	112	112

Note: The average LTV level is 38.5%. Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district are in parentheses. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

Dynamic Effects

We subsequently examine the duration over which a change in house prices may affect consumption. For example, an increase in house prices may affect consumption in a short run, but the effect may die down or perhaps be offset in the future due to general equilibrium effects. An increase in house prices over the long term influences inflation rates, which constructs plant investment, thereby ultimately reducing consumption (Seo, 1996; Lee, 2008).

[Table 8] Dynamic Effect on Consumption

Variable	Total	Wholesale and retail trades	Accommodation and food services	Sports and other services
	(1)	(2)	(3)	(4)
ΔW_t	0.201***	0.262***	0.236***	−0.028
	(0.041)	(0.043)	(0.051)	(0.079)
ΔW_{t-1}	−0.363***	−0.344***	0.089	−0.690***
	(0.119)	(0.108)	(0.174)	(0.177)
R^2	0.197	0.106	0.408	0.257
Mean of dep. var.	3.53	3.11	5.81	1.49
# of observations	560	560	560	560
(Group)	122	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district are in parentheses. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

To examine this possibility, we use lagged terms of the price change in house prices. Column 1 of Table 8 shows the effect of house price growth rate of the previous year on the current consumption growth rate. The estimated result shows that a growth rate of house price of the previous year has a negative effect on consumption. A 1% increase in house price growth rate leads to a 0.363%p decrease in consumption in the following year. A total summation of consumption changes is statistically zero. The results suggest that the stimulated effect of consumption, which is derived from an increase in house price, may not be sustainable in the long run.

VI. Conclusions

Examining the effects of demand shocks on consumption is of central importance for business cycle modeling. This study investigates the effect of house price changes on consumption. Moreover, it examines the extent to which such changes in consumption varies across detailed categories. For this purpose, we use unique, novel datasets on detailed spending from a representative credit card company and a consumer credit bureau. We construct detailed geographically disaggregated data on consumption, local house prices, and the levels of borrowing on housings.

For the sample period between 2012 and 2016, we find a positive relationship between house prices and the overall consumption. On the basis of a back-of-the-envelope calculation, we find that house price change accounts for about a quarter of the change in total consumption. By examining spending on the detailed consumption categories, we find substantial heterogeneity in such effects. Our results are robust when we use an instrumental variable approach. Our instrumental variables are based on the differences of regulatory constraints across districts.

We also examine the effects of borrowing constraints on the response of consumption to house price changes. The analysis uses LTV, which is constructed from household level credit bureau data. We find that places where there an above average LTV is observed are more likely to be affected by an increase in house prices. We do not find statistically significant effects from the places where the LTV is below average. Our results imply that changes in house prices may affect consumption through the effects of borrowing constraints.

The findings on the heterogeneous effects of house price changes on different categories may provide some guidance on policy in response to local demand shocks. Our research results show that living services and durable consumption, such as automobile supplies services and furniture and interior design, are highly sensitive to house price changes. Moreover, consumption categories, which are likely to be

affected by local consumers (such as food and beverage; restaurants, bakeries and coffee shops; and drinking places), are indeed more likely to be affected by house prices. Our finding implies that a negative demand shock is most likely to affect stores in these categories, which are usually run by small businesses or self-employment. Stimulus policies, if designed to focus on specific sectors affected by negative economic shock, may consider such heterogeneity effects of demand shocks across different consumption categories.

Appendix

[Table A1] Summary of Empirical Studies Examining South Korea Data

Studies	Consumption	Source	Period	Elasticity
Kim (2003)	National account	BOK	1988–2003	0.23
Lee (2004)	National account	BOK	1986–2003	0.03–0.09
Choi and Kim (2007)	National account	BOK	1988–1999	0.13
Song (2014)	National account	BOK	2005	0.057
Choi et al. (2015)	Individual level	KCB	2008–2014	0.064
Park (2019)	Household level	National Survey of Tax and Benefit	2008–2016	0.01

[Table A2] Summary of Empirical Studies Examining Income Elasticity

Studies	Category	Income elasticity
Van Soest and Kooreman (1987)	Foreign vacation	2.10
Van Soest and Kooreman (1987)	Domestic vacation	1.70
Van Soest and Kooreman (1987)	Vacation home	1.20
Di Matteo (2003)	Healthcare	1.18
Blanciforti and Green (1983)	Meats	1.15
Blanciforti and Green (1983)	Housing	1.00
Blanciforti and Green (1983)	Fruits and vegetables	0.61
Hughes et al. (2008)	Gasoline	0.48
Blanciforti and Green (1983)	Cereal	0.32
Kristrom and Riera (1996)	Environment	0.25
Branch (1993)	Electricity	0.23
Bouis (1983)	Rice	−0.44
Paulley et al. (2006)	Public Transit	−0.75

[Table A3] Regression Baseline: Subgroup Analysis (Ownership Rate)

	Total (ownership)	High (≥52.38)	Low(<52.38)
	(1)	(2)	(3)
$\Delta W_{i,t+1}$	0.057**	0.180***	0.024
	(0.026)	(0.048)	(0.024)
$\Delta Y_{i,t}$	0.333***	0.364**	0.365***
	(0.083)	(0.168)	(0.101)
r_{t+1}	3.810***	2.454***	3.166***
	(0.447)	(0.427)	(0.238)
$LTV_{i,t}$	0.063	0.162**	0.097**
	(0.040)	(0.068)	(0.073)
$owner_{i,t+1}$	0.288**		
	(0.135)		
$\Delta C_{i,t}$	0.245***	0.181	0.031
	(0.077)	(0.110)	(0.092)
R^2	0.602	0.494	0.549
# of observations	560	255	305
(Group)	112	51	61

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district level are in parentheses. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

[Table A4] Regression Baseline: Subgroup Analysis

	Total	Metropolitan areas	Non-metropolitan areas
	(1)	(2)	(3)
$\Delta W_{i,t+1}$	0.057**	0.079*	0.061*
	(0.026)	(0.041)	(0.036)
$\Delta Y_{i,t}$	0.333***	0.104***	0.525***
	(0.083)	(0.156)	(0.093)
r_{t+1}	3.810***	5.254***	2.395***
	(0.447)	(0.538)	(0.714)
$LTV_{i,t}$	0.063	−0.102	0.131**
	(0.040)	(0.066)	(0.052)
$owner_{i,t+1}$	0.288**	0.583***	0.045
	(0.135)	(0.187)	(0.193)
$\Delta C_{i,t}$	0.245***	0.234**	0.297***
	(0.077)	(0.102)	(0.066)
R^2	0.602	0.617	0.603
# of observations	560	340	220
(Group)	112	68	44

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district level are in parentheses. Symbols ***, **, and * indicate that the corresponding coefficient is statistically different than zero at the 1%, 5%, and 10% levels, respectively.

[Table A5] IV Estimation by Consumption Category

Variable	Wholesale and retail trade							
	Automobile service	Department store	Food	Appliance	Clothing	Furniture	Refueling	Online
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta W_{i,t+1}$	1.809***	0.202	0.154**	0.034	0.287***	1.314***	0.237***	0.042
	(0.144)	(0.150)	(0.065)	(0.159)	(0.078)	(0.163)	(0.046)	(0.044)
$\Delta Y_{i,t}$	1.540***	−0.264	0.155	2.603***	0.801***	0.487*	−0.200***	0.656***
	(0.221)	(0.261)	(0.096)	(0.324)	(0.137)	(0.271)	(0.073)	(0.085)
r_{t+1}	11.180***	1.643	5.325***	4.302*	3.787***	9.915***	2.228***	1.760***
	(1.501)	(1.216)	(0.525)	(2.505)	(1.165)	(2.383)	(0.432)	(0.482)
$LTV_{i,t}$	150.349***	0.733	9.369	42.259**	32.414**	153.776***	22.400***	−1.941
	(35.298)	(19.327)	(8.159)	(20.998)	(14.709)	(37.699)	(7.723)	(4.665)
$owner_{i,t+1}$	2.910***	−0.405	0.106	1.162*	−0.009	−1.353**	0.718***	0.151
	(0.512)	(0.481)	(0.158)	(0.679)	(0.316)	(0.609)	(0.150)	(0.135)
$\Delta C_{i,t}$	−0.030	−0.074**	−0.016	−0.016	0.011	0.036	−0.002	−0.018
	(0.047)	(0.034)	(0.013)	(0.046)	(0.024)	(0.063)	(0.013)	(0.014)
R^2	0.453	0.039	0.389	0.180	0.039	0.117	0.093	0.162
Mean of dep.var.	12.40	2.04	3.93	2.59	−1.18	2.53	−3.93	8.68
# of observations	560	560	560	560	560	560	560	560
(Group)	112	112	112	112	112	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district-level are in parentheses. Symbols ***, **, * indicate the corresponding coefficient is statistically different than zero at the 1%, 5% and 10% level, respectively.

[Table A5] IV Estimation Results by Consumption Category (Con't)

Variable	Accommodation and food service			Sports, amusement and other personal services		
	Accommodation	Restaurants	Drinking	Hobby	Living service	Cosmetic, beauty
	(9)	(10)	(11)	(12)	(13)	(14)
$\Delta W_{i,t+1}$	0.426***	0.171***	0.283***	−0.224***	1.294***	0.096
	(0.115)	(0.044)	(0.068)	(0.059)	(0.205)	(0.064)
$\Delta Y_{i,t}$	0.102	−0.310***	0.408***	0.623***	0.301	0.148
	(0.176)	(0.069)	(0.120)	(0.105)	(0.489)	(0.092)
r_{t+1}	3.617***	4.234***	6.877***	0.465	6.519**	3.283***
	(0.830)	(0.509)	(0.752)	(0.603)	(3.111)	(0.537)
$LTV_{i,t}$	15.111	0.970	20.182*	−48.138***	185.785***	1.132
	(15.707)	(5.991)	(11.188)	(13.512)	(45.432)	(8.088)
$owner_{i,t+1}$	0.115	−1.122***	0.243	−0.845***	0.025	0.076
	(0.308)	(0.146)	(0.195)	(0.200)	(0.992)	(0.187)
$\Delta C_{i,t}$	−0.022	0.009	−0.016	−0.015	0.016	−0.022
	(0.030)	(0.014)	(0.021)	(0.021)	(0.080)	(0.016)
R^2	0.041	0.547	0.233	0.425	0.107	0.161
Mean of dep.var.	1.40	7.38	−6.16	0.24	13.65	1.71
# of observations	560	560	560	560	560	560
(Group)	112	112	112	112	112	112

Note: Regressions are weighted by the number of residents in the corresponding district in the previous year. Standard errors clustered at the district-level are in parentheses. Symbols ***, **, * indicate the corresponding coefficient is statistically different than zero at the 1%, 5% and 10% level, respectively.

[Table A6] Back-of-the-envelope Calculation

Category	Consumption		Sales	
	Growth rate (%)	Explanation (%)	Growth rate (%)	Explanation (%)
Automobile supplies and services	12.4	23.20	7.61	37.80
Department stores	2.04	15.74	4.4	7.30
Food and beverage	3.93	6.23	7.92	3.09
Home appliances	2.59	2.09	−1.16	4.45
Clothing and fashion accessories	−1.18	27.89	2.84	1.07
Furniture and interior design	2.53	82.58	5.7	36.65
Refueling	−3.93	48.70	−4.4	28.22
Online and home shopping	8.68	0.77	7.68	0.87
Accommodation	1.40	48.38	1.41	48.04
Restaurants, bakeries, and coffee shops	7.38	3.68	7.74	3.51
Drinking places	−6.16	79.14	6.37	7.06
Hobby, entertainment, and leisure	0.24	59.74	0.26	57.08
Living services	13.65	15.07	8.27	24.88
Cosmetics and beauty	1.71	8.93	6.68	2.29

Note: The average of annual house price growth rate is 1.59%. The sales growth is calculated using Economic Census 2010, 2015 of KOSIS.

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아파트 가격 변화가 품목별 소비에 미치는 영향*

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논문초록 본 연구에서는 아파트 가격이 품목별 소비에 미치는 영향을 분석한다. 분석을 위해 국내 주요 카드사에서 제공하는 신용카드 사용액 자료와 국토부에서 제공하는 아파트 실거래가 자료를 결합하였다. 분석결과 아파트 가격은 전체소비에 양의 영향을 미치는 것으로 나타났으며, 품목별로 상당히 이질적인 반응이 나타나는 것을 확인하였다. 아파트 가격 변화는 전체소비 변동의 약 25%를 설명하였으며, 특히 이러한 영향은 품목별로 0.15%에서 46.08%까지 다르게 나타났다. 본 연구결과는 주택가격 변화에 따른 소비변화가 민감한 산업들을 중심으로 산업구조 변화 및 고용에도 영향을 줄 수 있음을 시사한다.

핵심 주제어: 아파트 가격, 품목별 소비, 자산효과, LTV, 담보효과
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