THE IMPACT OF THE OUT-OF-POCKET HOUSING EXPENSE INFLATION ON
HOUSEHOLD ALCOHOL AND TOBACCO PURCHASES

Virat Agrawal
Richard K. Green
Neeraj Sood
Christopher M. Whaley

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ABSTRACT

Housing expense inflation has historically averaged an annual growth rate of 3.0 percent. However, starting in early 2021 housing expense inflation surged, peaking at 8.2 percent by March 2023. Substance use also increased concurrently. This study investigates the impact of rising housing expenses on household purchases of alcohol and tobacco. The relationship is ambiguous: higher housing costs could reduce spending on these items due to constrained disposable income or increase them as a coping mechanism for financial stress. To identify the effects of housing expense inflation we utilize exogenous variation in county-level housing regulations and exposure to housing expense inflation, which affects renters and homeowners differently as homeowners with fixed-rate mortgages are less impacted. In particular, we employ a difference-in-difference-in-difference (DDD) approach, comparing changes in alcohol and tobacco purchases between renters and homeowners, before and after the housing expense surge, across counties with varying housing regulation levels. Our findings reveal that a 1-unit increase in our housing regulation index—equivalent to moving from the 10th to the 90th percentile—correlates with an additional $28.70 (about 15.6 percent) monthly increase in out-of-pocket housing expenses per household member for renters relative to homeowners between 2019 and 2022. This increase is also associated with a 26 to 38 percent rise in financial difficulties among renters compared to homeowners. Furthermore, the same regulatory increase corresponds to a 15.2 percent rise in monthly beer purchases per member among renters relative to homeowners in 2022 compared to 2019, driven largely by low-cost beer. However, we find no significant effect on monthly household purchases of liquor, wine, or cigarettes.

Virat Agrawal
USC Sol Price School of Public Policy
Los Angeles, CA 90089
viratagr@usc.edu

Richard K. Green
University of Southern California
331B, Ralph and Goldy Lewis Hall
650 Childs Way
Los Angeles, CA 90089
richarkg@price.usc.edu

Neeraj Sood
Schaeffer Center for Health Policy and Economics
Sol Price School of Public Policy
University of Southern California
University Park Campus
Los Angeles CA 90089
and NBER
nsood@healthpolicy.usc.edu

Christopher M. Whaley
Brown University
121 South Main Street
Providence, RI 02912
christopher_whaley@brown.edu

1. INTRODUCTION

In June 2022, the United States (U.S.) inflation rate (measure by the Consumer Price Index – CPI) hit a four-decade high, reaching 9.1 percent. Throughout 2022, the average annual inflation in CPI in the U.S. was roughly 8.0 percent, significantly higher than what had been the norm (2 to 3 percent) since the 1990s. Economists have long recognized that inflation erodes purchasing power – an "income effect", which creates uncertainty about future real income, thereby affecting the economic decisions of households (Easterly and Fischer 2001; Shiller 1996; Georgarakos et al. 2024). On the other hand, inflation can also help increase net worth by reducing outstanding debt in real terms – "wealth effect", depending on the ratio of debt to assets (Wolff 2023), which could affect household consumption (Case, Quigley, and Shiller 2005; Mian, Rao, and Sufi 2013). Together, inflation will have a net negative effect on household finances, consequently on household budgets when the income effect is larger than the wealth effect, and a net positive effect when the wealth effect exceeds the income effect. The negative effects are dominant for renters as they face large increases in rental expense relative to income and do not have substantial borrowing in the form of mortgages to enjoy the positive wealth effect of inflation. In contrast, for homeowners, who are more likely to be high-income earners, consumption could be insulated from transitory shocks due to nearly complete insurance and the positive wealth effects of inflation (Blundell, Pistaferri, and Preston 2008; Kaplan and Violante 2010; Wolff 2023). This study examines the causal impact of 2021-2022 inflation on household consumption among renters compared to homeowners.

Although, public discussion has largely focused on the national inflation rate, there is significant variation in inflation across regions, largely driven by inflation in housing expenses (Gascon and Fuller 2022; Gupta and McGranahan 2023). Changes in housing rent and rent

equivalents for homeowners are the single largest item in the U.S. Bureau of Labor Statistics Consumer Price Index for All Urban Consumers, accounting for 40-45 percent of the CPI (Gupta and McGranahan 2023). Historically, housing expense inflation has been about 3.0 percent annually, but it started to accelerate in early 2021 and continues unabated with housing expense inflation reaching 8.2 percent in March 2023 ("12-Month Percentage Change, Consumer Price Index, Selected Categories" 2024). In addition, housing expense inflation varied significantly across regions and metropolitan areas (Gupta and McGranahan 2023; Gascon and Fuller 2022).

Housing expenses are the largest expense for most U.S. households. In the U.S., 30 percent is the widely accepted ratio of housing expense to income for defining housing affordability (Stone 2006). Since the pandemic, there has been an increase in the share of households that spend more than 30 percent of their income on housing expense (housing burden), and the burden is particularly prevalent among renters (Cromwell 2022; Whitney 2024). The share of renters who face housing burden rose to 50 percent in 2022, and this increase is larger for low-to-middle-income households ("America's Rental Housing 2024 | Joint Center for Housing Studies" 2024). As a result, the amount of money available after paying for monthly housing expense (disposable income) has reduced significantly, especially for renters. Moreover, substance use surged during the COVID-19 pandemic (Dubey et al. 2020; Pollard, Tucker, and Green 2020; Esser et al. 2024; Spencer, Garnett, and Miniño 2024). In this paper, we examine the effects of housing expense inflation on household purchases of alcohol and tobacco for renters compared to homeowners.

The impact of reduced disposable income due to increased housing expenses on alcohol and tobacco consumption is *a priori* ambiguous. On the one hand, reduced disposable income could reduce the consumption of alcohol and tobacco purchase, as both are normal goods (Nelson 2013; Kenkel, Schmeiser, and Urban 2014). However, on the other hand, stress caused by reduced

disposable income, increase in housing burden and financial insecurity could potentially lead to increased consumption of alcohol and tobacco as coping mechanisms (Bergmans et al. 2019; Glei and Weinstein 2019). By the end of 2022, nearly 50 percent of American households reported feeling very stressed and 60 percent reported feeling very concerned about inflation (Jayashankar and Murphy 2023). In addition, the anxiety caused by housing instability (Burgard, Seefeldt, and Zelner 2012) and stress of making ends meet during high inflation might directly affect health (Wolfson, Garcia, and Leung 2021). Households might also forgo or delay health care use in response to lower real income due to inflation, which in turn might affect tobacco and alcohol consumption (Travers et al. 2017).

Examining the impacts of housing expense inflation on consumption patterns is inherently challenging. Housing prices are driven by both demand (e.g., changes in employment and income) and supply side factors (e.g., construction costs and ease of getting regulatory approval for new housing) (Quigley and Raphael 2004). However, demand side factors, such as employment and increases in income can directly impact both housing price, which in turn affects out-of-pocket housing expense, and household consumption, thus making housing expense inflation an endogenous predictor for household consumption. To solve this endogeneity, we use plausibly exogenous variation in out-of-pocket housing expense (rent, mortgage and taxes for primary residence) driven by variation in stringency of local housing regulations which constrains the supply of housing (Gyourko, Saiz, and Summers 2008). Local regulations affect housing construction in several ways, such as, construction prohibitions, approval delays, design and density restrictions, etc., which eventually impact housing supply and changes in housing supply in response to demand shocks (Wassmer and Williams 2021; Huang and Tang 2012). As a result, we expect a larger increase in monthly out-of-pocket housing expense in counties that have more

restrictive housing regulations compared to counties that have less restrictive regulations. Additionally, because regulations do not change frequently, housing regulations remain unchanged in our analysis, including the pandemic period. But COVID-19 induced shift in housing demand from dense urban centers to spacious suburbs made some areas more desirable than others (Ramani and Bloom 2021). Therefore, existing regulations made some of these reallocations easier in areas with low regulations and led to price spikes in areas with high regulations. Furthermore, because roughly 90 percent of homeowners in the U.S. have a 10 to 30-year fixed mortgage, homeowners are less likely to be impacted by increased housing expense inflation from 2021 to 2023 compared to renters. Taken together, we expect a larger increase in monthly out-of-pocket housing expense for renters relative to homeowners in counties with more stringent housing regulatory policies versus counties with less stringent policies. Consequently, we expect a larger increase in financial difficulties and stress, and a larger change in monthly alcohol and tobacco purchases among renters relative to homeowners in counties with more stringent housing regulations versus counties with less stringent regulations.

To examine the above empirical questions, we use a difference-in-difference-difference (DDD) approach to estimate – a) the effects of the local housing regulations on monthly out-of-pocket housing expense per member for renters relative to homeowners (*first stage),* before and after 2019, b) the effects of the local housing regulations on household financial difficulties and mental wellbeing, and c) the effects of the local housing regulations on household monthly purchase of alcohol per member and household monthly purchase of cigarette for renters relative to homeowners *(reduced form),* before and after 2019. We create a new housing regulations index (*New-Index hereafter)*, primary exogenous variable, using the county-level Wharton Residential Land Use Regulation Index (WRLURI) (Gyourko, Hartley, and Krimmel 2021). The new housing

regulations index is a weighted measure of state political involvement index, local assembly index, density restriction index, open space index and exactions index.

Using the housing regulations index data and the annual American Community Survey data on out-of-pocket monthly housing expense from 2017 to 2022, we find that more stringent housing regulations led to a significantly larger increase in monthly housing expense for renters relative to homeowners. We observe that a 1-unit increase in *New-Index*, which is equivalent to moving from the 10th percentile to the 90th percentile, is associated with $23.12 and $28.70 (roughly 15.6 percent) additional increase in out-of-pocket monthly housing expense per member for renters relative to homeowners in 2021 and 2022, respectively, compared to 2019. Next, using the Household Pulse Survey data, we find that a 1-unit increase in *New-Index* is associated with a 22.1 percentage point (25.8 percent) decrease in being caught up on rent and 26.9 percentage point (37.7 percent) increase in difficulty with paying household expenses, with no significant effect on mental wellbeing, such as self-reported anxiety and worry.

Similarly, using housing regulations data and the NielsenIQ Consumer Panel data, we estimate the impact of the local housing regulations on household monthly purchase of alcohol (beer, liquor and wine) per member and household monthly purchase of cigarette. We find that a 1-unit increase *in New-Index* is associated with 33.1 oz (15.2 percent) additional increase in monthly purchase of beer per household member among renters relative to homeowners in 2022 compared to 2019. We do not observe any change in liquor, wine and cigarette purchases. Furthermore, we use the same DDD approach to test whether increased purchase of beer among renters is influenced by changes in household income or prices of beer (rather than housing expense) in more versus less regulated areas. We do not find any significant change in household monthly income or prices faced by renters relative to homeowners in areas with more versus less regulations.

Our estimates suggest that housing expense inflation impacts beer consumption but not liquor wine or cigarette consumption. One possible explanation for these results is the difference in income elasticity across these goods. The income elasticity of beer is 0.5, while it is 1 for liquor and wine, and 5.6 for cigarettes (Nelson 2013; Kenkel, Schmeiser, and Urban 2014). The decline in disposable income due to housing expense inflation would significantly reduce consumption of liquor, wine and cigarettes but would not affect the consumption of beer to the same degree due to its relatively low-income elasticity. However, housing expense inflation might also lead to an increase in consumption of all these goods as coping mechanism for increased financial anxiety and uncertainty. For beer the coping mechanism effect dominates the income effect due to its relatively low income elasticity, thus we see a positive association between housing expense and beer consumption but do not observe similar effects for liquor, wine and cigarettes.

Our study contributes to three important literatures. First, prior studies have found mixed impact of changes in local labor market (economic crises or boom) on health and health-related behaviors. Economic boom and low unemployment are found to be associated with high mortality, increased acute diseases, higher obesity, increased alcohol consumption and smoking, unhealthy diet and less physical activity (Ruhm 2000; 2003; 2005; 2016; Gerdtham and Ruhm 2006; Ettner 1997; Evans and Moore 2009; Mulia et al. 2014). On the other hand, (Charles and DeCicca 2008; Dave and Kelly 2012) found increase in body weight, decline in mental health, reduced consumption of healthy food (fruits and vegetables) and increased consumption of unhealthy food (snacks and fast food) during a recession and unemployment. Our study extends this literature by assessing the effects of the most recent economic shock – post COVID-19 pandemic high inflation, on health-related behaviors, particularly the consumption of alcohol and tobacco. To the best of our knowledge, this is the first study to do so.

Second, housing is a key determinant of health and health-related behaviors. Substandard housing conditions are associated with various health issues, such as, chronic respiratory illness, infections, injuries, mental health challenges and nutrition deficits (Krieger and Higgins 2002; Fuller-Thomson, Hulchanski, and Hwang 2000; Capasso and D'Alessandro 2021). In addition, studies suggest that reduced disposable income due to increased housing expense or homelessness may lead to higher substance use and alcohol consumption (Petry 2001; Austin et al. 2021). On the contrary, (Goel 2014) finds that increased economic stress is associated with lower cigarette smoking. A major limitation in these studies is the bidirectional relationship, where alcohol, drugs and cigarette use can be both a result and a contributing factor to housing expense burden. We contribute to these studies by solving bidirectional relationship between economic hardship and substance use by leveraging plausibly exogenous local county-level housing regulations as the driver of housing burden.

Finally, this study also contributes to the literature on how local housing regulations might influence housing market and household financial decisions. Prior research shows that areas with more restrictive regulations tend to have less housing construction, lower homeownership rates, and higher rents and house prices (Gyourko and Molloy 2015; Katz and Rosen 1987; Malpezzi 1996; Quigley and Raphael 2005; Glaeser and Ward 2009). Furthermore, increased housing construction and supply can boost household consumption by increasing disposable income and consumer confidence (Yu and Guo 2023). A housing boom has also been associated with lower college attendance and educational attainment, especially among two-year degree associate's degree students, as it increases employment prospects and wages, raising the opportunity cost of attending college (Charles, Hurst, and Notowidigdo 2018). Our study expands this literature by

assessing the effects of housing regulations on housing expense inflation, household financial and mental wellbeing and household substance use.

The rest of the paper proceeds as follows. We start with a description of data on county-level housing regulations, out-of-pocket housing expense, household purchase of alcohol and tobacco, and household financial difficulties in section 2, followed by our empirical strategy in section 3. We present our estimated effects of housing regulations on out-of-pocket housing expense, financial difficulties and household purchase of alcohol and tobacco in sections 4, followed by robustness tests in section 5. Finally, we discuss our results, limitations, and implications in section 6.

2. DATA

2.1. Wharton Residential Land Use Regulation Index

We use the Wharton Residential Land Use Regulation Index (WRLURI) (Gyourko, Hartley, and Krimmel 2021) to construct our new plausibly exogenous housing regulations variable – *New-Index*. WRLURI is a county-level measure of regulatory restrictiveness, which was first developed in 2006. We use the latest 2018 version, which is composed of 12 components based on the information about the involvement and influence of various actors (such as, local council, state legislatures, citizens) in the regulatory process; explicit control on density, open space, affordable housing requirements, impact fees, exactions, approval delays; and the cost of development. To construct *New-Index*, we begin by estimating the effect of county-level Wharton Residential Land Use Regulation Index (WRLURI), a composite measure of 12 components, on out-of-pocket monthly housing expense per member, using our Difference-in-Difference-in-Difference (DDD) estimation approach, outlined in Section 3 (See Appendix Figure A4). To further understand the

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role of each individual component on out-of-pocket housing expense, we run the DDD estimation for each sub-component (see Appendix Figure A5, Panel A – Panel L). Among these, five components - SPII, LAI, DRI OSI and EI – are found to have a significant effect on out-of-pocket monthly housing expense per member. We constructed a new weighted composite measure, *New-Index*, using the five significant components. The goal was to choose a set of weights for the five significant components to best meet two conditions: (a) housing regulations do not differentially affect out of pocket housing expense of renters versus homeowners during the pre-inflationary period (this is the identifying assumption of our DDD model), (b) housing regulations differentially affect out of pocket housing expense of renters versus homeowners during the post-inflationary period (strong first stage). *New-Index* best satisfies these conditions. For more details on *New-Index* construction, see Appendix Section 9.1. *New-Index* has a mean of 0.98, a median of 1 and a standard deviation of 0.42. A 1-unit increase is *New-Index* is equivalent to moving from the 10th percentile to the 90th percentile.

2.2. IPUMS USA - American Community Survey Data

Data on monthly housing expense is sourced from 2017 to 2022 American Community Survey (ACS) 1-year Experimental IPUMS (Ruggles et al. 2024). To measure out-of-pocket monthly housing expense, we use the variables "OWNCOST" and "RENTGRS" for homeowners and renters, respectively. OWNCOST captures total monthly payment for owner-occupied house/units, which is the sum of mortgages, taxes, insurances, and other costs. Importantly, it is not the user cost of housing, rather out-of-pocket expense of owning a house (Quigley and Raphael 2004). RENTGRS reflects the gross monthly rental cost of the housing unit, including the contract rent and additional rent-related expenses. Finally, we factor in household size to construct a

standardized variable – "Out-of-pocket Monthly Housing Expense per Member" for both homeowners and renters.

The data also includes geographic information at the FIPS state and county-level, which we use to create 5-digit unique FIPS for each county. Using these county FIPS codes, we merge the housing regulation data, creating a final dataset of 363[1] distinct counties. Additionally, the dataset provides household demographic information, such as, the household head's age, gender, race, education, marital status, employment status, number of children in home and household income. These variables are used as covariates in our model to control for household-level differences (see Table 1 for descriptive statistics). We use household weights in our analysis to better represent the national estimates of demographics. A detailed explanation of the dataset, variables of interest and covariates can be found in Appendix Section 9.2.

2.3. Kilts NielsenIQ Consumer Panel Data

We use the NielsenIQ Consumer Panel data from January 2017 to December 2022 to study household alcohol and tobacco purchases. This dataset, provided by the Kilts Center for Marketing at the University of Chicago, Booth School of Business, tracks the grocery and non-grocery purchases (including alcohol and tobacco) of approximately 60,000 household each year. Additionally, the data includes geographic information at FIPS state and county-level which we use to merge with the housing regulation data, creating a final dataset of approximately 1022 distinct counties with roughly 42,000 to 47,000[2] distinct households in each year from 2017 to 2022. We use the "Projection Factor" weights to better represent the national estimates of

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[1] To protect participants privacy, particularly in smaller geographic areas, the dataset is limited to regions with population of 100,000 or more. Consequently, the final dataset includes 363 distinct counties with a combine population of 191 million, representing the most densely populated regions.

[2] The housing regulations data and NielsenIQ data have 1039 and 2916 distinct counties, respectively. After merging the two, we have roughly 1022 distinct counties, creating a dataset of roughly 42,000 to 47,000 distinct households in each year.

demographics. The data also provides household demographic information, such as household income, size, composition, type of residence, age and presence of children, marital status, age, education, occupation and employment of male and female heads of households. We use these demographic characteristics as covariates in our empirical model to control for socio-economic differences between households, particularly between homeowners and renters (see Table 2 for descriptive statistics).

Key variables include - "Type of Residence" (homeowner vs renter), product quantity, amount, description, final price paid after discounts, and household size. Using these variables, we standardize alcohol (beer, liquor and wine) and cigarette purchases into two key measures: "Monthly Purchase of Alcohol per Household Member (Oz)" and "Household Monthly Purchase of Cigarette (Count)" for both homeowners and renters. As discussed in Section 3, our identification strategy uses renters as the treatment group and homeowners as the control group. A detailed explanation of the dataset and the variables of interest can be found in Appendix Section 9.3.

2.4. Household Pulse Survey

To measure the impact of housing regulations on households' financial difficulties and mental wellbeing, we use data from the Household Pulse Survey (HPS). The HPS is conducted in multiple waves by the U.S. Census Bureau in partnership with thirteen other federal agencies, starting from April 2020. The HPS collects cross-sectional data in each wave of the survey to measure the impact of emergent issues on American households from a social and economic perspective. This study uses data from Waves 32 (June 9, 2021 to June 21, 2021) to Wave 63 (October 18, 2023 to October 30, 2023), focusing on the post-pandemic period characterized by high inflation. The survey

questions on financial difficulties are caught up on rent/mortgage and difficulty with expenses[3].

To measure the impact on households' mental wellbeing, we use self-reported symptoms of anxiety, worry[4] and the two-item validated measure of Generalized Anxiety Disorder[5] (GAD-2) (Centers for Disease Control and Prevention 2021) (Plummer et al. 2016). For each survey respondent, the HPS also gathers information on age, gender, race/ethnicity, education, marital status and COVID-19 vaccination status of household head, along with household income, number of children in home and any recent job loss within the household. We use these characteristics as covariates in our model, given the demographic differences between renters (treatment group) and homeowners (control group) based on each of these measures (See Table 3 for descriptive statistics). Moreover, the HPS provides geographic information at the FIPS State and Metropolitan Statistical Area (MSA) level. Using the MSA code, we merge housing regulation data to create a dataset covering 15 distinct MSAs, representing the most populated regions[6]. A detailed explanation of the variables of interest and covariates is provided in the Appendix Section 9.4.

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[3] The responses for "caught up on rent/mortgage" are 1(yes) and 2(no). Difficulty with expenses range from 1 – 4, where 1 is "Not at all difficult", 2 is "A little difficult", 3 is "Somewhat difficulty" and 4 is "Very difficult". We create a new dummy variable for difficulty with expense, where 0 is "Not at all difficult" and 1 is "A little / Somewhat / Very difficult.

[4] The responses for anxiety and worry range from 1 to 4, where 1 is "not at all", 2 is "several days", 3 is "more than half the days", and 4 is "nearly every day"? We create a new dummy variable for our analysis, where 0 is "Not at all" and 1 is "Several days / more than half the days / nearly every day".

[5] As per the Center for Disease Control and Prevention (CDC) scoring and estimation, the index for anxiety and worry are rescaled to 0 to 3., where 0 is Not at all, 1 is Several days, 2 is More than half the days, and 3 is Nearly every day. Following the CDC aggregation standards, the two responses on anxiety and worry are added together to create the variable "Generalized Anxiety Disorder", where a sum equal to three or greater is associated with anxiety disorder.

[6] We use MSAs to study the effect of local housing regulations on households' financial difficulties and mental wellbeing due to the lack of county-level geographic information in the HPS data.

3. ESTIMATION APPROACH

3.1. Effects of Housing Regulations (New-Index) on Housing Expense and Household Purchases - TWFE Difference-in-Difference (DD)

First, we examine the relationship between housing regulations and changes in out-of-pocket monthly housing expense per household member (first-stage), and second, we examine the effect of housing regulations on change in household monthly alcohol purchase per member and household monthly cigarette purchases (Reduced form). We begin by descriptively plotting the average out-of-pocket monthly housing expense per member from 2017 to 2022 for homeowners and renters (See Figure A1 in Appendix). We observe an upward trend in housing expense for both homeowners and renters, however, there is a much larger increase in housing expense for renters compared to homeowners, particularly after 2019.

Next, we plotted household monthly alcohol purchase per member (beer, liquor and wine), and household monthly cigarette purchases as substance use surged during the pandemic (See Figures A2 and A3 in Appendix, respectively). For beer purchase, we observe seasonal pattern within each year, but no trend from 2017 to 2019. Starting in 2020, the seasonal trend persists, but with a noticeable upward shift in overall consumption. This trend suggests an increase in beer consumption in the post-2019 years for households. For liquor purchase, we do not observe significant change in trends within or between years, with the exception of a large uptick in 2020 (likely due to the pandemic). Similarly, for wine purchase, there is no change in trend from 2017 to 2022, apart from a slight increase in 2020. Lastly, for cigarette purchases, we observe a substantial increase in household monthly cigarette purchase from 2020 onwards. Notably, while cigarette purchases in 2022 return to the 2019 level, they remain higher than the counterfactual level that would have been expected if the 2017-2019 trend had continued through 2022. Although

we find an overall increase in alcohol and cigarette purchases among households in the post-2019 years, these trends could be confounded by other common factors, such as changes in income and prices, COVID-19 related disruption to the economy and supply-chain effects.

We begin our first stage analysis by examining the effect of housing regulations on monthly housing expenses per household member. To account for the potential confounding factors, we first evaluated the association between housing regulations (*New-Index)* and the change in out-of-pocket monthly housing expense per member from 2019 to 2022 (Figure 1). We find a positive relationship between change in monthly housing expense per member and housing regulations (*New-Index)* for both renters and homeowners, with a larger slope for renters. We observe that a 1-unit increase in *New-Index* is associated with an additional \$39.0 increase in monthly housing expense per member for renters, compared to only \$7.5 additional increase for homeowners. These findings suggest that housing expense inflation was larger in highly regulated areas, particularly for renters.

We augment this descriptive analysis with regression analysis using data from years 2017 to 2022. In particular, we estimate two-way fixed effects or difference-in-difference models, as described in equations 1 for the first stage.

$$X_{hci} = \alpha_0 + \alpha_1 \, NewIndex_c * Year_i + \gamma_c + \tau_i + u_{ci} \qquad (1)$$

In the above specifications, the outcome variable, X_{hci}, represent out-of-pocket monthly housing expense per member for household h in county c and year i. $NewIndex_c * Year_i$ represents the key independent variable, and α_1 is the coefficient of interest. Housing regulations (*New-Index*) of county c is interacted with year dummies, from 2017 to 2022. Years 2017 and 2018 are considered pre-treatment period and years 2020 to 2022 are considered post-treatment period w.r.t. 2019. γ_c and τ_i are county and year fixed effects that control for time invariant county level

variables (such as selection into counties based on regulatory policies) and secular time trends (such as overall inflation), respectively. u_{ci} is the error term and we cluster standard error at the county level. α_1 indicates change in out-of-pocket monthly housing expense per member relative to 2019 due to 1 unit change in housing regulations (*New-Index*). We estimated the above specification separately for renters and homeowners. Similarly, we estimated reduced form equations to examine the effect of housing regulations (*New-Index*) on household monthly alcohol and cigarette purchases for renters and homeowners, separately, see equation 2.

$$Y_{hcim} = \beta_0 + \beta_1 \, NewIndex_c * Year_i + \gamma_c + \tau_i + \varepsilon_{ci} \qquad (2)$$

In the above specifications, the outcome variable, Y_{hcim} represent monthly alcohol purchase per member (Beer, Liquor and Wine) and monthly cigarette purchase by household h in county c in month m of year i. $NewIndex_c * Year_i$ represents the key independent variable, with β_1 as the coefficients of interest. Years 2017 and 2018 are considered pre-treatment period and years 2020 to 2022 are considered post-treatment period w.r.t. 2019. γ_c and τ_i are county and year fixed effects, respectively. ε_{ci} is the error terms, and standard error is clustered at the county level. β_1 indicates change in household monthly purchase of alcohol and cigarette relative to 2019 with 1 unit change in housing regulations (*New-Index*). Taken together, as discussed earlier, we expect a larger increase in housing expense for renters who live in counties with more stringent housing regulations, compared to those who live in less regulated counties. As a result, we also expect a larger change in household alcohol and tobacco purchases among renters who live in counties with more stringent housing regulations. We also expect little or no change in housing expense or alcohol and tobacco purchases for renters who live in counties with more stringent housing regulations in the pre-inflationary years 2017 and 2018.

3.1 Effects of Housing Regulations (New-Index) on Housing Expense and Household Purchases -Difference-in-Difference-in-Difference (DDD)

The two-way difference-in-difference approach estimates the effect of more restrictive versus less restrictive housing regulations on out-of-pocket housing expense and household alcohol and tobacco purchases, separately for renters and homeowners, before and after 2019. Although we control for common secular trends and time-invariant characteristics of counties in our DD estimation, households may still be affected by county-specific shocks, such as changes in wages, income, prices or other county-level policies. If these shocks are correlated with the stringency of local regulations, then these shocks have the potential to confound our DD estimation. It is important to note that since our primary explanatory variable is an interaction between *New-Index* and Year, and because *New-Index* is a time-invariant county-specific index, it is not possible to include controls for county-specific time trend in the DD estimation.

To account for county-specific shocks, we use a difference-in-difference-in-difference (DDD) approach (Olden and Møen 2022) to estimate the impact of housing regulations on out-of-pocket housing expense and household alcohol and tobacco purchases (see equations 3 and 4 for first stage and reduced form, respectively). As discussed earlier, most homeowners in the U.S. have a 10 to 30-year fixed mortgage, which makes them less susceptible to housing expense inflation compared to renters. Thus, homeowners serve as the control group, and renters as the treatment group in this specification. We estimate the effect of housing regulations (*New-Index*) on out-of-pocket monthly housing expense per member, as well as monthly alcohol purchase per member and monthly tobacco purchase, for renters relative to homeowners, in more restrictive counties compared to less restrictive counties, before and after 2019.

$$X_{hcij} = \alpha_0 + \alpha_1 \, NewIndex_c * Year_i + \alpha_2 \, NewIndex_c * Year_i * Renter_j +$$

$$\gamma_c + \tau_i + \theta_j + \gamma_c * \theta_j + \tau_i * \theta_j + \pi_{ci} \tag{3}$$

$$Y_{hcmij} = \beta_0 + \beta_1 NewIndex_c * Year_i + \beta_2 NewIndex_c * Year_i * Renter_j +$$

$$\gamma_c + \tau_i + \theta_j + \gamma_c * \theta_j + \tau_i * \theta_j + \eta_{ci} \tag{4}$$

The outcome variables, X_{hcij}, represent out-of-pocket monthly housing expense per member

for household h in county c, of type j (renter versus homeowner) and year i, and Y_{hcim} represent

monthly alcohol purchase per household member (Beer, Liquor and Wine) and monthly cigarette

purchase for household h in county c, of type j (renter versus homeowner) in month m of year i.

$NewIndex_c * Year_i * Renter_i$ represents the key independent variable, and α_2 and β_2 are the

coefficients of interest. The housing regulations ($NewIndex$) of county c is interacted with year

dummies, from 2017 to 2022, and with a dummy for housing type[7]. Years 2017 and 2018 are

considered pre-treatment period and 2020 to 2022 is considered post-treatment period *w.r.t.* 2019.

$NewIndex_c * Year_i$ controls for housing regulations specific county time trends. That is, counties

with different levels of regulation are allowed to experience different shocks, and thus have

different time trends. γ_c, τ_i, θ_i are county, year and renter fixed effects, respectively. $\gamma_c * \theta_i$

controls for time-invariant characteristic of renters and homeowners in each county, and $\tau_i * \theta_i$

controls for secular trends of renters and homeowners. π_{ci} and η_{ci} are the error terms. Standard

error is clustered at the county level.

In addition, although we control for common secular trends and time-invariant characteristics

of counties, our DD and DDD estimation may still be influenced by changes in household

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[7] 1 for renters and 0 for homeowners.

composition of renters and homeowners within a county over time. First, households may relocate from more restrictive counties to less restrictive neighboring counties due to rising housing expense. This shift in demand could impact housing expense, and consequently, household disposable income. Second, COVID-19 induced demand for larger homes and loose monetary policy led to a shift from dense cities to spacious suburbs, resulting in drop in rents, and surge in home purchases (Gamber, Graham, and Yadav 2023; Ramani and Bloom 2021), which could potentially change household composition of renters and homeowners in a county. Moreover, in our DDD estimation, renters are the treatment group while homeowners serve as the control group. However, homeowner and renters differ significantly in terms of demographic and socioeconomic factors (see descriptive statistics in Table 1 and 2). To account for these differences between the treatment and control groups, as well as potential changes in household composition, we control for various household characteristics, such as household income, household head's age, gender, race, education, marital status and employment status. Therefore, the model which controls for household characteristics is our preferred specification.

3.2 Effects of Housing Regulations (New-Index) on Household Financial Difficulties and Mental Wellbeing – Difference-in-Difference (DD)

We use a difference-in-difference regression model to estimate the effect of housing regulations (*New-Index*) on households' financial difficulties and mental wellbeing (see equation 5). Due to the lack of pre-2019 data, our analysis focuses on the post-pandemic period (June 2021 to Oct 2023), characterized by high inflation. We examine whether renters in high-regulated areas experiences greater financial hardship, anxiety and worry compared to renters living in less-regulated areas. As previously noted, homeowners are used as a control group to account for time invariant differences between areas with varying level of regulation.

$$Z_{hmij} = \beta_0 + \beta_1 \, NewIndex_m * Renter_j + \beta_2 NewIndex_m + \beta_3 Renter_j + X_{hi} +$$

$$\tau_i * Renter_j + \tau_i * State_s + \varepsilon_{mj} \qquad (5)$$

The outcome variables, Z_{hmi}, represent financial difficulty and mental wellbeing outcomes for household h in metropolitan statistical area (MSA) m, of type j (renter versus homeowner) and survey wave i. $NewIndex_m * Renter_j$ represents the key independent variable, and β_1 is the coefficient of interest. The housing regulations ($NewIndex$) of MSA m is interacted with $Renter_j$ dummy to estimate the effect of housing regulations on financial difficulties and mental wellbeing of renters (treatment group) compared to homeowners (control group). X_{hi} controls for household characteristics as renters and homeowners differ in terms of demographic and socioeconomic characteristics (see Table 3 for descriptive statistics). We also control for COVID-19 vaccination status as vaccines significantly improved mental wellbeing during the pandemic (Agrawal et al. 2021). $\tau_i * Renter_j$ controls for secular trends of renters and homeowners, and $\tau_i * State_s$ controls for the state-specific secular time trends. ε_{mj} is the error term and standard error is clustered at the household level.

4 RESULTS

4.1 Effect of Housing Regulations (New-Index) on Housing Expense

We begin by using a difference-in-difference (DD) estimation to examine the effect of housing regulations on monthly housing expenses, before and after 2019. As shown in Table A1, for renters, a 1-unit increase in housing regulations (*New-Index*), which is equivalent to moving from the 10th percentile to the 90th percentile, is associated with $33.10 and $38.94 significant additional increase in out-of-pocket monthly housing expense per member in 2021 and 2022, respectively. In contrast, we observe no statistically significant change for homeowners (Table A1). As discussed in Section 3, to account for changes in household composition, we control for household characteristics – household income, household head's age, gender, race, education, marital status and employment status. In this specification, our estimates remain consistent: a 1-unit increase in housing regulations (*New-Index*) is associated with $31.53 and $39.03 additional increase in out-of-pocket monthly housing expense per member for renters in 2021 and 2022, respectively, with no significant increase observed in for homeowners (Table A1). Figure 2, Panels A and B, present these findings graphically for homeowners and renters, respectively. We observe no significant increase in housing expense for homeowners post-2019, but a significantly large increase in housing expense for renters after 2019. We also observe a slight pre-trend for both homeowners and renters, possibly reflecting the moderate inflation in housing expense during 2017 and 2018.

The DD model controls only for a common time trend across all counties, without adjusting for county-specific secular trends as our treatment – county-level housing regulations is a time-invariant variable. To account for potential county-specific shocks, such as, changes in wages, income, prices or other local policies that could be correlated with the stringency of local housing regulations, we use a difference-in-difference-in-difference (DDD) specification. Using the model

outlined in section 3.2, equation 3, we estimate the effect of housing regulations on out-of-pocket monthly housing expense per member for renter relative to homeowners, before and after 2019. Our results indicate that 1-unit increase in housing regulations (*New-Index*), which is equivalent to moving from the 10th percentile to the 90th percentile, is associated with $23.86 and $30.26 increase in out-of-pocket monthly housing expense per member for renters relative to homeowners in 2021 and 2022, respectively, compared to 2019 (See Table 4, Column 1).

Next, we estimate the effect using our preferred model, which control for household characteristics to account for changes in household composition over time and demographic differences between renters and homeowners. The results remain consistent, showing increases of $23.12 in 2021 and $28.70 (a 15.6 percent relative increase[8]) in 2022 in out-of-pocket monthly housing expense per member for renters relative to homeowners, compared to 2019 (Table 4, Column 2). Figure 3 graphically displays the DDD estimates, showing a large significant increase in out-of-pocket monthly housing expense per member for renters relative to homeowners in counties with more restrictive regulations versus those with less restrictive regulations, before and after 2019. Importantly, we do not observe any pre-trend.

4.2 Effect of Housing Regulations (New-Index) on Household Financial Difficulties and

Mental Wellbeing

Since housing regulations are significantly associated with increased housing expenses for renters relative to homeowners post-2019, we also examine whether these regulations are linked with households' financial difficulties and stress. For renters, we observe 1-unit increase is housing

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[8] The average change in out-of-pocket monthly housing expense per member from 2019 to 2022 for renters is $184.23. Therefore, the DDD coefficient of 28.70 in 2022 shows that 1-unit increase in housing regulation (*New-Index*) is associated with 15.56 percent additional increase in out-of-pocket monthly housing expense per member in 2022 for renters.

regulations (*New-Index*) is associated with a 22.1 percentage point decrease (25.8 percent relative decrease) in being caught up on rent and a 26.9 percentage point increase (37.7 percent relative increase) in difficulty with paying household expenses relative to homeowners (See Table 5, Columns 1 and 2, respectively). However, we do not find any significant effects on self-reported anxiety, worry, or Generalized Anxiety Disorder (GAD-2) outcomes (See Table 5, Columns 3, 4 and 5, respectively). We also tested intensive margins of self-reported anxiety, worry and difficulty with expense. Our findings are consistent (See Table A6 in Appendix).

4.3 Effect of Housing Regulations (New-Index) on Household Alcohol and Tobacco Purchases

We estimate the effect of housing regulations on household monthly alcohol purchases per member, before and after 2019. Using our preferred model – a DDD specification that includes controls for household demographic characteristics - we analyze both extensive and intensive margins of beer, liquor and wine purchases among renters relative homeowners. First, we find no significant effect of the housing regulations (*New-Index*) on the extensive margins for any type of alcohol (See Figures 4, 6 and 8 for Beer, Liquor and Wine purchases, respectively). Second, we examine the effect of housing regulations on monthly alcohol purchases per member among households that already buy alcohol (intensive margin). We observe an upward trend in beer purchase for renters relative to homeowners after 2019 (See Figures 5), but no effect on liquor and wine purchases (See Figures 7 and 9, respectively). Specifically, a 1-unit increase in housing regulations (*New-Index*) is associated with an additional 33.08 oz increase in monthly beer purchase per member among renters relative to homeowners in 2022 compared to 2019. This translates to a 15.2 percent increase, although the coefficients are not statistically significant (See Table A4 in Appendix for DDD coefficients of both extensive and intensive margins).

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Next, we estimate the effect of housing regulations (*New-Index*) on household monthly cigarette purchase, before and after 2019. We find no effect either extensive or intensive margins of cigarette purchase among renters relative to homeowners (See Figures 10 and 11, respectively and Table A5 in Appendix for DDD coefficients). For DD results on the effect of housing regulations on alcohol (beer, liquor and wine) and cigarette purchases among renters before and after 2019, refer to Tables A2, A3 and Figures A6 to A9 in appendix.

5 ROBUSTNESS TESTS

5.1 Changes in Household Income

Using our DDD model, we estimate the effect of housing regulations on out-of-pocket monthly housing expense per member, household monthly alcohol purchase per member, and household monthly cigarette purchase, among renters relative to homeowners, before and after 2019. In this model, our identification relies on the assumption that homeowners serve as a suitable counterfactual for renters, after controlling for socioeconomic and demographic characteristics. However, if renters experience a shock to wages or income in counties with more stringent housing regulations, the observed increase in monthly beer purchases and no change in monthly liquor, wine and cigarette purchases could be attributed to higher income rather than housing regulations. To test the validity of our identification, we use the DDD model to estimate the effect of housing regulations (*New-Index*) on monthly household income per adult for renters relative to homeowners before and after 2019 (See Figure 12). We observe no significant changes in household income, suggesting that the increase in monthly beer purchases among renters is unlikely to be driven by increased income.

5.2 Changes in Price of Alcohol and Cigarette Faced by Households

Next, we test whether our findings are not influenced by changes in prices. To do so, we explore whether housing regulations are associated with prices of alcohol and cigarette products encountered by renters and owners. For instance, a large share of lower-to-middle income households live in inner cities, who rent and tend to buy more affordable beer (Mills and Lubuele 1997; Airgood-Obrycki, Hermann, and Wedeen 2023). At the same time, housing construction in inner cities, where many renters reside, is more heavily regulated than in suburban areas (Porter 1995). Therefore, if prices are correlated with local housing regulations, then increased beer purchase among renters relative to homeowners could be associated with lower beer prices in counties with a higher proportion of renters rather than by stringent housing regulations. We begin by descriptively examining the prices faced by renters and owners for the top six brands of alcohol and cigarettes in the U.S. (See Figures A10 to A16 in appendix for beer, liquor, wine and cigarettes). We do not observe any significant differences in prices between renters and homeowners, and no significant change in price from 2017 to 2022 for any of these products. Next, we use our preferred DDD specification to estimate the effect of housing regulations on the price of the top 6 brands of alcohol and cigarettes (e.g., price per pack of beer, price per bottle of liquor, price per bottle of wine, and price per pack of cigarettes) before and after 2019. We find no significant effect of housing regulations (*New-Index*) on the prices faced by renters relative to owners, before and after 2019 (See Figures A11, A13, A15 and A17 in Appendix for the top six brands of beer, liquor wine and cigarettes, respectively). These findings together suggest that increase in monthly beer purchase by renters relative to homeowners in 2022 is not influenced by price changes either.

5.3 Brand of Beer Purchased

As discussed in the main findings, we observe a rising trend in beer purchases among renters living in more regulated counties compare to those in less regulated counties, relative to homeowners, post-2019. We explore whether the increase is driven by low-cost or high-cost beer brands. We begin by descriptively plotting the total pints of beer purchased by households (See Figure A18, Panel A in Appendix). We observe no significant increase in total beer purchase from 2017 to 2019, but a roughly 600 million pints increase in beer purchase from 2019 to 2022. We then examine total beer purchase among renters living in low-regulation counties versus high-regulation counties (See Figure A18, Panel B in Appendix). There is a large increase in beer purchase among renters living in high-regulation counties, whereas no change is seen in less-regulated counties. Furthermore, we explore total beer purchase among renters living in high-regulation counties, by low-cost and high-cost beer brands (See Figure A18, Panel C in Appendix). We find a large increase in low-cost brand purchases in 2022 compared to 2017 and 2019, with no corresponding change in high-cost brands. Finally, we conduct a DDD estimation to examine the effect of housing regulations on household purchase of low-cost and high-cost beer brands, comparing renters to homeowners before and after 2019. We find that a 1-unit increase in housing regulations (*New-Index*) is significantly associated with a 15.0 percent increase in the purchase of low-cost beer brands among renters compared to homeowners in 2022, with no effect on high-cost brands (See Figure A19). Additionally, there is a significant declining trend in the purchase of low-cost beer in the pre-2019 period, however, the trend reversed in the post-2019 period. These findings suggest that the increase in monthly beer purchases among renters, relative to homeowners is primarily driven by low-cost beer purchases.

6   DISCUSSION

While the effects of the overall inflation on household purchasing power, food insecurity, financial stress and coping mechanisms are well documented, the impact of rising housing expense on household consumption of alcohol and tobacco is not well understood. This study uses a novel approach, leveraging plausibly exogenous local housing regulations, to assess the effect of out-of-pocket housing expense inflation on household budgets, mental wellbeing, and alcohol and cigarette purchases. We estimate that a 1-unit increase in housing regulations (*New-Index*), which is equivalent to moving from the 10th percentile to the 90th percentile, is associated with: a) approximately a 15.6 percent increase in out-of-pocket monthly housing expense per member, b) a roughly 26 percent to 38 percent increase in difficulty with paying rent and household expenses, and c) a 15.2 percent increase in monthly beer purchase per household member among renters relative to homeowners in 2022 compared to 2019. Notably, a 15.6 percent increase in housing expenses paired with a 15.2 percent rise in beer consumption implies an elasticity of beer consumption with respect to housing expense inflation of approximately 1. Additionally, we find no effect of housing regulations on household income and price of the products. These findings suggest that more stringent housing regulations is not only associated with higher housing expense, but also to greater financial difficulties and increased beer consumption. These effects are observed among renters who are more likely to come from lower socioeconomic backgrounds, racial minority groups and younger age groups compared to homeowners.

A possible explanation for the rise in beer purchase among renters, without a similar effect on liquor, wine and cigarettes could be explained by differences in income elasticity. Existing studies find the income elasticity of beer is 0.5, while it is 1 for liquor and wine, and 5.6 for cigarettes (Nelson 2013; Kenkel, Schmeiser, and Urban 2014). These elasticities indicate that beer is

inelastic, whereas liquor, wine and cigarettes are highly elastic. Since high regulations lead to both an increase in out-of-pocket housing expense, reducing disposable income; and increased financial difficulties, these factors affect purchases in opposite directions. For beer, a decrease in disposable income has minimal effect due to low elasticity, but increased financial difficulties may drive purchases up for coping, resulting in a net increase in beer purchase. In contrast, the high elasticity of liquor, wine and cigarettes means reduced disposable income could decrease purchases. However, increased financial difficulties due to housing burden may increase the purchases, leading to no overall change in purchases.

This study has several limitations. First, to protect participants privacy, particularly in smaller geographic areas, the American Community Survey dataset is restricted to regions with population of 100,000 or more. As a result, after merging with the housing regulations data, the final dataset includes 363 distinct counties with a combined population of 191 million, representing the most densely populated regions. Similarly, merging the NielsenIQ data with the housing regulations data yields approximately 1022 distinct counties for the reduced form analysis. Second, we examine the effects of housing regulations on household financial difficulties and mental wellbeing at the metropolitan statistical area level (15 distinct MSAs) due to the Household Pulse Survey's (HPS) lack of county-level geographic information. Third, since NielsenIQ data collects data on household grocery and non-grocery purchases, our analysis does not include alcohol purchased at restaurants. Fourth, due to data limitation, we were unable to combine all datasets. As a result, we conducted separate analyses examining the effect of housing regulations on housing expense (first stage) and on household alcohol and tobacco purchases (reduced form), rather than using a two-stage-least-squares (2SLS) specification. Fifth, the estimated effect of housing expense inflation on alcohol and cigarette purchases could be transitory. We plan to examine the

long-term effects in the future. Lastly, we do not examine changes in alcohol and cigarette consumption by specific brands or type, as our study focuses on overall consumption levels.

Despite these limitations, our study contributes to the understanding of how increased housing expense affects household consumption. To the best of our knowledge, this is the first attempt to estimate the effect of housing expense inflation, driven by local housing regulations, on household alcohol and tobacco purchases. Our findings suggest that housing expense inflation, driven by stricter housing regulations are associated with increased financial insecurity and difficulties, which leads to increased consumption of beer as coping mechanism. We argue that solving housing market supply constraints caused by excessive local regulations could not only increase housing supply and alleviate high housing expense inflation, but also substantial improve household financial security and influence their health-related behaviors, including the consumption of addictive substances.

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8 TABLES AND FIGURES

Table 1: Descriptive Statistics of the American Community Survey Data

	All (N = 3,297,772)		Pre (2017-2019) (N = 1,674,919)		Post (2020 – 2022) (N = 1,622,853)	
	Owner	Renter	Owner	Renter	Owner	Renter
Observations	2,358,912	938,860	1,184,341	490,578	1,174,571	448,282
Household Head Age (Mean)	55.9	45.5	56.0	45.5	55.8	45.5
Female	48.0%	54.5%	47.1%	54.3%	48.9%	54.7%
Hispanic Origin	12.7%	22.7%	12.2%	22.5%	13.2%	22.8%
Non-Hispanic Race*						
White	69.9%	46.1%	71.6%	46.8%	68.4%	45.4%
Black	8.1%	20.7%	8.1%	21.0%	8.2%	20.3%
Asian	6.7%	6.6%	6.5%	6.6%	6.9%	6.6%
Others / Mixed	15.1%	26.3%	13.6%	25.2%	16.4%	26.3%
Education						
Less than High School	5.9%	12.5%	6.3%	13.2%	5.6%	11.8%
High School Diploma or GED	18.4%	23.8%	18.9%	24.4%	17.8%	23.4%
Some College	28.5%	31.7%	28.9%	32.3%	28.0%	31.2%
Bachelor's Degree	26.9%	20.6%	26.3%	19.5%	27.6%	21.6%
Graduate Degree	20.3%	11.4%	19.6%	10.7%	21.0%	12.1%
Income Category (Nominal)						
< $30k	12.6%	35.1%	13.2%	37.1%	12.0%	33.2%
$30-75k	27.8%	38.3%	29.2%	38.6%	26.5%	38.0%
$75-100k	14.2%	10.9%	14.5%	10.3%	13.9%	11.4%
$100-150k	19.9%	9.5%	19.7%	8.6%	20.0%	10.2%
$150-200k	10.9%	3.3%	10.2%	2.9%	11.4%	3.7%
$200k+	14.7%	3.0%	13.1%	2.5%	16.2%	3.5%
Marital Status						
Married	63.9%	30.8%	64.2%	32.0%	63.6%	29.7%
Separated /Divorced / Widowed	24.1%	29.4%	24.5%	30.2%	23.8%	28.7%
Single /Never Married	12.0%	39.8%	11.3%	37.8%	12.6%	41.6%
Employment Status						
Yes	63.9%	69.3%	64.4%	69.6%	63.4%	69.0%
No	36.1%	30.7%	35.6%	30.4%	36.6%	31.0%
Children in Household						
Yes	42.7%	36.7%	42.5%	38.7%	42.9%	34.8%
No	57.3%	63.3%	57.5%	61.3%	57.1%	65.2%

This table shows the descriptive statistics of socioeconomic and demographic information of the IPUMS American Community Survey 1-year data, from 2017 to 2022. *The non-Hispanic race categories show the share of population within the non-Hispanic demographic.

	All		Pre (2017-2019)		Post (2020 – 2022)	
	Owner	Renter	Owner	Renter	Owner	Renter
Beer Purchase						
Observations	3,166,187		1,628,454		1,537,733	
	2,412,586	753,601	1,253,760	374,694	1,158,826	378,907
Households Beer Purchase - Yes	14.0%	12.1%	12.8%	11.4%	15.3%	12.9%
Monthly Purchase/Member (Oz), if yes	193.1	211.9	191.5	211.4	194.5	212.3
Liquor Purchase						
Observations	3,165,876		1,628,178		1,537,698	
	2,412,320	753,556	1,253,526	374,652	1,158,794	378,904
Households Liquor Purchase - Yes	10.5%	9.9%	10.4%	10.0%	10.5%	9.8%
Monthly Purchase/Member (Oz), if yes	53.0	58.7	52.4	58.6	53.5	58.9
Wine Purchase						
Observations	3,166,584		1,628,855		1,537,729	
	2,412,861	753,723	1,254,042	374,813	1,158,819	378,910
Households Wine Purchase - Yes	13.8%	12.2%	14.1%	12.5%	13.6%	12.0%
Monthly Purchase/Member (Oz), if yes	69.0	78.5	67.8	77.4	70.3	79.6
Cigarette Purchase						
Observations	3,166,077		1,628,359		1,537,718	
	2,412,470	753,607	1,253,663	374,696	1,158,807	378,911
Households Cigarette Purchase - Yes	4.7%	7.4%	4.9%	7.4%	4.6%	7.4%
Monthly Purchase (Count), if yes	227.6	208.4	222.1	209.9	233.5	206.9
Female Head Age						
<= 29 years	4.3%	9.3%	4.8 %	9.7%	3.7 %	9.0%
30 – 39 years	20.9%	25.3%	21.5%	25.1%	20.3%	25.5%
40 – 49 years	20.5%	18.8%	20.4%	18.0%	20.6%	19.5%
50 – 64 years	33.6%	28.2%	33.2%	28.6%	34.1%	27.7%
65+ years	20.7%	18.4%	20.1%	18.5%	21.3%	18.2%
Male Head Age						
<= 29 years	2.0%	4.3%	2.5 %	4.5%	1.5 %	4.2%
30 – 39 years	21.4%	26.7%	22.1%	26.6%	20.8%	26.9%
40 – 49 years	21.0%	19.8%	20.9%	19.1%	21.1%	20.6%
50 – 64 years	34.4%	29.7%	34.0%	30.3%	34.9%	29.2%
65+ years	21.2%	19.4%	20.6%	19.6%	21.8%	19.2%
Hispanic Origin	14.5%	15.3%	14.3%	14.5%	14.7%	16.0%
Non-Hispanic Race*						
White	75.9%	70.8%	76.1%	71.6%	75.6%	70.1%
Black	10.7%	14.4%	10.7%	14.2%	10.7%	14.5%
Asian	5.3%	5.2%	5.0%	4.6%	5.6%	5.7%
Others / Mixed	8.1%	9.6%	8.2%	9.5%	8.0%	9.7%
Female Head Education						
Less than High School	20.5%	30.7%	20.5%	31.1%	20.5%	30.4%
High School Diploma or GED	24.6%	22.5%	25.2%	22.5%	23.9%	22.6%
Some College	25.1%	22.8%	25.3%	23.4%	25.0%	22.2%
Bachelor's Degree	19.5%	15.9%	19.0%	15.3%	20.1%	16.5%
Graduate Degree	10.2%	8.0%	10.0%	7.7%	10.4%	8.4%
Male Head Education						
Less than High School	29.4%	44.8%	29.9%	44.6%	29.0%	45.0%
High School Diploma or GED	21.8%	17.2%	22.0%	17.5%	21.6%	17.0%
Some College	21.2%	17.1%	21.1%	17.3%	21.3%	16.8%
Bachelor's Degree	18.2%	14.0%	17.9%	13.8%	18.5%	14.2%
Graduate Degree	9.3%	6.8%	9.0%	6.7%	9.6%	6.9%
Income Category						
< $10k	2.8%	7.0%	2.9%	6.7%	2.7%	7.1%
$10-30k	13.3%	28.5%	14.8%	30.9%	11.8%	26.2%
$30-50k	15.0%	19.9%	16.2%	20.4%	13.9%	19.4%
$50-70k	13.4%	13.8%	13.9%	13.7%	12.9%	13.9%
$70-100k	16.9%	13.0%	17.1%	12.3%	16.8%	13.7%
$100k+	38.5%	17.7%	35.1%	15.8%	41.8%	19.6%
Marital Status						

Married	61.0%	35.4%	60.8%	35.4%	61.1%	35.5%
Separated /Divorced / Widowed	23.3%	31.4%	23.8%	32.8%	22.9%	30.0%
Single /Never Married	15.6%	33.2%	15.4%	31.7%	15.9%	34.5%
Female Head Employment Status						
Yes	60.8%	59.9%	60.5%	58.9%	61.2%	60.8%
No	39.2%	40.1%	39.5%	41.1%	38.8%	39.2%
Male Head Employment Status						
Yes	72.8%	68.5%	72.8%	68.2%	72.8%	68.8%
No	27.2%	31.5%	27.2%	31.8%	27.2%	31.2%

This table shows the descriptive statistics of socioeconomic and demographic information of the NielsenIQ Consumer Panel data, from 2017 to 2022. *The non-Hispanic race categories show the share of population within the non-Hispanic demographic.

Table 3: Descriptive statistics of the Household Pulse Survey Data *(N=499,790)*

Variables	Owner (N=361,775) 72%	Renter (N=138,015) 28%
Caught up on Rent / Mortgage Payment	93.7%	85.5%
Difficulty with Expense	50.0%	71.4%
Self-reported Anxiety	53.0%	67.1%
Self-reported Worry	44.3%	59.8%
Self-Reported GAD-2	21.7%	34.8%
Received COVID-19 Vaccine (Yes)	91.4%	87.3%
Female	50.0%	53.7%
Hispanic Origin	16.7%	27.3%
Non-Hispanic Race*		
White	74.1%	61.9%
Black	11.4%	22.3%
Asian	10.0%	8.4%
Others / Mixed	4.5%	7.4%
Education		
High school or less	25.8%	37.0%
Some College / Associate's Degree	25.8%	27.1%
Bachelor's Degree	23.9%	20.8%
Graduate Degree	24.5%	15.1%
Income category		
<$25k	7.0%	23.9%
$25-50k	16.0%	28.4%
$50-100k	28.5%	27.0%
$100-150k	19.8%	10.6%
$150k+	28.6%	10.1%
Children in Household		
No	65.7%	68.1%
1-2	28.4%	25.2%
3+	5.9%	6.7%
Recent Household Job Loss		
Yes	19.1%	10.1%
Marital Status		
Married	62.0%	30.9%
Widowed, Divorced, Separated	18.9%	23.1%
Never Married	19.0%	46.0%

This table shows the descriptive statistics of socioeconomic and demographic information of the Household Pulse Survey data, from 2021 to 2023. *The non-Hispanic race categories show the share of population within the non-Hispanic demographic.

Table 4: DDD - Effect of Housing Regulation (*New-Index*) on Out-of-Pocket Monthly Housing Expense per Member

Monthly Housing Expense / Member	(1)	(2)
New-Index*2017*Renter	0.50	-0.13
	(6.66)	(6.18)
New-Index*2018*Renter	-0.98	-2.86
	(7.71)	(6.44)
New-Index*2019*Renter	-	-
New-Index*2020*Renter	25.56***	19.58**
	(9.41)	(8.06)
New-Index*2021*Renter	23.86**	23.12**
	(10.82)	(9.39)
New-Index*2022*Renter	30.26***	28.70***
	(11.51)	(10.65)
County FE	Y	Y
Year FE	Y	Y
Dummy Renter	Y	Y
County* Renter FE	Y	Y
Year* Renter FE	Y	Y
HH Characteristic		Y
Observations	3,297,772	3,297,772
R-Square	0.10	0.32
2019 Average Rent	$766.05	$766.05
2022 Average Rent	$950.28	$950.28
2019 – 2022 Change in Average Rent	$184.23	$184.23
2019 – 2022 % Change in Average Rent	24.05%	24.05%
2019 – 2022 Additional Change	3.9pp	3.7pp
2019 - 2022 Relative Additional Change	16.21%	15.4%

This table estimates the effect of housing regulation index (*New-Index*) on monthly housing expense per-member for renters relative to homeowners, before and after 2019. In Model 1, monthly housing expense is regressed on *New-Index*Year*Renter* and *New-Index*Year*. Model 2 adds 2019 household characteristics – Household income, Marital status, Race, Hispanic origin, Household head age, Household head education, Household head gender, Household head employment status and Number of children in household. Both models control for County and Year fixed effects, Renter vs. Owner dummy, County*Renter time invariant characteristics and Year*Renter secular time trends. Standard error is clustered at county-level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Effect of Housing Regulation (*New-Index*) on 2021-2023 Financial Difficulties and Self-Reported Mental Health Symptoms

	Caught Up on Rent / Mortgage Payment	Difficulty with Expense	Anxiety	Worry	GAD-2
	(1)	(2)	(3)	(4)	(5)
New-Index	0.26***	-0.38***	-0.44***	-0.43***	-0.16
	(0.09)	(0.09)	(0.11)	(0.11)	(0.10)
New-Index*Renter	-0.22***	0.27***	-0.09	0.03	-0.05
	(0.08)	(0.08)	(0.10)	(0.10)	(0.10)
HH Characteristic	Y	Y	Y	Y	Y
Renter FE	Y	Y	Y	Y	Y
Survey-wave*Renter FE	Y	Y	Y	Y	Y
Survey-wave*State FE	Y	Y	Y	Y	Y
Observations	376,768	499,790	499,790	499,790	499,790
R-Square	0.11	0.27	0.11	0.10	0.09
Mean	85.5%	71.4%	67.1%	59.8%	34.8%
Relative Change	-25.8%	37.7%	NA	NA	NA

This table estimates the effect of housing regulation index (*New-Index*) on difficulty with housing payment, difficulty with expenses, self-reported anxiety, worry and Generalized Anxiety Disorder (GAD-2), for renters relative to homeowners. All models control for household characteristics – Household income, Marital status, Race, Hispanic origin, Age, Gender, Education, Number of children in household, Recent household job loss, COVID-19 vaccination status, Renter, Survey-wave*Renter and Survey-wave*State fixed effects. Standard error is clustered at household-level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 1: Change in Out-of-Pocket Monthly Housing Expense per Member from 2019 to 2022 vs Housing Regulations (*New-Index*)

Panel A: Owner

Panel B: Renter
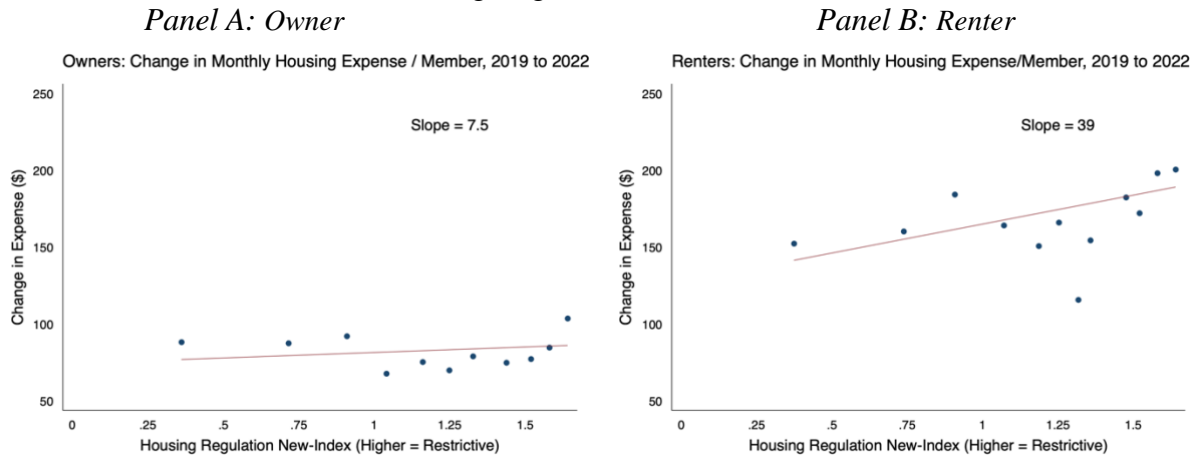
Figure 2: DD - Change in Out-of-Pocket Monthly Housing Expense per Member, Pre and Post 2019

Panel A: DD Owner

Panel B: DD Renter
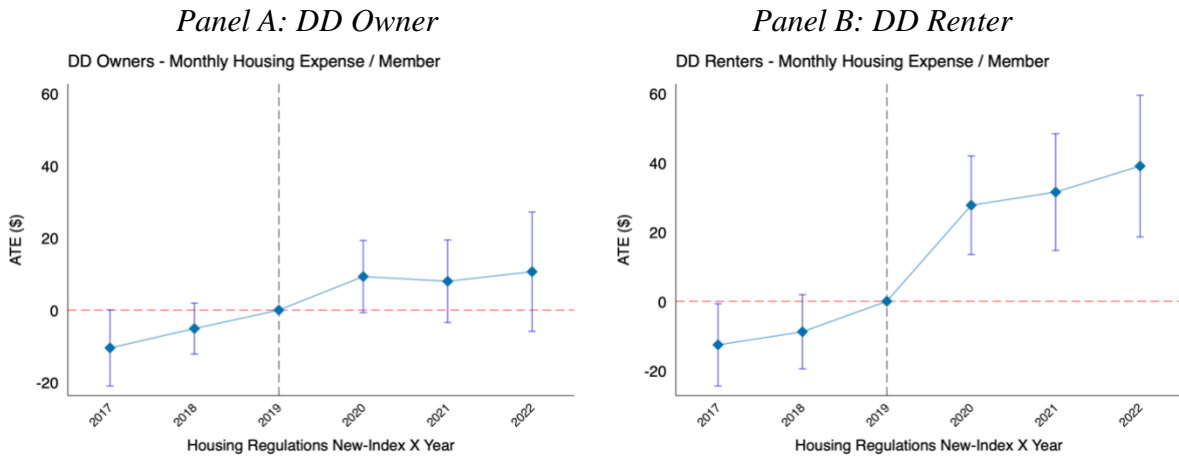
Figure 3: DDD - Change in Out-of-Pocket Monthly Housing Expense per Member for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Housing Expense / Member
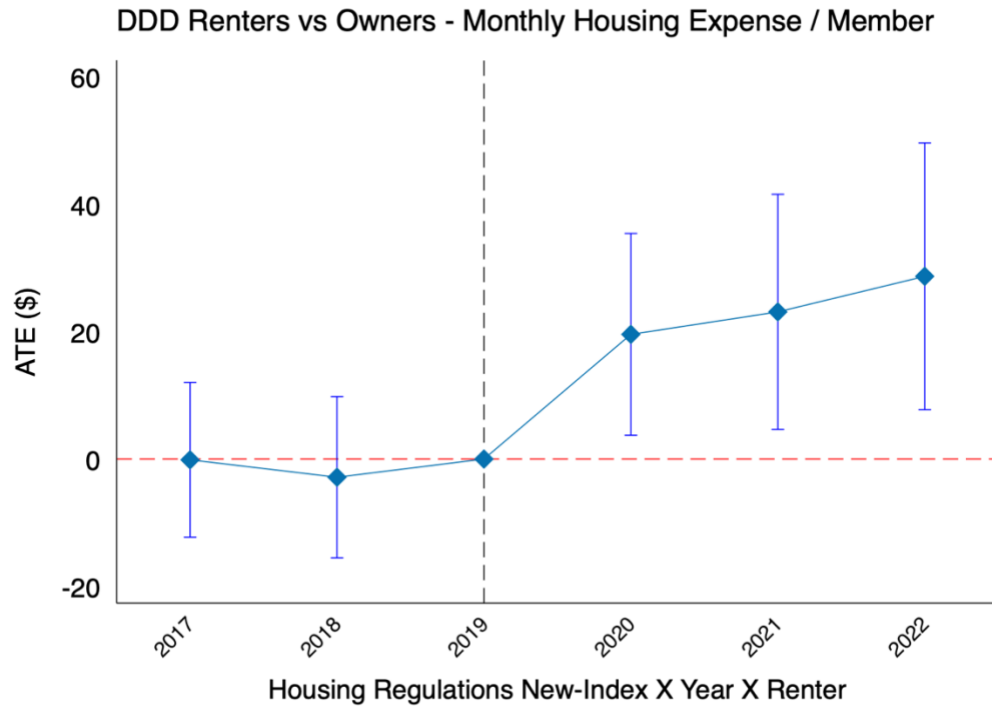
Figure 4: DDD – Extensive Margin: Change in Monthly Beer Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Beer Purchase - 0 vs 1

Figure 5: DDD - Intensive Margin: Change in Monthly Beer Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Beer Purchase / HH Member

Figure 6: DDD - Extensive Margin: Change in Monthly Liquor Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Liquor Purchase - 0 vs 1

Figure 7: DDD - Intensive Margin: Change in Monthly Liquor Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Liquor Purchase / HH Member

Figure 8: DDD - Extensive Margin: Change in Monthly Wine Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

Figure 9: DDD - Intensive Margin: Change in Monthly Wine Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

Figure 10: DDD - Extensive Margin: Change in Household Monthly Cigarette Purchase for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - Monthly Cigarette Purchase - 0 vs 1
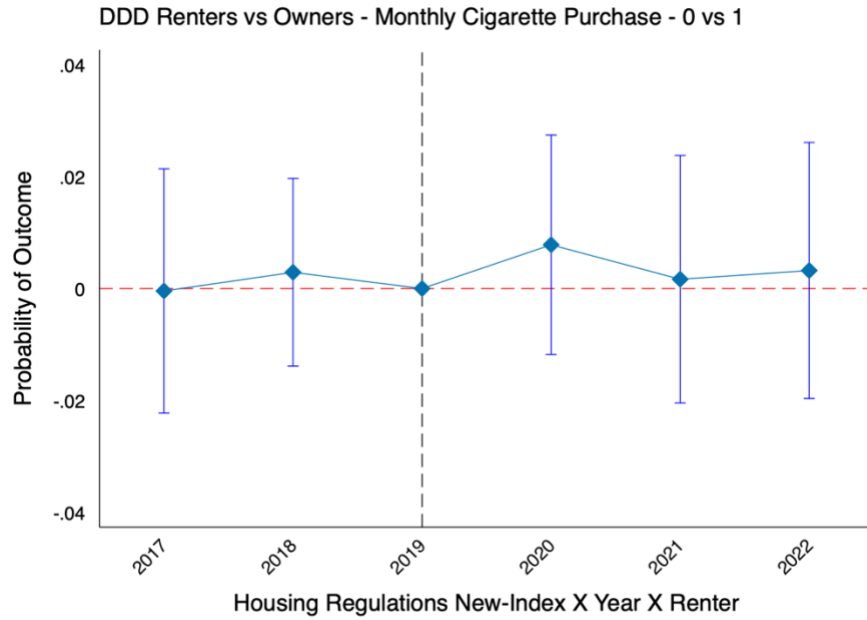
Figure 11: DDD - Intensive Margin: Change in Household Monthly Cigarette Purchase for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - HH Monthly Cigarette Purchase

Figure 12: DDD - Change in Monthly Household Income per Adult[9] for Renters relative to Owners, Pre and Post 2019

DDD Renters vs Owners - HH Monthly Income per Adult

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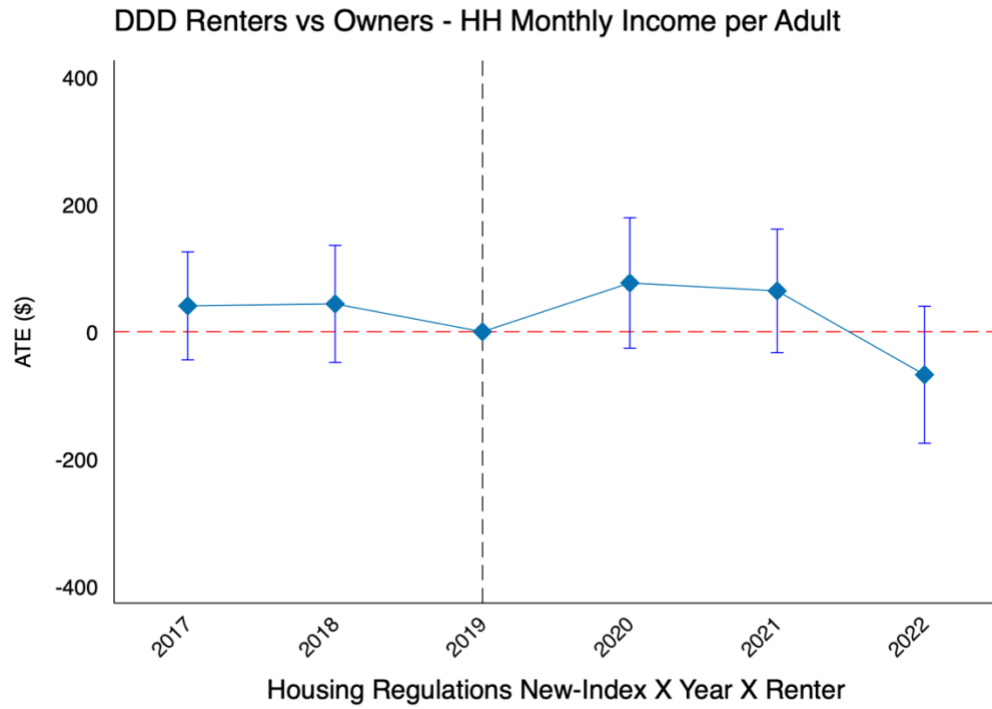
[9] Household income reports the total income of all household members age 15+ during the previous year. Monthly household income per adult is calculated by dividing the annual household income by 12 and by number of adults in the household.

9 APPENDIX

9.1 New-Index – Exogenous Variable for Housing Regulation

We construct our housing regulation variable – *New-Index* using the Wharton Residential Land Use Regulation Index (WRLURI) , which comprises of 12 components, discussed below.

- Local Political Involvement Index (LPPI): This component measures the degree to which various local actors, such as local council, managers, community pressure groups and other entities, influence the local residential development process.

- State Political Involvement Index (SPII): This component measures the degree of influence of state legislatures in residential building activities.

- Court Involvement Index (CII): It measures the involvement of local and state courts in residential building activities and/or their growth management.

- Local Project Approval Index (LPAI): This component measures the approval needed from different entities, such as local council, commissioners, county zoning board, environmental review board, public health office and others, for building new housing. It pertains to projects that do not require changes in the existing zoning codes.

- Local Zoning Approval Index (LZAI): This component is similar to LPAI, except, it is applicable on projects that require changes in the local zoning codes.

- Local Assembly Index (LAI): It measures whether a town meeting required to approve any residential project.

- Supply Restrictions Index (SPI): It measures the restrictions (annual cap), if at all, on the supply of new housing.

- Density Restrictions Index (DRI): It measure the restrictions related to the minimum lot size requirements.

- Open Space Index (OSI): This component measures whether new projects are required to provide some type of space for the community to use as part of the project.

- Exactions Index (EI): It measure whether developers are required to pay any kind of impact fee.

- Affordable Housing Index (AHI): It measure whether new projects are required to include affordable housing.

- Approval Delay Index (ADI): This component measures the review time for residential project and permit approval.

To construct *New-Index*, we begin by estimating the effect of county-level Wharton Residential Land Use Regulation Index (WRLURI), a composite measure of 12 components, on out-of-pocket monthly housing expense per member, using our Difference-in-Difference-in-Difference (DDD) estimation approach, outlined in Section 3. As shown in Appendix Figure A4, we observe a significant effect of WRLURI on out-of-pocket monthly housing expense per member for renters relative to homeowners in counties with more restrictive regulation compared to those with less restrictive regulation, in post 2019 period. To further understand the role of each individual component on out-of-pocket housing expense, we run the DDD estimation for each sub-component (see Appendix Figure A5, Panel A – Panel L). Among these, five components - SPII, LAI, DRI OSI and EI – are found to have a significant effect on out-of-pocket monthly housing expense per member.

We constructed a new weighted composite measure, *New-Index*, using the five significant components. To find the optimal weights for these components, we applied the Slot Machine

method outlined in (Aladago and Torresani 2021), which involves selecting weights from a set of random weights that maximizes a given function. Our objective was to maximize the post-2019 coefficients and minimize the pre-2019 coefficients from equation 3.

$$Maximize \left\{ \sum_{i=2020}^{2022} \beta_i^2 - \sum_{t=2017}^{2018} \alpha_t^2 \right\}$$

We generated 500 random weights and assigned them to the five significant components in a looping process, creating 100 different composite indices based on various combinations of SPII, LAI, DRI OSI and EI. Then, we run 100 loops of the DDD estimation model using these combinations. Moving on, we calculated the loss function based on the estimated coefficients, ranking the results from best to least. This process was repeated on several test datasets, each comprising a 50% sample of the full dataset. Finally, we selected the weight set that consistently ranked in top five in different test datasets, and used it to create our final composite measure, *New-Index*. This index has a mean of 0.98, a median of 1 and a standard deviation of 0.42.

$$NewIndex = 0.06 * SPII + 0.33 * LAI + 0.13 * DRI + 0.40 * OSI + 0.09 * EI$$

9.2 IPUMS USA - American Community Survey Data

The IPUMS USA database provides highly integrated, precise data from the American Community Surveys of 2000 – present. It provides detailed information on various aspects of U.S. population, such as internal migration, labor-force participation, occupational structure, education, ethnicity, and household composition, both at the household and individual-levels over time. For this study, we use annual data from 2017 to 2022. To measure out-of-pocket monthly housing expense, we use the variables "OWNCOST" and "RENTGRS" for homeowners and renters, respectively. OWNCOST captures total monthly payment for owner-occupied house/units, which is the sum of mortgages, taxes, insurances, and other costs. Importantly, it is not the user cost of

housing, rather out-of-pocket expense of owning a house (Quigley and Raphael 2004). RENTGRS reflects the gross monthly rental cost of the housing unit, including the contract rent and additional rent-related expenses. Finally, we factor in household size to construct a standardized variable – "Out-of-pocket Monthly Housing Expense per Member". The dataset also provides information on type of housing tenure (homeowner vs renter) and household's demographic characteristics, such as race, age, gender, education, marital status and employment status of the household head, household income, and number of children in home. Geographic information is available at county-level, which enable us to merge the housing regulation data. Importantly, to protect participants privacy, particularly in smaller geographic areas, the dataset is limited to regions with population of 100,000 or more. Consequently, the final dataset includes 363 distinct counties, representing the most densely populated regions. Details on household demographic characteristics are discussed below.

- Age: The survey contains the age of the household head.

- Gender: The survey assigns 1 for "Male" and 2 for "Female".

- Hispanic Origin: The survey assigns 0 for "non-Hispanic", 1 for "Mexican", 2 for "Puerto Rican", 3 for "Cuban" and 4 for "Others". We created a dummy variable, where 0 indicates "non-Hispanic" and 1 indicates "Hispanic Origin".

- Non-Hispanic Race: The survey codes non-Hispanic race from 1 – 9. We created a new scale from 1 – 5, where 1 is "White", 2 is "Black", 3 is "Native Americans", 4 is "Asians" and 5 is "Others/Mixed".

- Education: The survey codes education from 0 – 11. We created a new scale from 1 – 7, where 1 is "No school or up to kindergarten", 2 is "Less than high school", 3 is

"High school but no diploma", 4 is "High school", 5 is "Some college", 6 is "Bachelor's degree" and 7 is "Graduate degree".

- Marital Status: The survey codes marital status from 1 – 6. We created a new scale from 1 – 3, where 1 is "Married", 2 is "Separated or Divorced or Widowed" and 3 is "Never married",

- Employment Status: The survey codes marital status from 1 – 3. We created a dummy variable, where 1 indicates "Employed" and 0 indicates "Not employed"

- Number of Children: The survey collects data on number of children in household. We created a categorical variable, where 0 indicates "No children", 1 indicates "1 child", 2 indicates "2 children" and 3 indicates "3 or more children" in the household.

- Household Income: The survey collects total income of the households. We created a categorical variable, where 1 is less than $10,000; 2 is $10,001 to $30,000; 3 is $30,001 to $50,000; 4 for $50,001 to $75,000; 5 is $75,001 to $100,000; 6 is $100,001 to $150,000; 7 for $150,001 to $200,000; and 8 is $200,001 and above.

9.3 Kilts NielsenIQ Consumer Panel Data

NielsenIQ Consumer Panel data is a longitudinal dataset that tracks household purchases from approximately 60,000 panelist households each year. The dataset, provided by the Kilts Center for Marketing at the University of Chicago, Booth School of Business, began in 2004. For our analysis, we use data from 2017 to 2022 to estimate the effects of increased out-of-pocket monthly housing expense, driven by stringent housing regulations, on household alcohol and tobacco purchases. The dataset provides detailed information on grocery and non-grocery purchases from a nationally representative sample of households.

It is important to note that the Consumer Panel data transitioned to a new product hierarchy structure starting from 2021, meaning the product classification for 2021-2022 differs from that of 2017 to 2020. Between 2004 to 2020, products are grouped into 10 departments (7 food and 3 non-food). To study changes in alcohol purchases, we use the non-food department – "Alcoholic Beverages", which is further categorized into 3 product groups - Beer, Liquor and Wine. For tobacco purchases, we use the non-food department – "Non-Food Grocery", focusing on the product group "Tobacco & Accessories" and the product module "Cigarettes".

From 2021 onwards, the new product hierarchy is comprised of 18 departments (8 food items, 10 non-food), classified into super-categories (product group), and categories (product module). For alcohol purchases, we use the non-food department – "Alcohol", which is divided into 5 super-categories. Out of these, we analyze the categories "Beer/FMD/Cider, Total Spirits, and Total Wine". For tobacco purchases, we use the non-food department – "Tobacco and Tobacco Alternatives", focusing on the super-category "Tobacco" and the category "Cigarettes".

We then create separate datasets for Beer, Liquor, Wine and Cigarette purchases. For statistical reasons, we also create separate datasets for households that did not purchase beer, liquor, wine and cigarette, and merge the zero-value file of each product with the non-zero value file. Finally, using the county FIPS codes, we merge the housing regulation data, creating a final datasets for alcohol (Beer, Liquor, Wine) and tobacco (Cigarette) purchases with roughly 42,000 to 47,000[10] distinct households in each year from 2017 to 2022. We use household weights - "Projection Factor" to re-weight the data to better reflect national demographic estimates. The NielsenIQ Consumer Panel data also provides information on household geographic location, type of residence (homeowner versus renter) and demographic characteristics, discussed below.

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[10] The housing regulations data and NielsenIQ data have 1039 and 2916 distinct counties, respectively. After merging the two, we have roughly 1012 counties, creating a dataset of roughly 42,000 to 47,000 distinct households.

- Geographic Variables: The data contains panelist ZIP code, FIPS state and county codes, region, and Scantrack Market code (assigned by NielsenIQ). We use FIPS state and county codes to create 5-digit unique county-level FIPS code, which is used to merge with the county-specific housing regulation, creating a final dataset with roughly 1022 distinct counties.

- Owner versus Renter: The data contains variable - "Type of Residence", which is categorized into: One Family House, One Family House (Condo/Coop), Two Family House, Two Family House (Condo/Coop), Three+ Family House, Three+ Family House (Condo/Coop), and Mobile Home or Trailer. We construct a dummy variable "Owner" for this study, where 1 indicates "Owner – One Family House", and 0 indicates "Renter", representing the remaining "Type of Residence".

- Demographic Variables[11]: The data gathers information on household income, size, composition, race, Hispanic origin, marital status, type of residence, presence and age of children. It also provides information on age, education, occupation and hours employment of the male and female heads of the household. These demographic characteristics are used as covariates (listed below) in our empirical model to control for socio-economic differences between households, particularly between homeowners and renters.

- Number of Adults: We use monthly alcohol purchase per household member (beer, liquor and wine) in our analysis. To do so, we create the variable "Number of Adults in Household" using the variables: "Household Size" and "Age and Presence of Children"

    o Number of Adults = Household Size – 1 if household has 1 child

    o Number of Adults = Household Size – 2 if household has 2 children

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[11] As per the NielsenIQ Datasets, the numeric codes of these variables are part of NielsenIQ's proprietary information which is not allowed to be disclosed publicly.

- o Number of Adults = Household Size – 3 if household has 3 children

- o Number of Adults = Household Size if household has no child

- Household Size: The variable indicates the number of members residing in household. We create a new household size variable for this study, scaled from to 1 to 5 to use as a covariate, where1 indicates one member, 2 indicate two members, 3 indicate three members, 4 indicate four members, and 5 indicates 5 or more members in household.

- Household Income: The variable indicates the range of total annual household income. We create a new categorical variable for this study, scaled from 1 to 6, where 1 is for income less than $10,000, 2 indicates between $10,000 to $30,000, 3 indicates between $30,000 to $50,000, 4 indicates between $50,000 to $70,000, 5 indicates between $70,000 to $100,000 and 6 indicates more than $100,000.

- Marital Status: The variable indicates the marital status of household heads: Married, Widowed, Divorced / Separated or Single. We create a new categorical variable for this study, where 1 indicates "Married", 2 indicates "Widowed / Divorced / Separated, and 3 indicates "Single".

- Race: The variable represents the racial identity of the household: White / Caucasian, Black / African American, Asian and Other.

- Hispanic Origin: The variable represents whether members of the household are of Hispanic origin.

- Female (Male) Head Age: The variable indicates the age range of household head: Under 25 years, 25-29 years, 30 – 34 years, 35 – 39 years, 40 – 44 years, 45 – 49 years, 50 – 54 years, 55 – 64 years and 65+ years.

- Female (Male) head Education: The variable indicates the highest degree earned by household head: Grade School, Some High School, Graduated High School, Some College, Graduated College and Post Graduate College.

- Female (Male) Head Occupation: The variable indicates the type of employment for household head: "Economist, Doctor, Lawyer, etc.", "Administrator, Banker, Government employee, etc.", "Cashier, Inventory manger, Insurance adjuster, etc.", "People working in sales", "Carpenter, Baker, Technician, etc.", "Factory machine operator, delivery person, etc.", "Members of Armed Forces", "Barber, Childcare worker, bartender, etc.", "Farmer", "Students employed less than 30 hours", "Constriction worker, gardener, etc." and "Housewife, unemployed, retired and unable to work.

9.4 Household Pulse Survey Data

The Household Pulse Survey (HPS) is a nation-wide survey conducted by the U.S. Census Bureau, in collaboration with multiple federal agencies, to measure the impact of emergent issues on American households from a social and economic perspective. The survey has multiple phases, and each phase has multiple waves to produce statistics at three levels: national, state, and 15 metropolitan areas. We used data from survey Waves 32 (June 9, 2021 to June 21, 2021) to Wave 63 (October 18, 2023 to October 30, 2023) in this study for two reasons a) the inflation began to rise in the fall of 2021, with the Consumer Price Index (CPI) reaching 5.4 percent by June 2021, and it continued until the end of 2023, and b) by the end of May 2021, over 50 percent of the population had received at least one dose of COVID-19 vaccine, leading to receding of the peak effects of the pandemic.

To capture the impact of the housing regulation on households' financial difficulties and mental wellbeing, we use four questions from the survey:

- Caught up on rent : Is this household currently caught up on rent payments? The responses are 1 (Yes) and 2 (No).

- Difficulty with expenses: In the last 7 days, how difficult has it been for your household to pay for usual household expenses, including but not limited to food, rent or mortgage, car payments, medical expenses, student loans, and so on? The responses range from 1 to 4, where 1 is "Not at all difficult", 2 is "A little difficult", 3 is "Somewhat difficulty" and 4 is "Very difficult". We create a new dummy variable for difficulty with expense, where 0 is "Not at all difficult" and 1 is "A little / Somewhat / Very difficult".

- Anxiety: Over the last 7 days, how often have you been bothered by the following problems ... Feeling nervous, anxious, or on edge? The responses range from 1 to 4, where 1 is "not at all", 2 is "several days", 3 is "more than half the days", and 4 is "nearly every day"? We create a new dummy variable for anxiety for our analysis, where 0 is "Not at all" and 1 is "Several days / more than half the days / nearly every day".

- Worry: Over the last 7 days, how often have you been bothered by the following problems ... Not being able to stop or control worrying? The responses range from 1 to 4, where 1 is "not at all", 2 is "several days", 3 is "more than half the days", and 4 is "nearly every day"? We create a new dummy variable for worry for our analysis, where 0 is "Not at all" and 1 is "Several days / more than half the days / nearly every day".

- Generalized Anxiety Disorder (GAD-2): For this study, as per the Center for Disease Control and Prevention (CDC) scoring and estimation, the index for anxiety and worry are rescaled to 0 to 3., where 0 is Not at all, 1 is Several days, 2 is More than half the days, and 3 is Nearly every day. Following the CDC aggregation standards, the two responses on

anxiety and worry are added together to create the variable "Generalized Anxiety Disorder", where a sum equal to three or greater is associated with anxiety disorder. The demographic characteristics of household head and household are discussed below.

- Age: The survey contains the birth year of each respondent. We calculated age of each respondent based on the year of the survey conducted, i.e., either 2020 or 2021.

- Gender: The survey assigned 1 for "Male" and 2 for "Female".

- Hispanic: The survey assigned 1 for "Not of Hispanic origin" and 2 for "Hispanic origin."

- Non-Hispanic Race: As per the survey, 1 is for "Non-Hispanic White", 2 for "Non-Hispanic Black", 3 for "Non-Hispanic Asian" and 4 for "other non-Hispanic races".

- Education: The survey indexed education from 1 to 7, where 1 is less than high school, 2 is some high school, 3 is high school graduate or equivalent, 4 is some college, but degree not received or in progress, 5 is associate degree, 6 is bachelor's degree, and 7 is graduate degree.

- Marital Status: The survey indices are 1 for "Now Married", 2 for "Widowed", 3 for "Divorced", 4 for "Separated", and 5 for "Never Married".

- Income: The survey indices for income are as follows. 1 for less than $25,000; 2 for $25,000 to $34,999; 3 for $35,000 to $49,999; 4 for $50,000 to $74,999; 5 for $75,000 to $99,999; 6 for $100,000 to $149,999; 7 for $150,000 to $199,999; and 8 for $200,000 and above.

- Number of Children: The variable "Total number of people under 18-years old in household" counts the number of children.

- Work Loss: The survey asks question on any recent household job loss, where 1 id "Yes" and 2 is "No".

- COVID-19 Vaccine: The survey gathers information on household head's vaccination status. 1 indicates "Yes" and 2 indicates "No".

9.5 Tables and Figures

Table A1: DD - Effect of Housing Regulations (*New-Index*) on Out-of-Pocket Monthly Housing Expense per Member

Monthly Housing Expense / Member	(1)		(2)	
	Owner	**Renter**	**Owner**	**Renter**
New-Index*2017	-14.35**	-13.84**	-10.49*	-12.57**
	(5.94)	(6.87)	(5.36)	(6.05)
New-Index*2018	-7.67*	-8.65	-5.12	-8.80
	(4.08)	(6.98)	(3.59)	(5.45)
New-Index*2019	-	-	-	-
New-Index*2020	10.74*	36.30***	9.28*	27.73***
	(5.62)	(10.02)	(5.08)	(7.24)
New-Index*2021	9.24	33.10***	7.97	31.53***
	(6.34)	(10.43)	(5.81)	(8.57)
New-Index*2022	8.68	38.94***	10.63	39.03***
	(8.53)	(12.01)	(8.40)	(10.40)
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
HH Characteristic			Y	Y
Observations	2,358,912	938,860	2,358,912	938,860
R-Square	0.10	0.11	0.29	0.41

This table estimates the effect of housing regulations (*New-Index*) on monthly housing expense per member relative to year 2019. Model 1 is the basic specification, where monthly housing expense per household member is regressed on *New-Index*Year*. Model 2 controls for household characteristics – Household income, Marital status, Race, Hispanic origin, Household head age, Household head education, Household head gender, Household head employment status and Number of children in household. Both models control for county and year fixed effects. Standard error is clustered at county-level. *** p<0.01, ** p<0.05, * p<0.1

Table A2: DD – Effect of Housing Regulations (*New-Index*) on Monthly Alcohol Purchase / Household Member

	Extensive		Intensive		Intensive (Log)	
	Owner	Renter	Owner	Renter	Owner	Renter
Beer	(1)	(2)	(3)	(4)	(5)	(6)
New-Index*2017	0.0004	-0.0074	-9.50	1.46	-0.0318	-0.0041
	(0.0047)	(0.0078)	(8.13)	(14.90)	(0.0416)	(0.0772)
New-Index*2018	-0.0001	-0.0102	-4.38	-3.46	0.0032	-0.0315
	(0.0041)	(0.0069)	(6.56)	(15.59)	(0.0317)	(0.0754)
New-Index*2019	-	-	-	-	-	-
New-Index*2020	-0.0004	-0.0001	-6.01	-6.08	0.0147	-0.0103
	(0.0048)	(0.0069)	(6.52)	(14.27)	(0.0352)	(0.0700)
New-Index*2021	0.0058	-0.0008	-8.81	11.97	0.0017	0.0595
	(0.0052)	(0.0076)	(7.61)	(18.02)	(0.0421)	(0.0922)
New-Index*2022	-0.0040	0.0050	-7.47	26.91	0.0125	0.174*
	(0.0059)	(0.0091)	(8.53)	(20.46)	(0.0449)	(0.0980)
Year & County FE	Y	Y	Y	Y	Y	Y
Observations	2,412,585	753,601	335,550	87,107	335,550	87,107
R-Square	0.04	0.05	0.18	0.26	0.16	0.23
Liquor						
New-Index*2017	-0.0033	-0.0144	2.31	-3.97	0.0343	-0.0696
	(0.0042)	(0.0093)	(1.79)	(3.53)	(0.0346)	(0.0776)
New-Index*2018	-0.0064*	-0.0029	4.18**	-1.00	0.0961***	-0.0081
	(0.0035)	(0.0065)	(1.68)	(2.73)	(0.0300)	(0.0639)
New-Index*2019	-	-	-	-	-	-
New-Index*2020	0.0019	0.0027	0.45	-5.08*	0.0202	-0.0916
	(0.0041)	(0.0068)	(1.63)	(2.79)	(0.0312)	(0.0633)
New-Index*2021	0.0036	0.0013	0.89	-6.81*	0.0038	-0.0968
	(0.0048)	(0.0080)	(2.24)	(3.76)	(0.0426)	(0.0855)
New-Index*2022	-0.0038	0.0095	-2.71	-1.73	-0.0325	0.0159
	(0.0048)	(0.0080)	(2.58)	(4.10)	(0.0482)	(0.0863)
Year & County FE	Y	Y	Y	Y	Y	Y
Observations	2,412,320	753,556	253,687	75,377	253,687	75,377
R-Square	0.03	0.04	0.17	0.21	0.15	0.19
Wine						
New-Index*2017	0.0057	-0.0010	-2.86	-2.47	-0.0137	-0.0453
	(0.0046)	(0.0076)	(3.17)	(6.88)	(0.0412)	(0.0764)
New-Index*2018	-0.0011	-0.0045	0.86	-1.34	0.0314	-0.0331
	(0.0040)	(0.0065)	(2.32)	(4.63)	(0.0307)	(0.0587)
New-Index*2019	-	-	-	-	-	-
New-Index*2020	0.0063	0.0048	0.92	6.01	-0.0008	0.0607
	(0.0045)	(0.0067)	(2.82)	(5.08)	(0.0394)	(0.0676)
New-Index*2021	-0.0034	0.0009	1.07	3.24	0.0228	0.0440
	(0.0052)	(0.0075)	(3.78)	(5.09)	(0.0484)	(0.0608)
New-Index*2022	-0.0061	0.0014	-3.39	10.74**	-0.0231	0.0927
	(0.0055)	(0.0078)	(4.00)	(5.26)	(0.0515)	(0.0826)
Year & County FE	Y	Y	Y	Y	Y	Y
Observations	2,412,861	753,723	360,344	100,144	360,344	100,144
R-Square	0.04	0.05	0.16	0.20	0.16	0.21

This table estimates the effect of housing regulations (*New-Index*) on household monthly alcohol purchase per member for homeowners and renters separately, in counties with more stringent regulation compared to those with less stringent regulations, before and after 2019. Columns 1 and 2 estimate extensive margin – the effect of housing regulations on whether a household purchases alcohol. Columns 3 and 4 estimate intensive margin – the effect of housing regulations on monthly purchase of alcohol per household member (Oz), given that a household already buys alcohol. Columns 5 and 6 estimate intensive margin with Log of monthly alcohol purchase per household member. All estimates control for household characteristics – Household income, Marital status, Race, Hispanic origin, Male head age, Female head age, Male head education, Female head education, Male head occupation, Female head occupation. All estimates control for Year and County fixed effects. Standard error is clustered at county-level. *** p<0.01, ** p<0.05, * p<0.1

Table A3: DD – Effect of Housing Regulations (*New-Index*) on Household Monthly Cigarette Purchase

Cigarette	Extensive		Intensive		Intensive (Log)	
	Owner	Renter	Owner	Renter	Owner	Renter
	(1)	(2)	(3)	(4)	(5)	(6)
New-Index*2017	0.0034	0.0027	0.03	-14.16	0.0108	-0.0882
	(0.0051)	(0.0089)	(12.35)	(18.44)	(0.0764)	(0.1170)
New-Index*2018	0.0009	0.0025	10.12	-14.69	0.0591	-0.0909
	(0.0042)	(0.0072)	(10.87)	(13.95)	(0.0698)	(0.0924)
New-Index*2019	-	-	-	-	-	-
New-Index*2020	-0.0068	0.0007	17.03*	-18.37	0.1240**	-0.1260
	(0.0042)	(0.0087)	(9.34)	(17.58)	(0.0570)	(0.1160)
New-Index*2021	-0.0023	-5.00e-06	38.42***	10.69	0.2250***	0.0113
	(0.0046)	(0.0010)	(12.35)	(18.86)	(0.0710)	(0.1150)
New-Index*2022	0.0015	0.0049	29.28**	41.04*	0.1690**	0.2430*
	(0.0051)	(0.0106)	(13.96)	(22.07)	(0.0793)	(0.1380)
Year & County FE	Y	Y	Y	Y	Y	Y
Observations	2,412,470	753,606	98,422	49,145	98,422	49,145
R-Square	0.05	0.08	0.28	0.28	0.26	0.25

This table estimates the effect of housing regulations (*New-Index*) on household monthly cigarette purchase for homeowners and renters separately, in counties with more stringent regulation compared to those with less stringent regulations, before and after 2019. Columns 1 and 2 estimate extensive margin – the effect of housing regulations on whether a household purchases cigarette. Columns 3 and 4 estimate intensive margin – the effect of housing regulations on household monthly cigarette purchases (Count), given that a household already buys cigarettes. Columns 5 and 6 estimate intensive margin with Log of household monthly cigarette purchases. All estimates control for household characteristics – Household income, Marital status, Race, Hispanic origin, Male head age, Female head age, Male head education, Female head education, Male head occupation, Female head occupation. All estimates control for Year and County fixed effects. Standard error is clustered at county-level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A4: DDD - Effect of Housing Regulations (*New-Index*) on Monthly Alcohol Purchase / Household Member

	Beer			*Liquor*			*Wine*		
	Extensive	Intensive	Intensive (Log)	Extensive	Intensive	Intensive (Log)	Extensive	Intensive	Intensive (Log)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
New-Index*2017*Renter	-0.0075	7.37	0.0094	-0.0108	-6.02	-0.1030	-0.0051	0.04	-0.0342
	(0.0096)	(18.02)	(0.0930)	(0.0104)	(3.86)	(0.0847)	(0.0090)	(8.33)	(0.0988)
New-Index*2018*Renter	-0.0095	-0.08	-0.0403	0.0043	-5.21	-0.1030	-0.0022	-2.14	-0.0672
	(0.0081)	(18.07)	(0.0860)	(0.0078)	(3.23)	(0.0685)	(0.0078)	(5.25)	(0.0669)
New-Index*2019*Renter	-	-	-	-	-	-	-	-	-
New-Index*2020*Renter	0.0001	-0.84	-0.0279	0.0013	-5.81	-0.1230	-0.0008	5.17	0.0624
	(0.0090)	(15.90)	(0.0821)	(0.0081)	(3.66)	(0.0761)	(0.0080)	(6.68)	(0.0855)
New-Index*2021*Renter	-0.0078	18.99	0.0496	-0.0019	-7.85*	-0.1080	0.0049	2.07	0.0165
	(0.0094)	(19.41)	(0.1020)	(0.0094)	(4.53)	(0.0979)	(0.0085)	(6.12)	(0.0775)
New-Index*2022*Renter	0.0089	33.08	0.1520	0.0136	0.35	0.0367	0.0077	13.72*	0.1080
	(0.0112)	(21.48)	(0.1050)	(0.0098)	(5.04)	(0.1030)	(0.0090)	(7.10)	(0.1030)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Renter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year X Renter	Y	Y	Y	Y	Y	Y	Y	Y	Y
County X Renter	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,166,186	422,657	422,657	3,165,876	329,064	329,064	3,166,584	460,488	460,488
R-Square	0.04	0.20	0.17	0.04	0.18	0.16	0.04	0.17	0.17

This table estimates the effect of housing regulations (*New-Index*) on household monthly alcohol purchase per member for renters relative to homeowners, in counties with more stringent regulation compared to those with less stringent regulations, before and after 2019. Columns 1, 4 and 7 estimate extensive margin – the effect of housing regulations on whether a household purchases alcohol. Columns 2, 5 and 8 estimate intensive margin – the effect of housing regulations on monthly purchase of alcohol per household member (Oz), given that a household already buys alcohol. Columns 3, 6 and 9 estimate intensive margin with Log of monthly alcohol purchase per household member. All estimates control for household characteristics – Household income, Marital status, Race, Hispanic origin, Male head age, Female head age, Male head education, Female head education, Male head occupation, Female head occupation. All estimates control for Year, Renter and County fixed effects, County*Renter time invariant characteristics and Year*Renter time trend. Standard error is clustered at county-level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: DDD - Effect of Housing Regulations (*New-Index*) on Household Monthly Cigarette Purchase

| | **Cigarette** | | |
| | Extensive | Intensive | Intensive (Log) |
	(1)	**(2)**	**(3)**
New-Index*2017*Renter	-0.0004	-15.04	-0.1010
	(0.011)	(21.79)	(0.1400)
New-Index*2018*Renter	0.0029	-26.31	-0.1530
	(0.0085)	(17.81)	(0.1130)
New-Index*2019*Renter	-	-	
New-Index*2020*Renter	0.0078	-36.88*	-0.2670**
	(0.0100)	(20.53)	(0.1330)
New-Index*2021*Renter	0.0017	-25.32	-0.2090*
	(0.0113)	(21.31)	(0.1240)
New-Index*2022*Renter	0.0032	14.57	0.0840
	(0.0117)	(26.20)	(0.1580)
Year FE	Y	Y	Y
Renter FE	Y	Y	Y
County FE	Y	Y	Y
Year X Renter	Y	Y	Y
County X Renter	Y	Y	Y
HH Characteristic	Y	Y	Y
Observations	3,166,076	147,567	147,567
R-Square	0.06	0.28	0.25

This table estimates the effect of housing regulations (*New-Index*) on household monthly cigarette purchase for renters relative to homeowners, in counties with more stringent regulation compared to those with less stringent regulations, before and after 2019. Column 1 estimates extensive margin – the effect of housing regulations on whether a household purchases cigarette. Columns 2 estimates intensive margin – the effect of housing regulations on household monthly purchase of cigarette (Count), given that a household already buys cigarette. Columns 3 estimates intensive margin with Log of household monthly cigarette purchase. All estimates control for household characteristics – Household income, Marital status, Race, Hispanic origin, Male head age, Female head age, Male head education, Female head education, Male head occupation, Female head occupation. All estimates control for Year, Renter and County fixed effects, County*Renter time invariant characteristics and Year*Renter time trend. Standard error is clustered at county-level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A6: Effect of Housing Regulations (*New-Index*) on Self-Reported Frequency of Anxiety, Worry and Difficulty with Expenses: *Intensive Margins*

	Anxiety		Worry		Difficulty with Expense	
	0-1 vs 2-3	*0-2 vs 3*	*0-1 vs 2-3*	*0-2 vs 3*	*0-1 vs 2-3*	*0-2 vs 3*
	(1)	(2)	(3)	(4)	(5)	(6)
New-Index	-0.124	0.112	-0.078	0.029	-0.473***	-0.235***
	(0.100)	(0.085)	(0.099)	(0.081)	(0.105)	(0.087)
New-Index*Renter	-0.037	0.064	0.009	0.005	0.372***	0.329***
	(0.097)	(0.082)	(0.095)	(0.078)	(0.098)	(0.085)
HH Characteristic	Y	Y	Y	Y	Y	Y
Renter FE	Y	Y	Y	Y	Y	Y
Survey-wave*Renter FE	Y	Y	Y	Y	Y	Y
Survey-wave*State FE	Y	Y	Y	Y	Y	Y
Observations	499,790	499,790	499,790	499,790	499,790	499,790
R-Square	0.09	0.06	0.08	0.06	0.23	0.18

This table estimates the effect of housing regulations (*New-Index*) on self-reported frequency of Anxiety, Worry, and Difficulty with Expenses for renters relative to homeowners. All models control for household characteristics – Household income, Marital status, Race, Hispanic origin, Age, Gender, Education, Number of children in household, Recent household job loss, COVID-19 vaccination status, Renter, Survey-wave*Renter and Survey-wave*State fixed effects. Standard error is clustered at household-level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure A1: Owner vs. Renter – Trends in Out-of-Pocket Monthly Housing Expense per Member
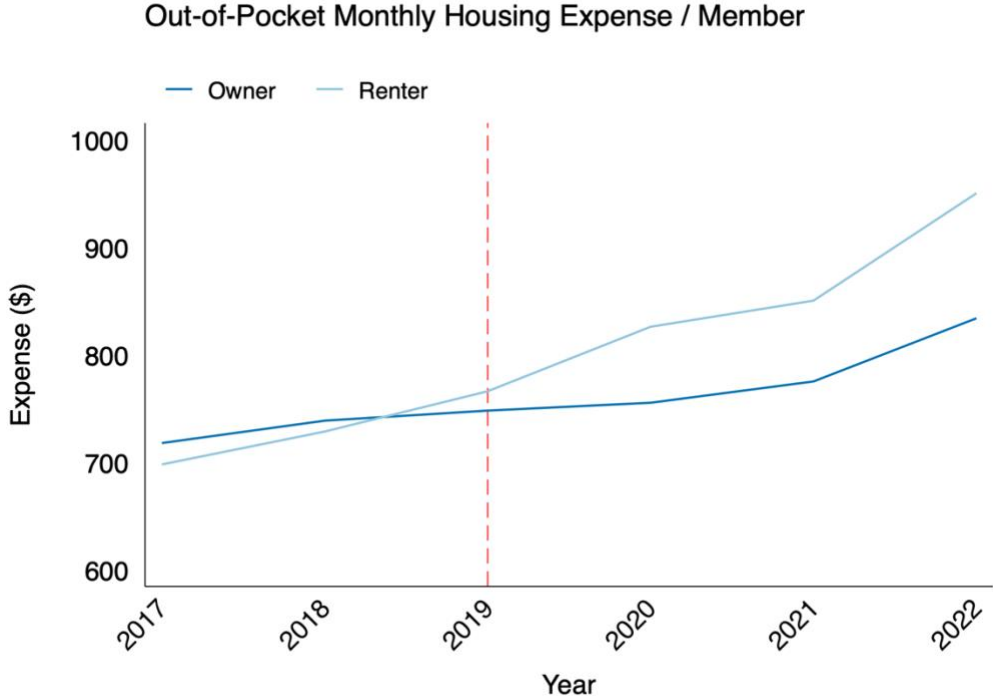
Figure A2: Owner vs. Renter – Trends in Monthly Alcohol Purchase per Household Member

Panel A: Beer

Panel B: Liquor

Monthly Liquor Purchase / HH Member

Panel C: Wine

Monthly Wine Purchase / HH Member
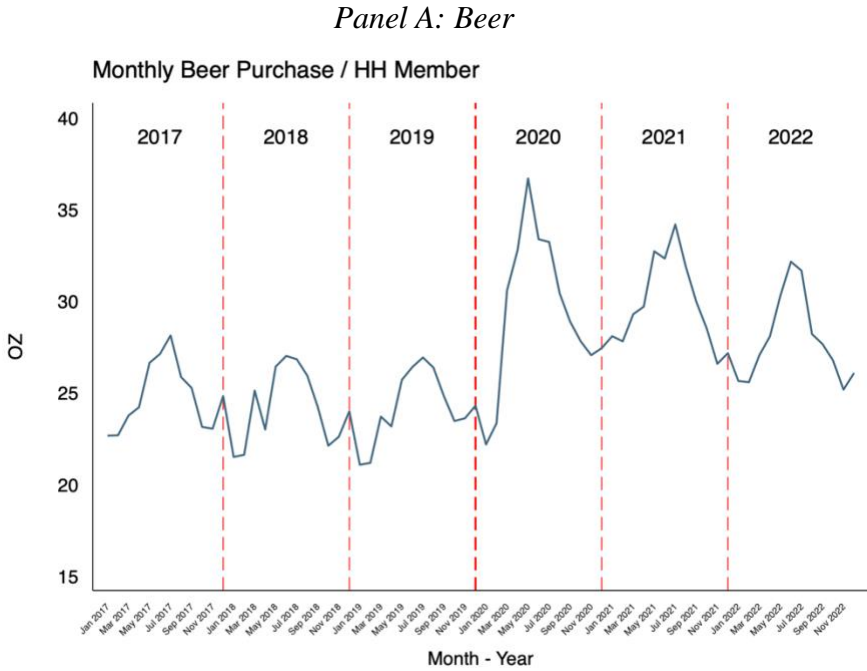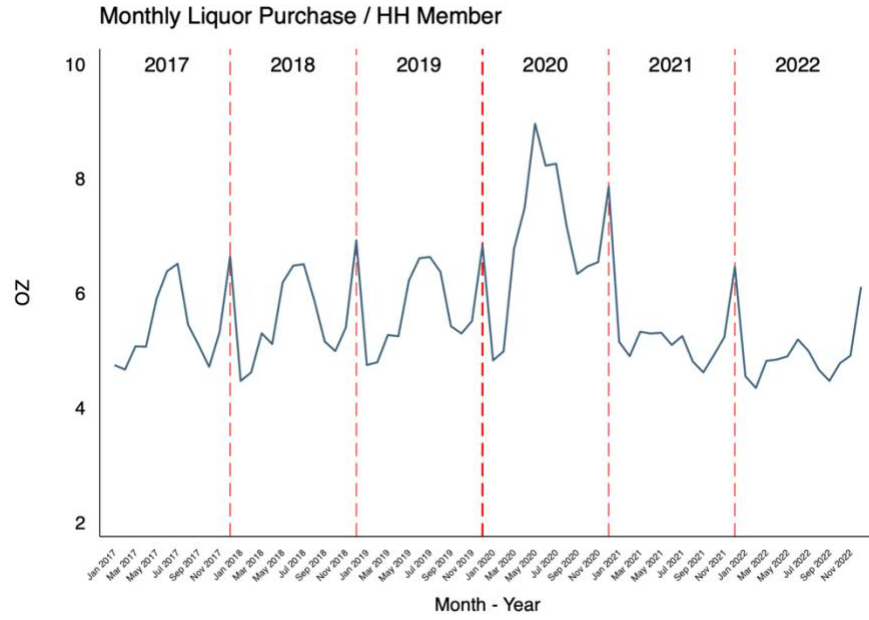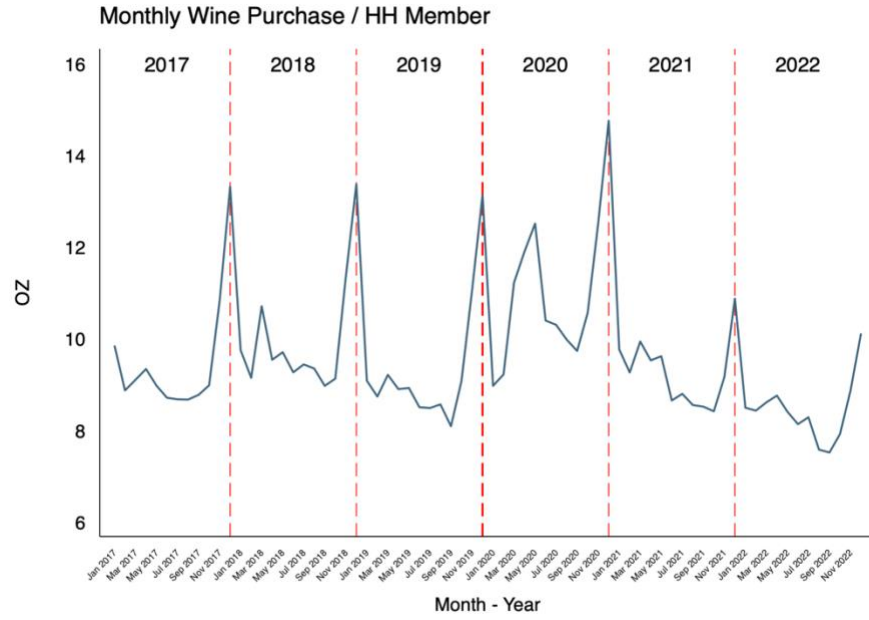
Figure A3: Owner vs. Renter – Trends in Household Monthly Cigarette Purchase

HH Monthly Cigarette Purchase
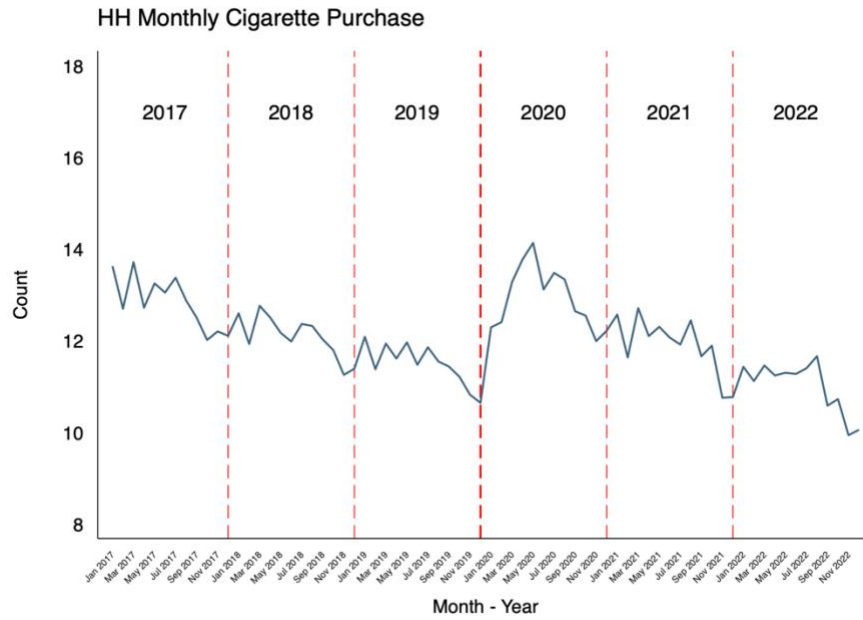
Figure A4: DDD - Change in Out-of-Pocket Monthly Housing Expense per Member for Renters relative to Owners, Pre and Post 2019
(Using Wharton Index)

DDD Renters vs Owners - Monthly Housing Expense / Member

Figure A5: DDD by Sub-Indices - Change in Out-of-Pocket Monthly Housing Expense per Member for Renters relative to Owners, Pre and Post 2019

Panel A

Panel B

Panel C

Panel D

Panel E

Panel F

Panel G

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Supply Restrictions Index

Panel H

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Density Restrictions Index

Panel I

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Open Space Index

Panel J

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Exactions Index

Panel K

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Affordable Housing Index

Panel L

DDD (Renters vs Owners) - Monthly Housing Expense / Member

Approval Delay Index

Figure A6: DD – Renters: Change in Monthly Beer Purchase per Household Member, Pre and Post 2019

Panel A: Extensive Margin   *Panel B: Intensive Margin*

Figure A7: DD - Renters: Change in Monthly Liquor Purchase per Household Member, Pre and Post 2019

Panel A: Extensive Margin   *Panel B: Intensive Margin*

Figure A8: DD – Renters: Change in Monthly Wine Purchase per Household Member, Pre and Post 2019

Panel A: Extensive Margin   *Panel B: Intensive Margin*

Figure A9: DD – Renters: Change in Household Monthly Cigarette Purchases, Pre and Post 2019

Panel A: Extensive Margin   *Panel B: Intensive Margin*

Figure A10: Trend in County-Level Average Price / Pack of Beer (Price Faced for Top 6 Brands)
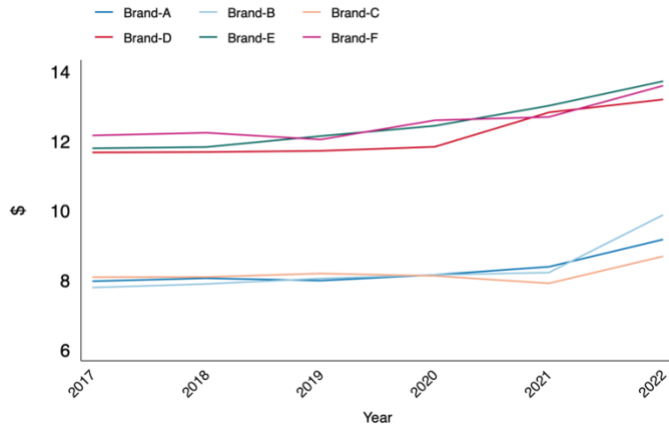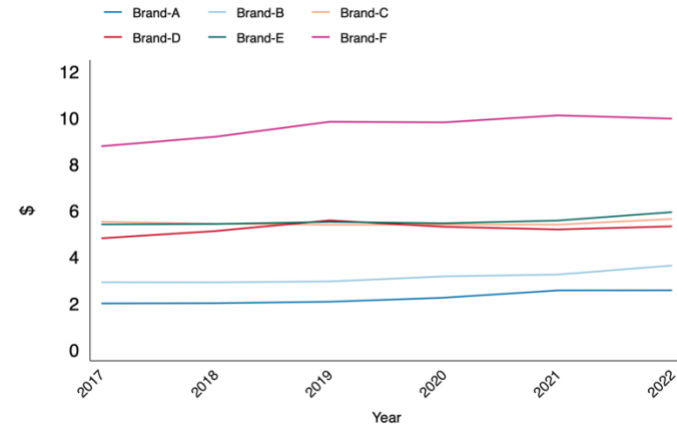
Panel A: Owners   *Panel B: Renters*
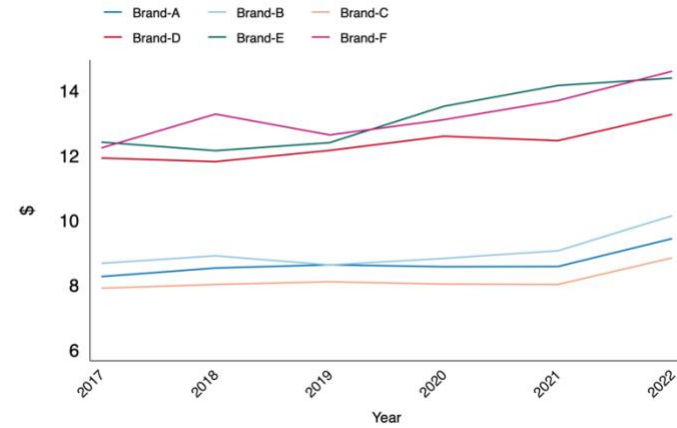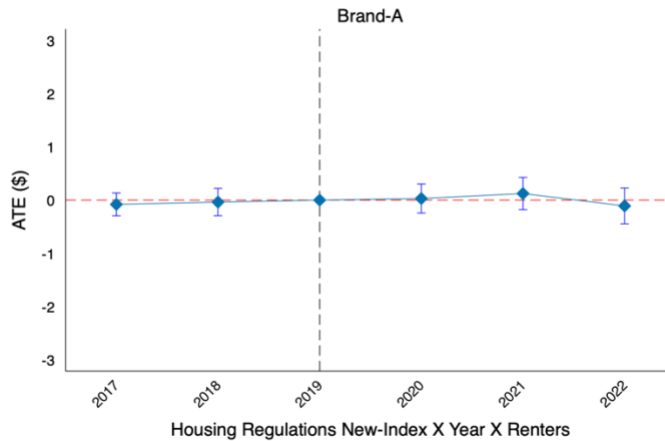

Figure A11: DDD - Change in County-Level Average Price / Pack of Beer for Renters relative to Owners, Pre and Post 2019

Brand A   *Brand B*

Brand C

DDD Renters vs Owners - County Average Price / Pack of Beer

Brand-C

ATE ($) vs Housing Regulations New-Index X Year X Renters

Brand D

DDD Renters vs Owners - County Average Price / Pack of Beer

Brand-D

ATE ($) vs Housing Regulations New-Index X Year X Renters

Brand E

DDD Renters vs Owners - County Average Price / Pack of Beer

Brand-E

ATE ($) vs Housing Regulations New-Index X Year X Renters

Brand F

DDD Renters vs Owners - County Average Price / Pack of Beer

Brand-F

ATE ($) vs Housing Regulations New-Index X Year X Renters

74
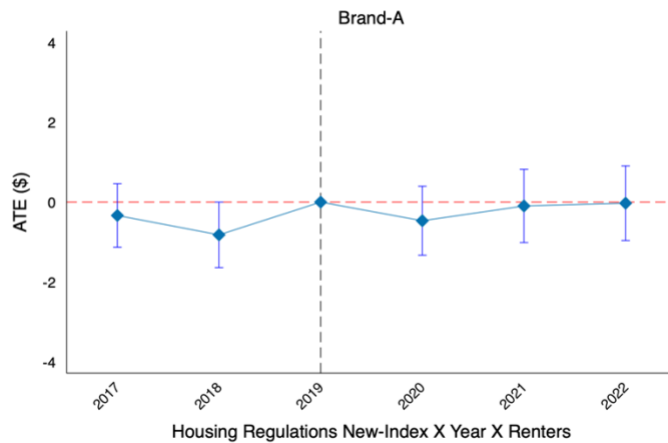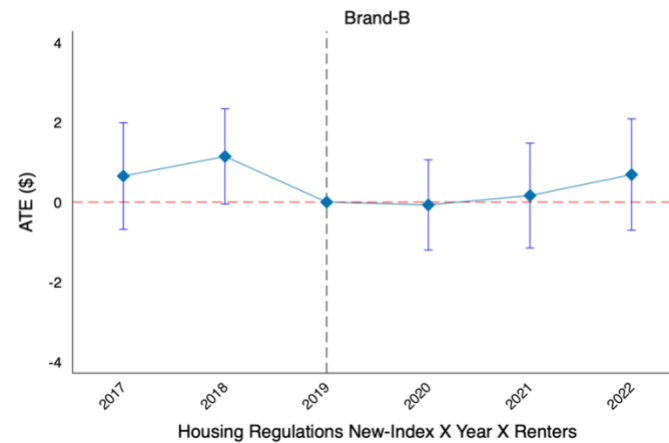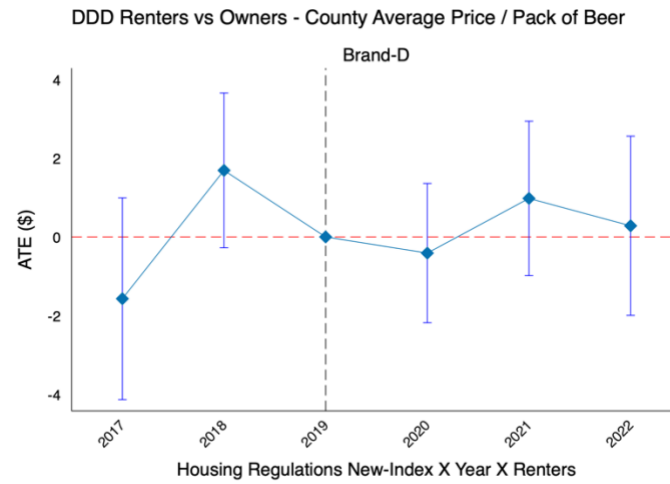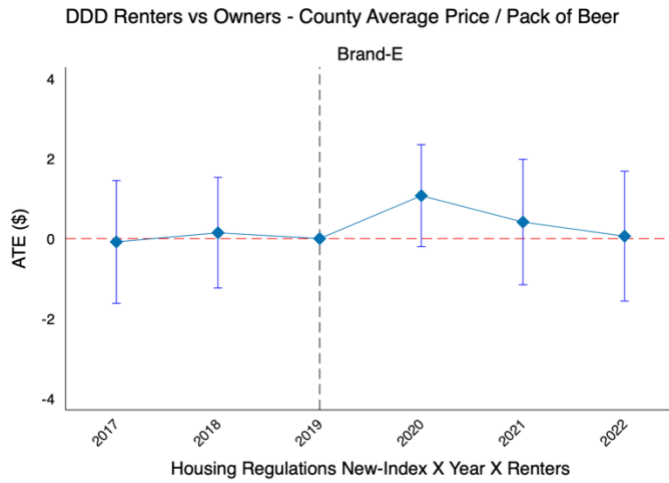
Figure A12: Trend in County-Level Average Price / Bottle of Liquor (Price Faced for Top 6 Brands)
Panel A: Owners   *Panel B: Renters*
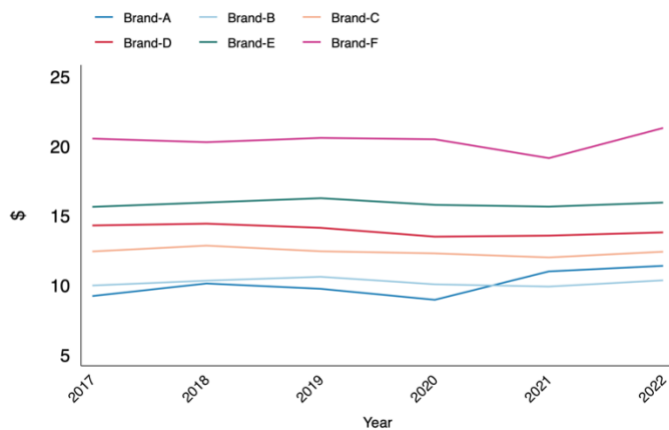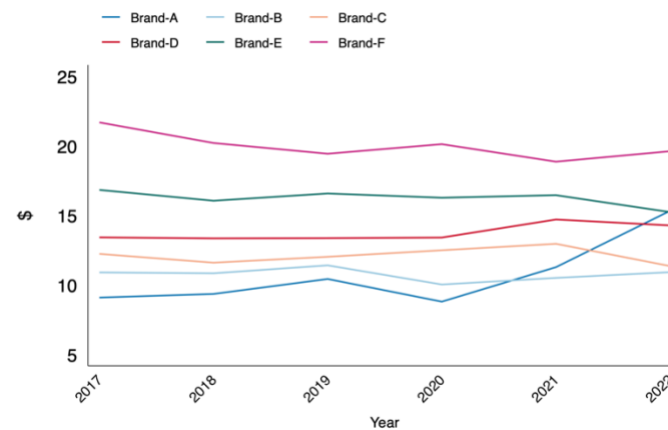
Figure A13: DDD - Change in County-Level Average Price / Bottle of Liquor for Renters relative to Owners, Pre and Post 2019
*Brand A*   *Brand B*

Brand C

DDD Renters vs Owners - County Average Price / Bottle of Liquor

Brand D

DDD Renters vs Owners - County Average Price / Bottle of Liquor

Brand E

**DDD Renters vs Owners - County Average Price / Bottle of Liquor**
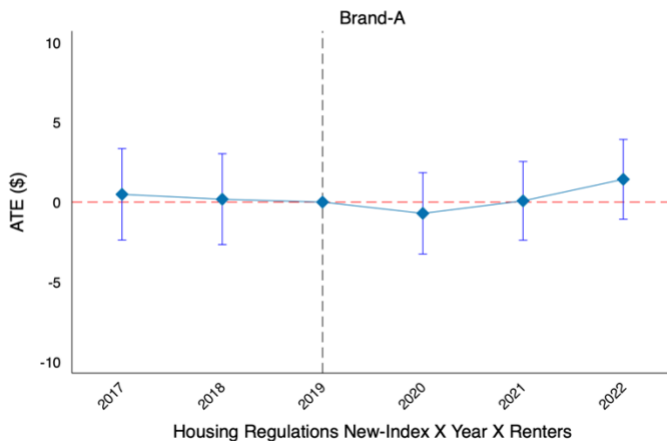
Brand F

**DDD Renters vs Owners - County Average Price / Bottle of Liquor**
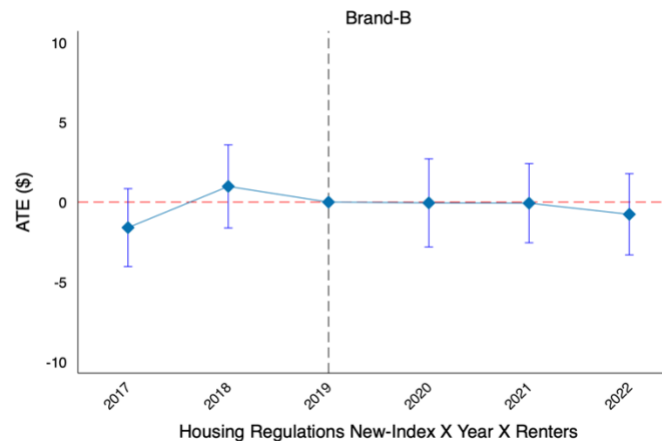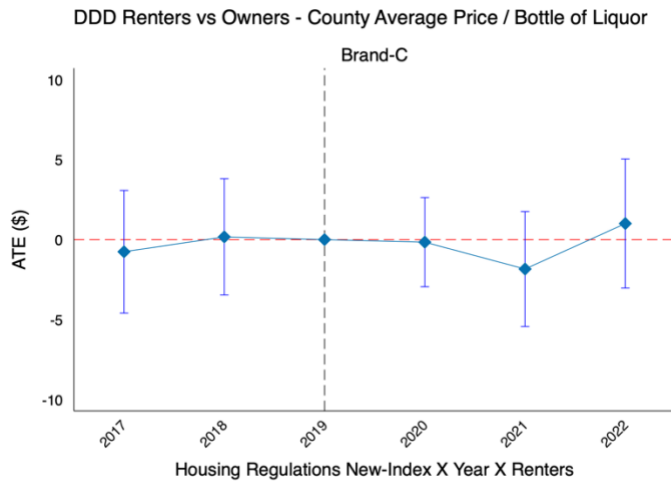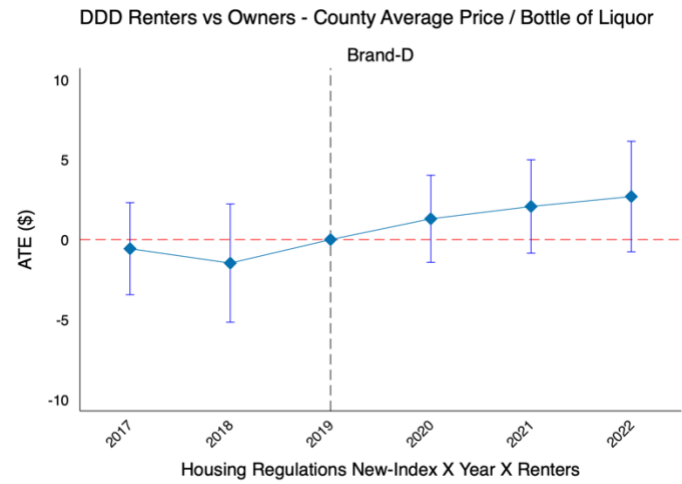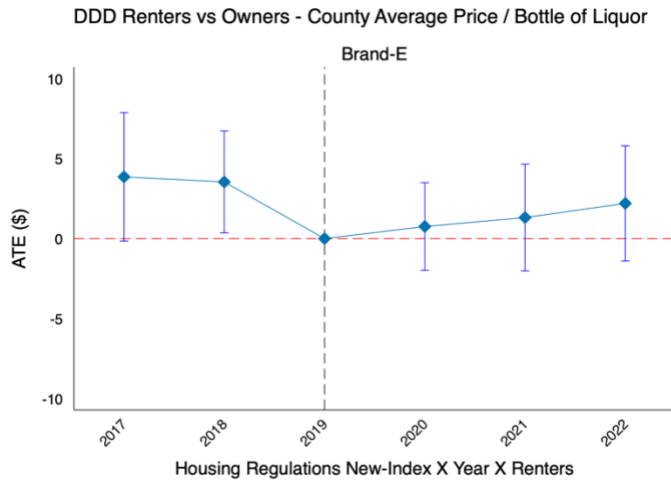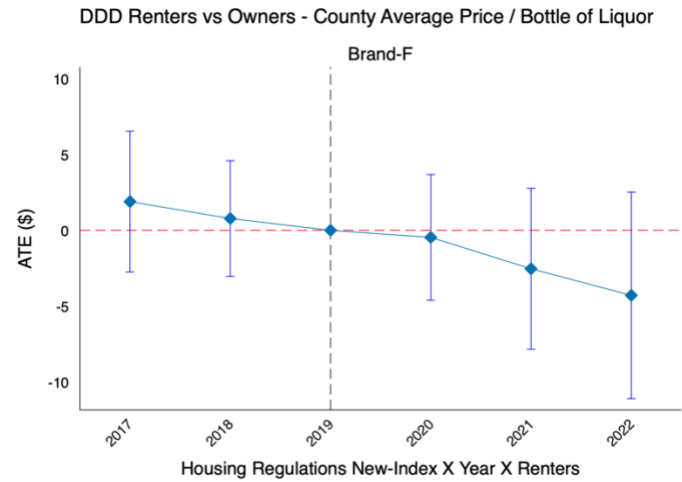
Figure A14: Trend in County-Level Average Price / Bottle of Wine (Price Faced for Top 6 Brands)
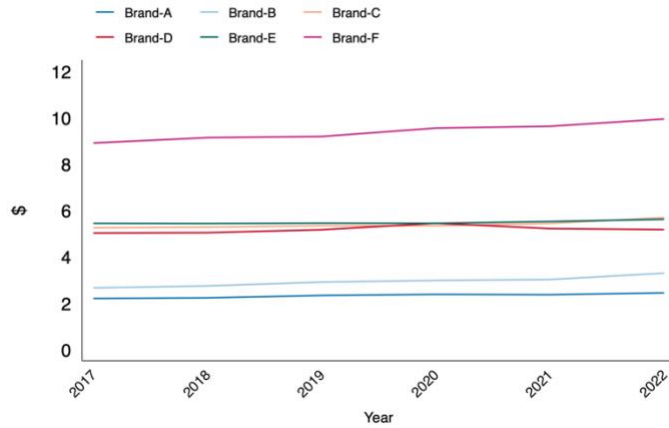
Panel A: Owners   *Panel B: Renters*

Figure A15: DDD - Change in County-Level Average Price / Bottle of Wine for Renters relative to Owners, Pre and Post 2019

Brand A   *Brand B*

Brand C

DDD Renters vs Owners - County Average Price / Bottle of Wine

Brand D

DDD Renters vs Owners - County Average Price / Bottle of Wine

Brand E

DDD Renters vs Owners - County Average Price / Bottle of Wine

Brand F

DDD Renters vs Owners - County Average Price / Bottle of Wine
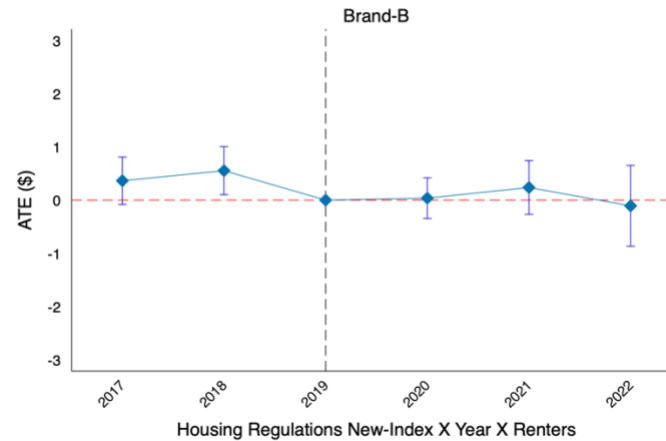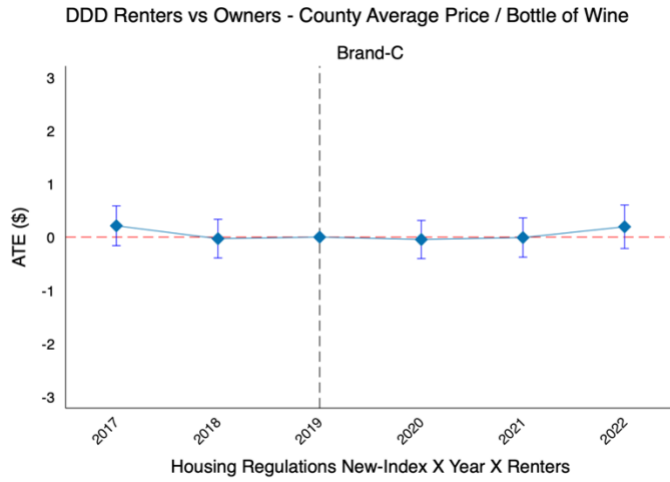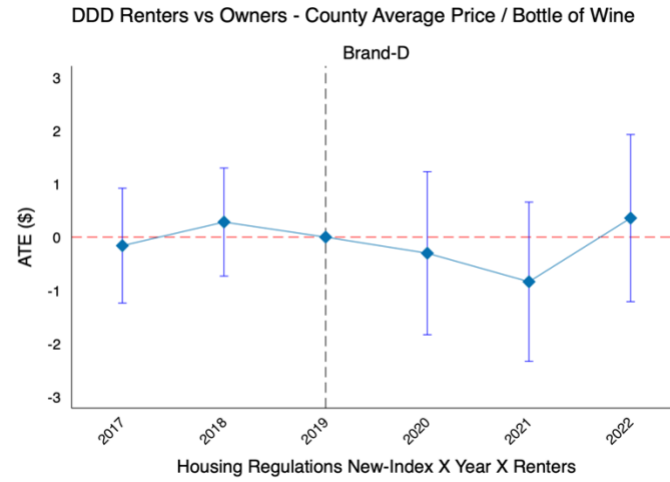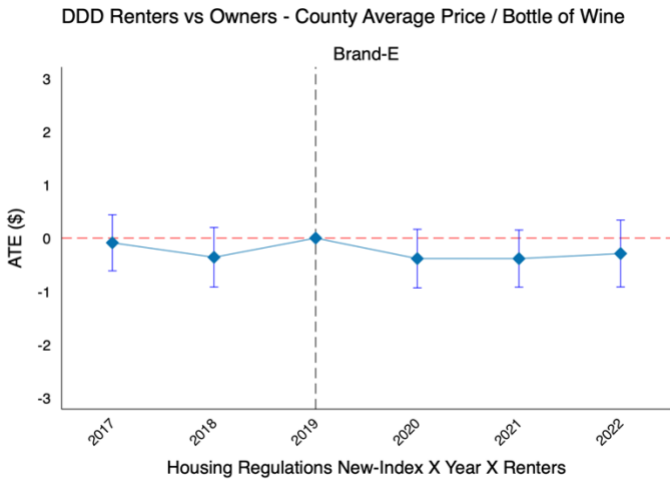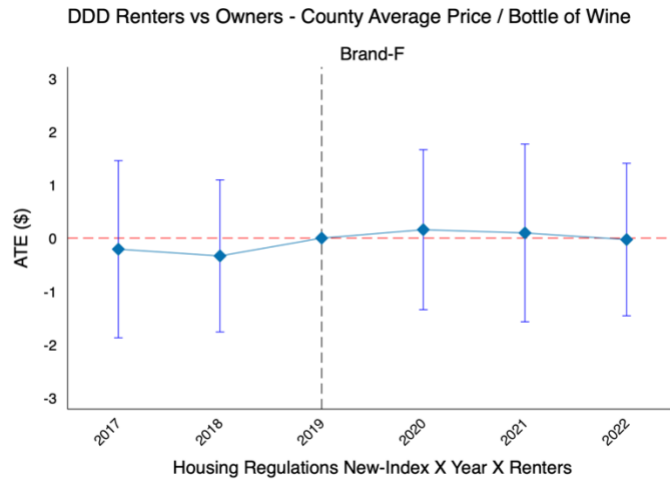
Figure A16: Trend in County-Level Average Price / Pack of Cigarette (Price Faced for Top 6 Brands)

Panel A: Owners *Panel B: Renters*
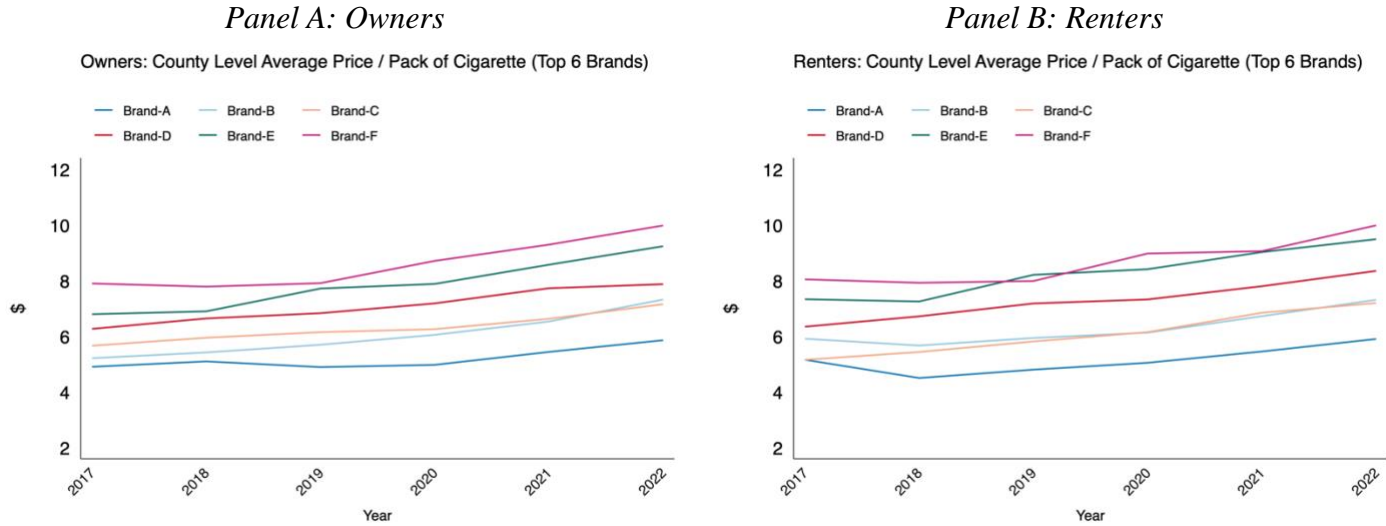
Figure A17: DDD - Change in County-Level Average Price / Pack of Cigarette for Renters relative to Owners, Pre and Post 2019

Brand A *Brand B*

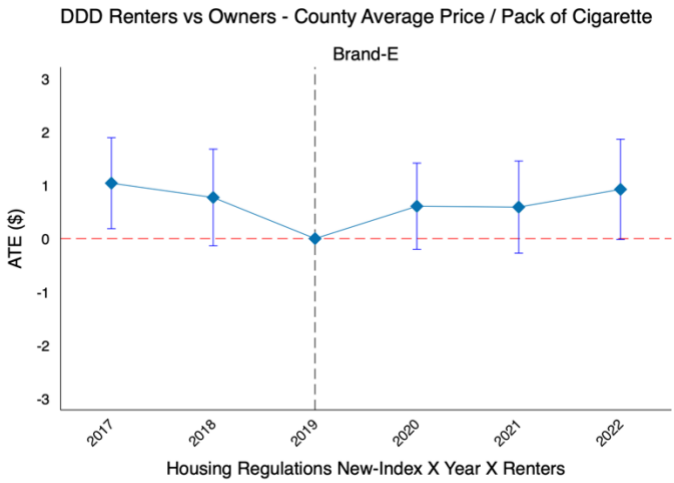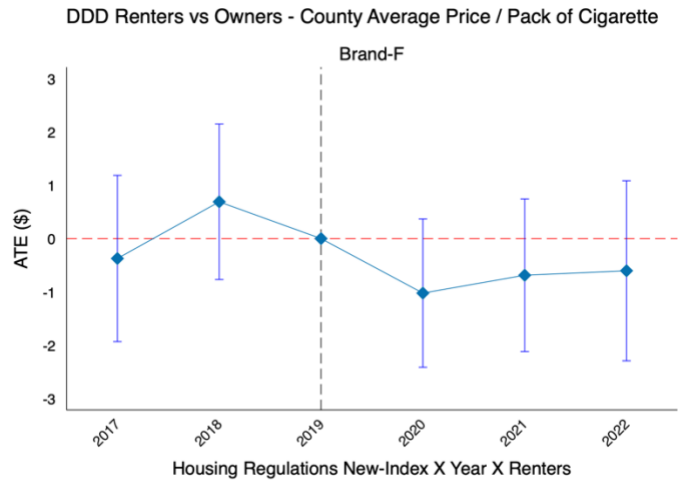## *Brand C*

DDD Renters vs Owners - County Average Price / Pack of Cigarette

Brand D

DDD Renters vs Owners - County Average Price / Pack of Cigarette

Brand E

DDD Renters vs Owners - County Average Price / Pack of Cigarette

Brand F

DDD Renters vs Owners - County Average Price / Pack of Cigarette
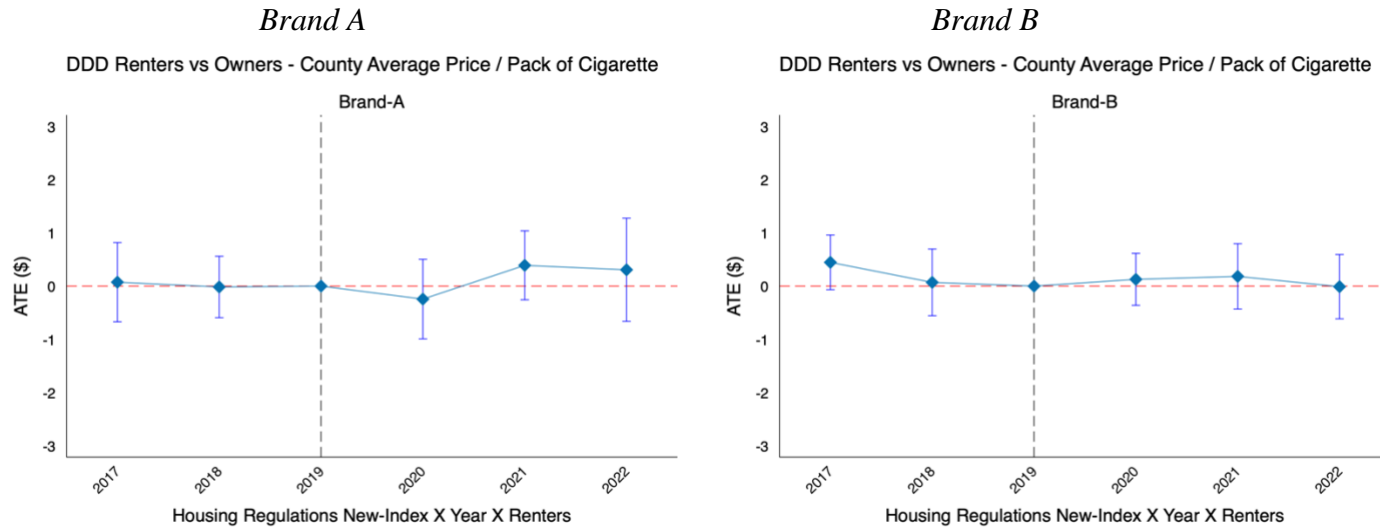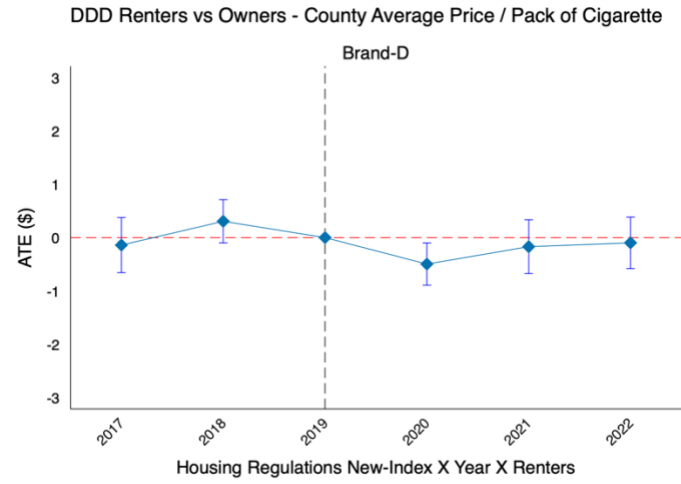
Figure A18: Annual Beer Purchase in the United States

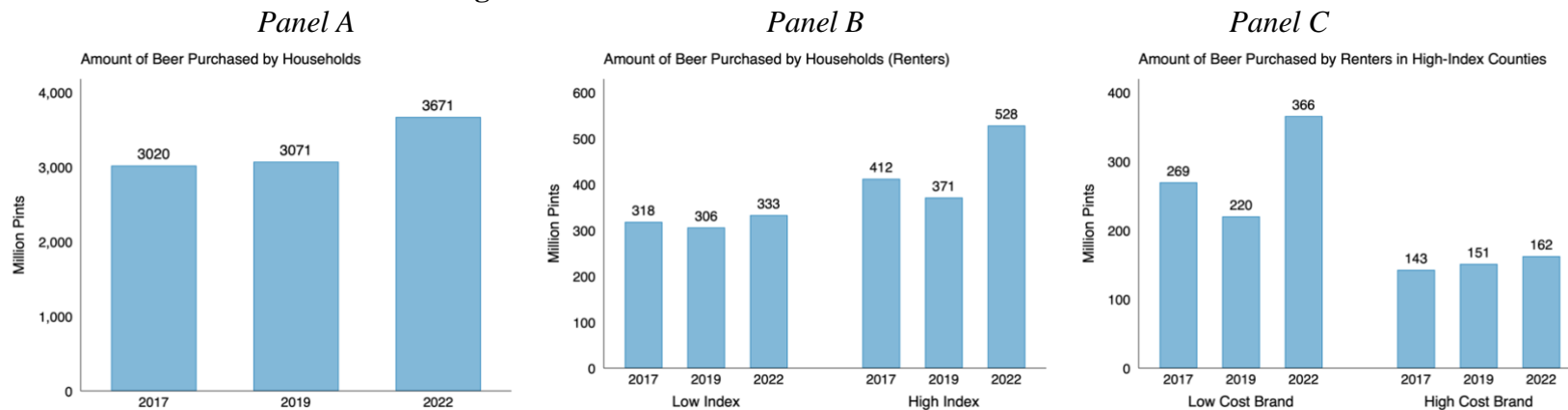| *Panel A* | *Panel B* | *Panel C* |

Figure A19: DDD, By Brand Type - Change in Monthly Beer Purchase per Household Member for Renters relative to Owners, Pre and Post 2019

| *Panel A* | *Panel B* |