

# Second-Home Buying and the Housing Boom and Bust

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## Abstract

I estimate the effects of second-home buying (existing homeowners acquiring additional properties) on the housing boom and bust, by constructing a new measure and using a new identification strategy based on the rise in out-of-town demand for second homes in vacation areas during the housing boom. Areas with plausibly exogenous higher second-home buying experienced a sharper boom and bust: faster growth in house prices and construction employment from 2000 to 2006, and a sharper contraction from 2006 to 2010. The results suggest that changes in credit demand were important in amplifying the recent housing cycle.

*JEL codes:* R12, R21, R31

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# 1 Introduction

The record-high level of second-home buying (homeowners acquiring nonprimary residences) was a central feature of the 2000s housing boom.<sup>1</sup> The share of home purchase mortgages issued for existing homeowners rose from about 20 to 40 percent from 2000 to 2006. The increase in second-home buying could have had important macroeconomic implications, contributing to housing mispricing and overconstruction during the boom and the rise in foreclosures during the recession (Haughwout et al. 2011; Bhutta 2015; Chinco and Mayer 2016). However, causal inference is challenging for at least two reasons: first, homebuyers underreported second-home status during the housing boom; and second, from the identification problem that second-home purchases might reflect other economic conditions, such as changes in credit supply or other fundamentals like income or house prices.

The contribution of this paper is to construct a new measurement of second-home buying and use a new identification strategy to estimate the effects of second-home buying during the housing boom and bust. To measure second-home buying, I use a merged dataset of credit bureau data and mortgage servicing records, allowing for a measure of second-home buying relying on individuals' credit histories rather than on self-reported status. For identification, I exploit the rise in out-of-town demand for second homes in vacation areas. Vacation areas are an ideal laboratory, as they otherwise appear to be ordinary in terms of boom-bust indicators, having average credit scores, increases in household debt, use of alternative and privately securitized mortgages, pretrends in house price and labor income, and second-home buying by locals. Therefore, the rise in out-of-town demand in vacation areas largely reflected nonlocal factors, such as rising wealth and income in the home location of the out-of-town buyers.

The main finding of the paper is that areas with plausibly exogenous increases in second-home buying experienced a sharper boom and bust: faster growth in house prices and construction employment from 2000 to 2006, and a sharper contraction in residential activ-

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<sup>1</sup>A note on nomenclature: existing homeowners acquiring new properties are often called property investors in the literature, as in Haughwout et al. 2011; Bhutta 2015; Albanesi et al. 2017 and others. However, many second-home purchases may also serve a consumption motive – about 70 percent of second-home purchases during the housing boom were for a second property (rather than third or higher). Therefore, I use the term second-home buying and when possible try to distinguish between different types of second-home buying.

ity from 2006 to 2010. The results support the view that changes in credit demand were an important contributor to the housing boom and bust – in line with other recent work emphasizing that changes in housing demand also mattered, not just supply (Foote et al. 2016; Piazzesi and Schneider 2016; Kaplan et al. 2017) – because vacation areas did not experience an appreciable credit supply shock. In particular, new mortgages in vacation areas during the housing boom were average in their use of private-label securitization and alternative mortgages. Moreover, the paper contributes to the literature showing the housing boom and bust was more than a subprime phenomenon (Ferreira and Gyourko 2015; Adelino et al. 2016; Albanesi et al. 2017), implying that monitoring of other indicators such as second-home buying is likely important macroprudentially.

To measure second-home buying, I use the Credit Risk Insight Servicing McDash (CRISM) dataset, which merges credit bureau data (Equifax) with mortgage servicing records (Black Knight McDash). Second-home buyers are identified as those having 2 or more first lien mortgages, same as in Haughwout et al. (2011); Bhutta (2015); Albanesi (2018) and others also using credit bureau data. A key advantage of CRISM is it contains property address data, whereas credit bureau data alone does not for nonprimary residences. Using the measurement of second-home buying from CRISM, I find that second-home buying is strongly correlated with various outcomes during the housing boom and bust. For example, county-level second-home purchase shares during the boom years explain over 50 percent of the variation in house price changes from 2000 to 2006. The strong association suggests that second-home buying might have contributed to appreciation during the boom. However, the association could instead be driven by reverse causality or other factors.

The identification problem is that some second-home purchases likely reflect local factors, such as changes in local credit supply or expectations about house price changes. Indeed, areas with high second-home buying, such as Miami, Las Vegas, and Phoenix, also tended to have high use of alternative (such as balloon) mortgages, private-label securitization (PLS), and stronger increases in household leverage. Moreover, the rise in second-home buying appears partially driven by rising fundamentals in the late 1990s – residents of areas where house prices and labor income grew more in the late 1990s were more likely to buy second homes during the mid 2000s than residents elsewhere. To isolate the effects of the rise in

second-home buying from other local shocks, I use as an instrument the vacation share of housing from the 2000 census (the share of housing stock vacant for seasonal, recreational, or occasional use).

Vacation localities are an ideal laboratory for studying the effects of second-home buying, because the stronger rise in second-home buying there during the housing boom largely reflected nonlocal factors, for the following reasons. First, the stronger rise in vacation areas was fully accounted for by out-of-town buyers. Second, vacation areas were otherwise ordinary in terms of other boom-bust indicators, having average credit scores, use of alternative and PLS mortgages, increases in household debt, housing supply elasticities, and other indicators. Third, pretrends in house prices and labor income were essentially the same as in elsewhere. Therefore, while rising house prices and income prior to the boom in other areas might explain why second-home buying increased during the boom, those changes did not originate from vacation areas.<sup>2</sup> In sum, the rise in second-home buying in vacation areas seems to have largely reflected nonlocal factors which were plausibly exogenous to local shocks originating from vacation areas.

The vacation share of housing is predictive of second-home buying both within and outside of the “sand states” (CA, AZ, NV, FL). In fact, the association is stronger when excluding the sand states. The reason is sand state cities well known to have had a severe housing boom and bust, such as Miami, Las Vegas, and Phoenix, had high second-home buying, but low vacation shares of housing (reflecting that most housing in those cities is occupied rather than vacant). The comparison is worth dwelling on: those sand state cities had not only high second-home buying, but also high use of PLS and alternative mortgages, increases in household debt, and other bubbly indicators, making it difficult to isolate the effects of second-home buying from those localities alone. Hence, the appeal of using the vacation share of housing as an instrument: unlike the sand state cities, vacation areas were average in terms of the main boom indicators except for having high second-home buying. Though vacation areas are interesting in their own right, the opportunity is we can learn from their experience about the effects of second-home buying elsewhere, where identification is

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<sup>2</sup>I also show that house prices in vacation areas are not generally cyclical, at least not during any of the expansions or recessions from 1975-2000 (the period prior to the housing boom in which local price data is available).

more challenging.

Second-home buying in vacation localities was broadly representative of buying across the country. The vacation share of housing strongly predicts variation in second-home buying of borrowers acquiring their second or third property, the majority of the market, accounting for about 70 percent and 15 percent of all second-home buying during the boom, respectively. But the vacation share of housing is also predictive of second-home buying by borrowers with 4 or more houses, a segment of the market more likely to consist of property investors. Therefore, I interpret the main findings of the paper as informative of second-home buying overall.

The main results are as follows, conditional on various demographic, financial, and industry characteristics as well as pretrends and region fixed effects.<sup>3</sup> Areas with plausibly exogenous higher second-home buying (instrumented with the vacation share of housing) experienced a sharper boom and bust. Those areas had faster growth in house prices and construction employment from 2000 to 2006. However, over the next years, activity in those areas contracted more sharply: house prices and construction employment declined more while delinquency rates increased more from 2006 to 2010. The rise and decline in activity are roughly offsetting; when looking at changes in construction employment and house prices from 2000 to 2010 (or 2000 to 2014), the estimated effects are close to zero and not significant. These results are consistent with other findings in the literature arguing that second-home buying amplified the boom and bust (Chinco and Mayer 2016; DeFusco et al. 2017; Mian and Sufi 2018; Albanesi 2018).

The effects of second-home buying appear to have been concentrated in the residential sector. In broader employment categories, the estimated effects of second-home buying are smaller and not significant. The 2SLS estimates contrast with their OLS counterparts, which tend to be 2-4 times larger across specifications, suggesting the OLS coefficient estimates are biased upwards because of other factors such as reverse causality or omitted variable bias.

To gain a sense of the overall effect of second-home buying on residential activity, I combine the 2SLS estimates with the counterfactual assumptions that the share of second-home

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<sup>3</sup>Results are robust to including state fixed effects, using unweighted regressions, controlling for the supply elasticity of Saiz (2010), and other checks.

buying remained at its 2000 level instead of rising. In the baseline scenario, I find that second-home buying could explain about 30 and 10 percent of the run-up in construction employment and house prices, respectively, from 2000 to 2006. However, this estimate is subject to uncertainty about coefficient estimates and assumptions about general equilibrium effects and external validity. Reflecting uncertainty in the model estimates, I find that second-home might explained between 13 to 47 percent of the runup in construction employment, and between 3 and 19 percent of the increase in house prices over from 2000 to 2006.<sup>4</sup>

The results suggest that changes in credit demand played a role in amplifying the housing boom and bust, as rising fundamentals in the late 1990s expansion appear to have contributed to the increase in second-home buying in the mid 2000s, and a large majority of second-home purchases were mortgage-financed during the boom.<sup>5</sup> Moreover, vacation localities did not have an appreciable credit supply shock, having instead average credit scores, alternative mortgages and PLS use, and changes in mortgage debt by locals. Do the results imply that credit supply did not matter overall in generating the housing boom? No, the results are compatible with credit supply having been important elsewhere and in the aggregate, as argued in other work such as Mian and Sufi (2009); Demyanyk and Hemert (2011); Garcia (2018). It seems likely that changes in both credit supply and credit demand, bolstered by expectations of future house price growth, were important in generating the boom and bust, with a more recent strand in the literature emphasizing the role played by credit demand, such as Foote et al. (2016); Kaplan et al. (2017).

This paper adds to the growing literature showing that second-home buyers were an important driver of the boom and bust. Bhutta (2015) documents that second-home buyers contributed significantly (more than first-time homeowners) to the rise in aggregate mortgage debt during the housing boom. Second-home buyers had higher than average default rates during the recession (Haughwout et al. 2011) though they were typically higher income and prime prior to it (Albanesi et al. 2017; Albanesi 2018). Bayer et al. (2011) finds that

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<sup>4</sup>These estimates are derived from the 90 percent confidence intervals of the baseline models.

<sup>5</sup>Using deeds records, Mills et al. (2019) find that about 70 percent of individual ‘property investors’ used mortgages in 2005, with the share falling to 40 percent in 2014. Investors in Mills et al. (2019) are defined as individuals with 3 or more properties.

many second-home buyers appeared uninformed and experienced large losses. Quantitative work, such as Piazzesi and Schneider (2009); Burnside et al. (2016); DeFusco et al. (2017); Nieuwerburgh and Favilukis (2017), highlights how second-home buyers can influence other buyers and drive boom-bust episodes. Chincio and Mayer (2016) find that second-home buying led to higher house prices (and mispricing) in a panel of 21 U.S. cities using a high frequency panel VAR identification approach. Gao et al. (2018) also find that second-home buying contributed to the boom-bust in activity, though they use data from the Home Mortgage Disclosure Act, which is known to underreport second-home buying (Elul and Tilson (2015)). Overall, the results in this paper are complementary to this literature; the main contribution is using new data combining the strength of datasets previously used in isolation (credit bureau data and mortgage servicing records), a novel identification strategy, and results that include a broad set of outcome variables including employment.

More broadly, this paper fits in the extensive body of work studying the determinants of the housing boom. The housing boom had many often interrelated causes involving households up and down the income and credit score distributions (Adelino et al. 2016; Foote et al. 2016; Albanesi et al. 2017; Ferreira and Gyourko 2015). One of the main contributions of this paper is isolating the effect of second-home buying on changes in construction employment and house prices during the 2000s. I do so by showing that the vacation share of housing is uncorrelated with major determinants of the housing boom identified in the literature, including: the interaction of changes in housing demand with supply constraints (Saiz 2010; Aladangady 2017); the use of alternative mortgages such as interest-only or balloon mortgages (Barlevy and Fisher 2012; Foote et al. 2008); the expansion in subprime credit (Mian and Sufi 2009; Demyanyk and Hemert 2011; Gerardi et al. 2008); and the boom-bust in private-label securitization (Keys et al. 2010; Nadauld and Sherlund 2009; Mian and Sufi 2018).

## 2 Data

The main dataset used in the paper, the Credit Risk Insight Servicing McDash (CRISM), is a loan-level merge of Black Knight McDash (formerly known as LPS) with the Equifax credit

bureau records. CRISM combines the strengths of these two datasets: from McDash, the property address (for example, county) of each mortgaged property is obtained, and from Equifax, an accurate measure of second-home status based on individuals' credit histories. The datasets and the merge are explained below.

The McDash dataset contains loan-level information collected from the largest residential mortgage servicers in the United States. The data provide extensive information about mortgage loans, including property address, loan amount, borrower characteristics, interest rate type, securitization, and loan performance. On average, McDash covers about 60 percent of the mortgage market, measured as the fraction of mortgage originations in McDash relative to those reported under the Home Mortgage Disclosure Act (HMDA).<sup>6</sup> The McDash data are detailed, but they do not contain a measure of second-home status based on individuals' credit histories.<sup>7</sup>

To construct CRISM, Equifax uses a proprietary and confidential matching process to match each loan in the McDash dataset to the Equifax credit bureau records. The match is based on various loan characteristics such as origination date, current mortgage balance, and payment history. Because each unique McDash loan is assigned to one and only one primary borrower in CRISM, coverage in CRISM is roughly the same as in McDash, about 60 percent of the mortgage market.<sup>8</sup> While Equifax allows for second-home identifiers based on individuals' credit histories (discussed below), Equifax does not contain property address information for nonprimary residences, only collecting borrowers' primary residence address (mailing address). Therefore, the match with McDash is key: CRISM contains property address data from McDash and second-home identifiers from Equifax.

To identify second-home buyers in the Equifax portion of the data, I follow the approach of Haughwout et al. (2011), Bhutta (2015), and others working with a subset of the Equifax data – the FRBNY Consumer Credit Panel/Equifax (FRBNY CCP/Equifax). The FRBNY CCP/Equifax contains credit reporting data for a nationally representative 5 percent sample

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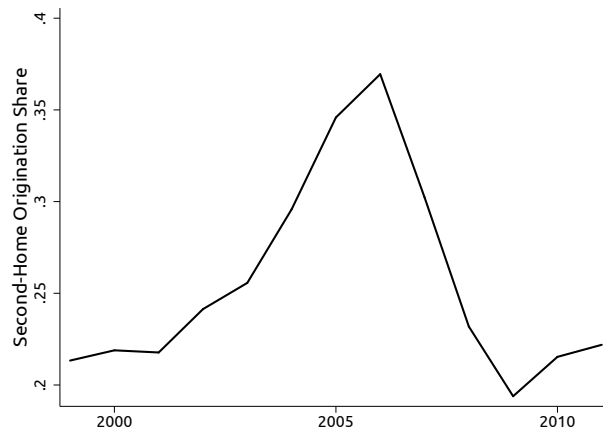
<sup>6</sup>For more information on the McDash-HMDA match see Rosen (2011).

<sup>7</sup>McDash does contain a self-reported identifier for nonprimary residences, but Haughwout et al. (2011) and Elul and Tilson (2015) find that these data underreport second-home buying (primary residences mortgages typically require lower down payments and have lower interest rates).

<sup>8</sup>Equifax assigns each match a “confidence score” ranging from 0 to 0.9. In line with their recommendations, I limit the sample to loans with a confidence score greater than 0.8, accounting for about 90 percent of all loans in the data.



**Figure 1:** The Aggregate Second-Home Origination Share (FRBNY CCP/Equifax)

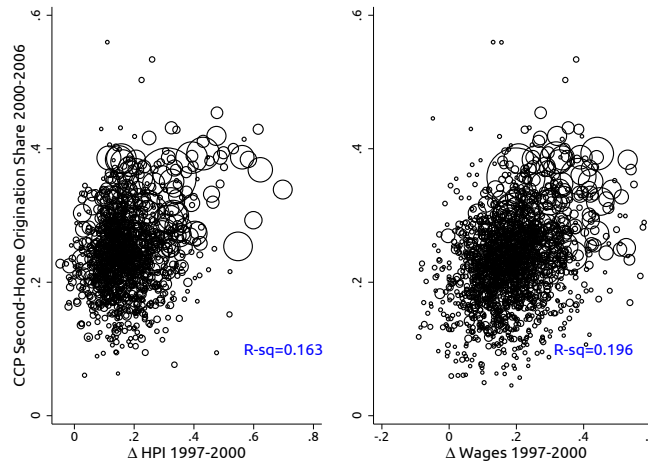


Note: The figure plots the aggregate second-home origination (new loans for nonprimary residences) share by year. Source: FRBNY Consumer Credit Panel/Equifax and author's calculations.

of all adults with a social security number and credit report beginning in 1999. The data contain information on the number of first-lien mortgages per borrower. Second-home purchase originations are defined as new purchase loans for borrowers with 2 or more properties. For each origination, I use the borrower's number of first mortgage accounts four quarters ahead of the origination, to avoid counting false positives, for example, a refinancing or change in residency that temporarily shows the borrower as having two properties because of reporting lags. Figure 1 shows the FRBNY CCP/Equifax aggregate second-home origination share, which rose from 21 percent in 2000 to its peak of 37 percent in 2006, subsequently falling back to near 20 percent over 2009-2011 – similar patterns as those in Haughwout et al. (2011).

What drove the increase in second-home buying? Though a full answer is beyond the scope of this paper, rising fundamentals during the late 1990s expansion, such as rising income and wealth, likely contributed to the increase in second-home buying. Figure 2 plots county-level second-home origination shares from the FRBNY CCP/Equifax over 2000-2006 against percent changes in house prices and labor income from 1997 to 2000. Second-home origination shares are defined as the ratio of second-home home purchase originations (existing homeowners acquiring new properties) to total purchase originations. The FRBNY CCP/Equifax measure is based on borrower location irrespective of property location. Figure

**Figure 2:** FRBNY CCP/Equifax Second-Home Origination Shares 2000-2006 vs  $\Delta$  HPI, Wages 1997-2000



Note: The figure plots CCP county second-home origination shares 2000-2006 (y-axis) against percent changes in house prices (x-axis, left panel) and the wage bill (x-axis, right panel) from 1997-2000. CCP shares are measured at borrower location. Source: FRBNY Consumer Credit Panel/Equifax, CoreLogic HPI, Quarterly Census of Employment and Wages, and author’s calculations.

2 show that residents of areas where house prices and labor income grew more prior to the housing boom had higher second-home shares during the boom years than elsewhere. Though not causal, these associations are consistent with the view that improving fundamentals contributed to higher demand for second homes during the boom years.

## 2.1 CRISM

Using CRISM, I measure county-level second-home origination shares as the ratio of second-home originations to total originations. Note this measurement is based on property address, rather than borrower address as in the FRBNY Consumer Credit Panel/Equifax measure. In line with others working with credit bureau data (Haughwout et al. 2011; Bhutta 2015; Albanesi 2018) a second-home origination is identified as an origination for which the borrower has two or more properties one year after the mortgage was closed.<sup>9</sup> Figure 3 plots the aggregate second-home origination in CRISM, the FRBNY Consumer Credit Panel/Equifax, and

<sup>9</sup>For originations before 2005, second-home origination status is derived based on the borrower’s number of first-lien mortgages in 2005, when the Equifax portion of CRISM is first available.

HMDA. The series show a similar pattern with second-home shares rising from 2000 to 2006 and falling from 2006 to 2010 in each case. However, the CRISM and FRBNY Consumer Credit Panel/Equifax shares are in much closer alignment. The HMDA share is significantly lower and its contour is flatter, likely because of underreporting of second-home buying in HMDA (Elul and Tilson 2015 and Haughwout et al. 2011).<sup>10</sup>

Across counties, the CRISM second-home origination share explains significant variation in house price appreciation during the boom years. Figure 4 plots the county-level percent change in the CoreLogic house price index against the CRISM second-home origination shares, both measured over 2000-2006. There is a strong positive association: areas with higher second-home origination shares experienced stronger growth in house prices from 2000 to 2006. The second-home origination share explains almost 55 percent of the variation in house price changes. By comparison, the R-squared is only 0.06 when using the HMDA second-home shares (available upon request), suggesting underreporting in HMDA was more pronounced in areas with faster appreciation (Elul and Tilson 2015).<sup>11</sup>

The strong association between house price appreciation and second-home shares suggests variation in second-home buying might have driven some of the variation in house price appreciation. However, the association is not causal and might also reflect other factors, such as expectations about house prices or variation in credit supply. Indeed, that is likely the case.

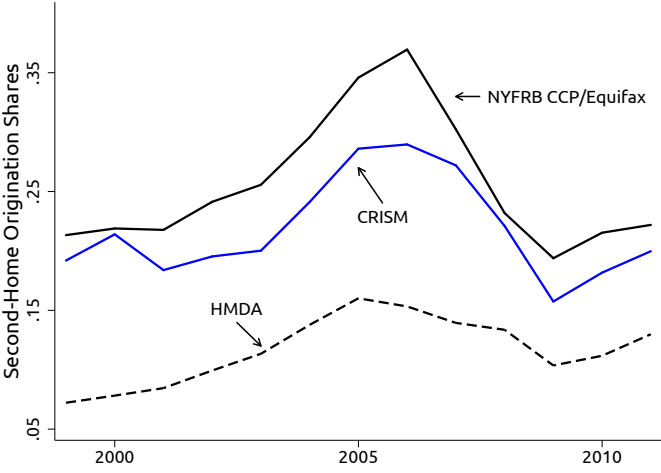
Second-home origination shares are strongly correlated with various other housing boom indicators, such as changes in household debt, use of alternative and private-label securitization (PLS), and supply constraints. The increase in household debt (Mian and Sufi 2009; Giroud and Mueller 2015), use of alternative (not fixed rate) mortgages (Barlevy and Fisher 2012; Foote et al. 2008), private-label securitization (Keys et al. 2010; Mian and Sufi 2018), and inelastic housing supply (Saiz 2010; Mian et al. 2013) are among the main explanations for the severity of the housing boom identified in the literature. Figure 5 plots each of these boom indicators on the y-axis – the share of alternative mortgages (top left panel),

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<sup>10</sup>The FRBNY Consumer Credit Panel/Equifax and CRISM shares need not be the same, as they are based on different samples. For instance, the CRISM sample of mortgage borrowers is somewhat younger and younger individuals are less likely to own more than one house.

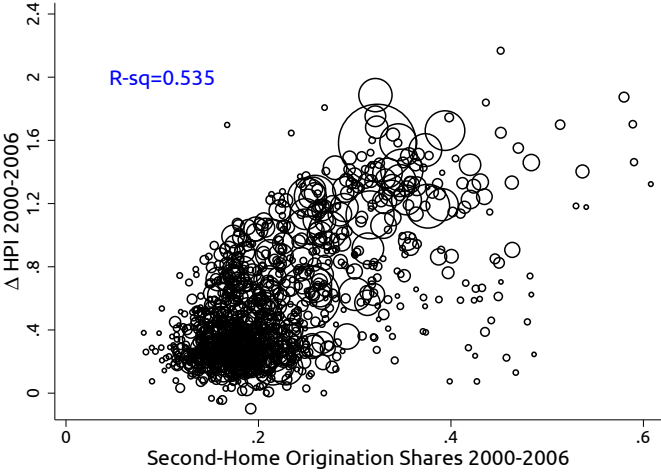
<sup>11</sup>An analogous comparison between CRISM and the FRBNY Consumer Credit Panel/Equifax cannot be made, since the latter is based on borrower rather than property location.

**Figure 3:** Second-Home Shares in CRISM, FRBNY Consumer Credit Panel/Equifax, and HMDA



Note: The figure plots aggregate second-home shares. Source: FRBNY Consumer Credit Panel/Equifax, CRISM, HMDA, and author’s calculations.

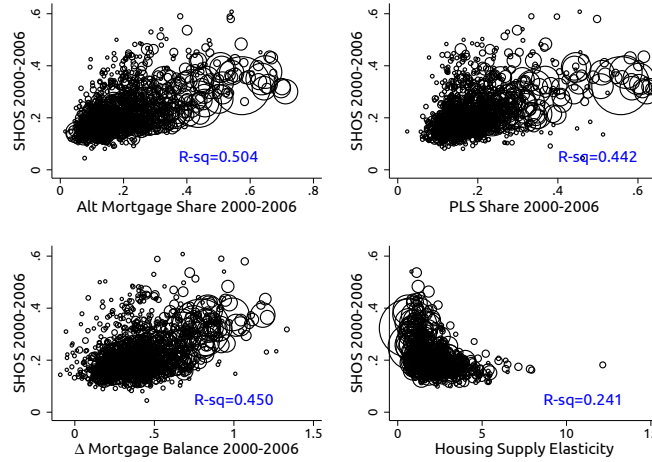
**Figure 4:**  $\Delta$  HPI and Second Home Origination Shares 2000-2006



Note: The figure plots county-level changes in house prices (y-axis) against second-home origination shares (x-axis) over 2000-2006. Observations are weighted by housing units in 2000 census. Source: CoreLogic HPI, CRISM, and author’s calculations.

the percent change in median first-lien mortgage debt (bottom left panel), the share of PLS (top right panel), and the housing supply elasticity of Saiz (2010) (bottom right panel) – against second-home origination shares on the x-axis. Data on household debt come from the FRBNY Consumer Credit Panel / Equifax, while the alternative mortgage and PLS shares

**Figure 5:** Second-Home Origination Shares vs Other Boom Indicators



Note: The figure plots county-level second-home origination shares (y-axis) against different boom indicators: the share of alternative mortgages (top left panel), the share of privately-securitized mortgages (top right panel), the percent change in median first-lien mortgage debt balances (bottom left panel), and the housing supply elasticity of Saiz (2010) (bottom right panel). Observations are weighted by housing units in the 2000 census. Source: CRISM, McDash, FRBNY Consumer Credit Panel/Equifax, and author's calculations.

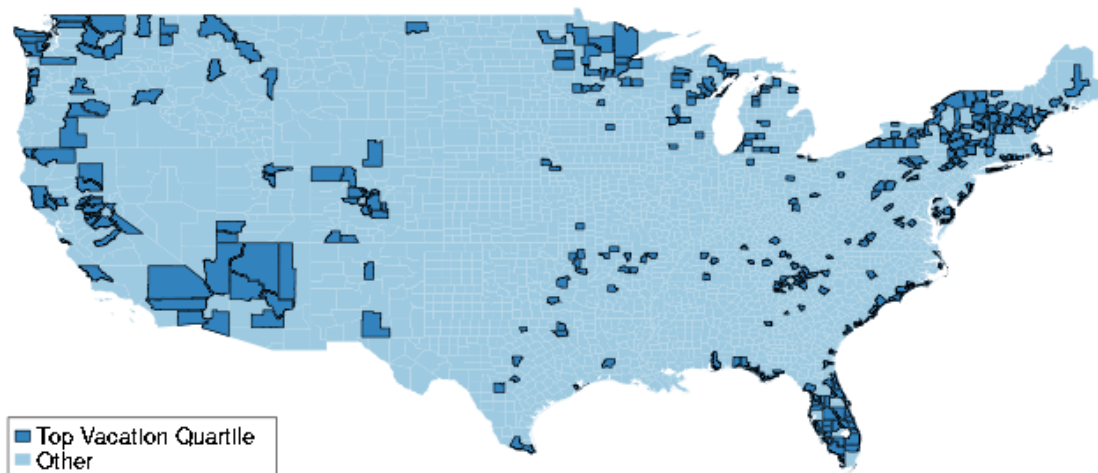
come from McDash.<sup>12</sup> Figure 5 shows a strong association between second-home shares and each boom indicator. For example, variation in second-home shares explain about 50 percent of the variation in alternative mortgage shares.

These associations nicely illustrate the identification problem: some second-home purchases might merely reflect other local factors. For example, places with higher use of alternative (such as balloon) mortgages tended to have more second-home buying. Similarly, places with stronger increases in mortgage debt also tended to have stronger second-home buying. Therefore, naively regressing an outcome variable (such as changes in house prices) on second-home origination shares is likely to lead to biased coefficient estimates, from the correlation between the second-home shares and other local factors driving the housing boom. To isolate the effects of second-home buying, I use an instrument that is predictive of second-home buying while uncorrelated with the aforementioned boom indicators.

<sup>12</sup>McDash identifies for each purchase loan both the interest type at origination, as well as the investor type (the institution type owning the mortgage in the secondary market). Alternative mortgages are those without a fixed principal or interest rate, and privately securitized mortgages as those owned by private securitizers in December 2006.

### 3 Vacation Areas and Second-Home Buying

Figure 6: The Geography of Vacation Areas



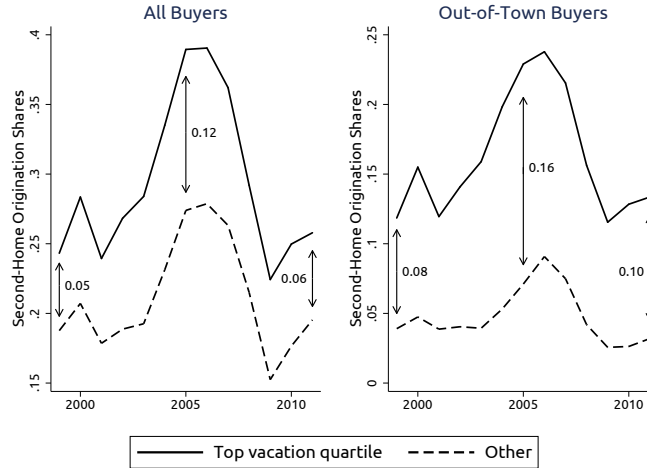
Note: The map shows the location of the top quartile of the vacation share of housing from the 2000 census. The top quartile of vacation localities is shaded in dark blue, while the other localities are in lighter blue. Source: 2000 census, and author’s calculations.

As an instrument, I use the vacation share of housing from the 2000 census – the share of the housing stock vacant for seasonal, recreational, or occasional use.<sup>13</sup> Areas with high vacation shares (hence ‘vacation areas’) tend to have appealing physical characteristics. Figure 6 shows a map of the location of the top quartile of U.S. counties by the vacation share of housing. Many vacation areas are located near a body of water, such as along the Eastern Seaboard or near the Great Lakes. They tend to have warm winters or are located along mountain ranges such as the Ozarks. The vacation share of housing is nearly collinear when measured in different decennial census years, reflecting the persistent nature of the underlying physical qualities of the localities. For example, the correlation coefficient is 0.97 between the vacation shares in the 2000 and 2010 decennial census years.

Vacation areas had a stronger increase in second-home buying during the housing boom, which was driven by out-of-town buyers. Figure 7 plots second-home origination shares against time for two groups: the top quartile of vacation areas and the other localities. The left panel plots second-home originations for all buyers, while the right panel shows

<sup>13</sup>For more information see <https://www.census.gov/hhes/www/housing/census/historic/vacation.html>

**Figure 7:** Second-Home Origination Shares in Vacation vs Other Areas



Note: The figure plots second-home origination shares for two groups: the top quartile of vacation shares and the other counties in the U.S. The left panel plots total second-home origination shares, while the right panel shows out-of-town second-home origination shares (the ratio of out-of-town second-home originations to total originations). Source: CRISM, Census, and author’s calculations.

out-of-town second-home origination shares (the ratio of second-home originations by out-of-town buyers to total originations).<sup>14</sup> Starting with the left panel, second-home shares are typically higher in the vacation area group reflecting more second-home buying there from their more appealing physical characteristics. In 1999, second-home shares were about 5 percentage points higher in the vacation group. Over the next years, second-home shares rose in both groups, but they rose about twice as fast in the vacation area group. By 2005, second-home shares were about 12 percentage points higher in the vacation area group than in the other areas. From 2006 to 2010, second-home buying fell in both groups but declined more in vacation areas. By 2011, the distance in the shares had shortened back to around 6 percentage points. In sum, the vacation area group had a sharper rise and collapse in second-home buying.

The relatively stronger rise and subsequent decline in second-home buying in vacation areas is fully explained by out-of-town buyers. The right panel in Figure 7 plots out-of-town second-home origination shares for the two groups against time. Typically, the out-of-town

<sup>14</sup>Out-of-town second-home originations are defined as second-home originations for which the borrower’s county of residence does not match the county of the property. The county of residence is obtained from borrowers’ mailing address reported in the Equifax records one year ahead of origination’s closing date.

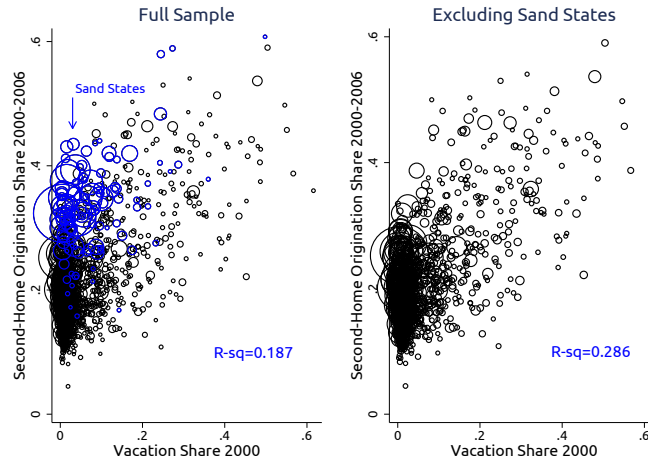
second-home shares are higher in the vacation area group; out-of-town second-home buyers account for a larger fraction of total originations in vacation areas. But the distance between out-of-town second-home shares in the two groups doubled during the housing boom, fully accounting for the relatively stronger rise in total second-home buying shown in the left panel. From 2006 to 2010, out-of-town second-home origination shares fell in both groups, but declined more in the vacation area group. Once again, the fall in out-of-town second-home buying in vacation areas fully accounts for the decline in second-home shares in vacation areas from 2006 to 2010.

Across localities, there is also a strong positive association between the vacation share of housing and second-home buying during the housing boom. The left panel of Figure 8 plots county-level second-home shares over 2000-2006 against the vacation share of housing in the 2000 census for all U.S. counties. The positive association is driven by all localities across the country, not just the “sand states” (CA, AZ, NV, FL). The right panel in Figure 8 plots second-home shares against the vacation share of housing excluding the sand states. The R-squared in the right panel is higher, reflecting that sand state cities such as Miami, Las Vegas, and Los Angeles had high second-home buying shares but low vacation shares of housing (most housing in those cities is occupied rather than vacant), evident from the counties in blue in the left panel missing on the right panel. The fact that identification is not coming exclusively from the sand states is a strength – sand state cities tended to have not only high second-home buying, but also high use of PLS and alternative mortgages, increases in household leverage, and other bubbly indicators, making it difficult to isolate the effects of second-home buying from those localities alone. That said, a natural next question is: how representative was second-home buying in vacation localities relative to purchases elsewhere?

Second-home buying in vacation areas appears broadly representative of overall second-home buying. We cannot directly observe from credit bureau records whether second-home purchases were intended as investment (such as flips) or consumption purchases, but we can measure individuals’ number of first-lien mortgages to derive a proxy. Individuals with four or more mortgages are more likely to be professional investors, while individuals acquiring a second or even third property are more likely to derive at least some consumption from their

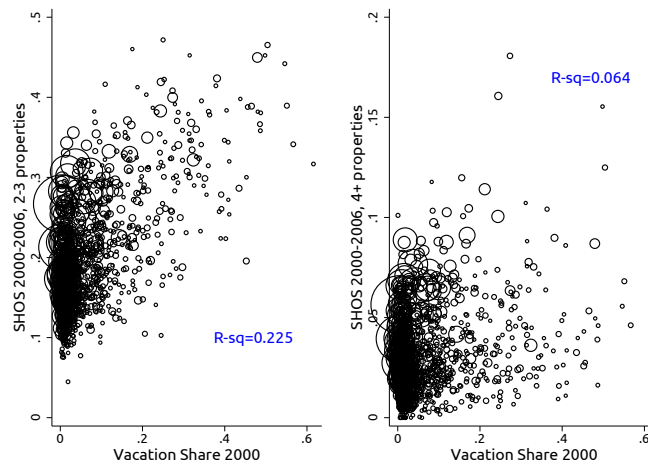


**Figure 8:** Second-Home Origination Shares vs Vacation Share of Housing



Note: The figure plots county-level second-home origination shares (y-axis) against the vacation share of housing (x-axis) from the 2000 census. The right panel excludes the sand states (CA, AZ, NV, FL). Observations are weighted by housing units in the 2000 census. Source: CRISM, Census, and author’s calculations.

**Figure 9:** Second-Home Origination Shares vs Vacation Share of Housing



Note: The figure plots county-level second-home origination shares (y-axis) against the vacation share of housing (x-axis) from the 2000 census. The left panel right panel excludes the sand states (CA, AZ, NV, FL). Observations are weighted by housing units in the 2000 census. Source: CRISM, Census, and author’s calculations.

properties (Haughwout et al. 2011; Albanesi 2018). Figure 9 plots second-home origination shares against the vacation share of housing, breaking down second-home buying by the individuals’ number of first-lien mortgages. The left panel (right panel) plots second-home

shares for individuals acquiring their second or third (fourth or higher) property against the vacation share of housing. The vacation share of housing is a statistically significant predictor of variation in both types of second-home buying, though the association is stronger for individuals acquiring their second or third property (left panel). These purchases account for the majority of second-home buying. Of all second-home buying between 2000-2006, those acquiring a second property accounted for about 70 percent of the total, those with a third property about 15 percent, and those acquiring their fourth or higher property the remaining 15 percent.

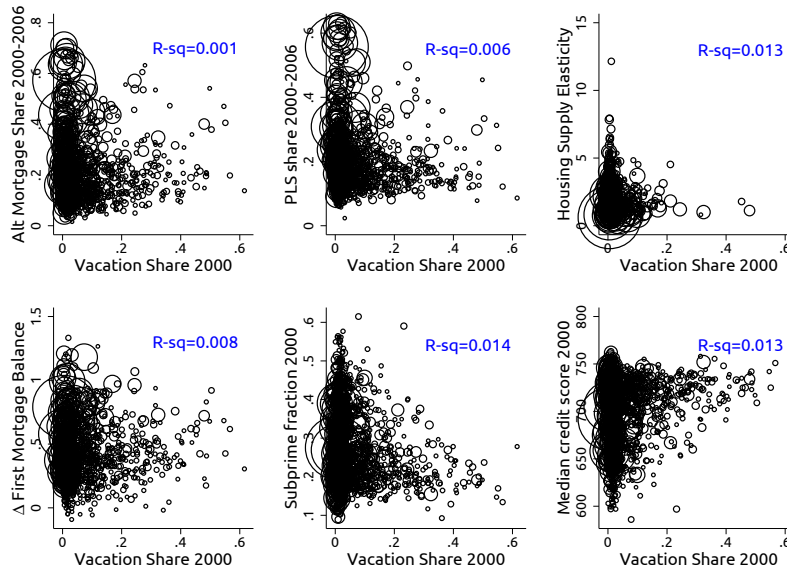
In sum, second-home buying rose more quickly in vacation areas during the housing boom. As documented below, the relatively faster rise in second-home buying there largely reflected nonlocal factors – higher demand for second-homes originating from other localities.

### **3.1 Out-of-Town Demand for Vacation Area Properties**

Vacation areas are an ideal laboratory for studying the effects of second-home buying, because the relative rise in second-home buying there during the boom years largely reflected nonlocal factors. That is, the rise in out-of-town demand for second homes in vacation areas was plausibly exogenous to local shocks originating from those areas, for the following reasons. First, vacation areas were average in terms of other boom indicators, having average use of alternative mortgage, PLS, increases in household debt, housing supply elasticities, and credit scores. Second, pretrends in house prices and labor income were essentially the same in vacation localities as in elsewhere. Therefore, while rising house prices and wages in the late 1990s expansion might explain why second-home buying increased during the housing boom, those changes did not originate from vacation areas. Third, higher second-home buying in vacation areas reflected out-of-town buying: locals of vacation areas were not buying second-homes or using home equity loans more than locals elsewhere. In sum, the stronger second-home buying in vacation areas largely reflected nonlocal factors, as elaborated in the next paragraphs.

First, vacation areas were about average in terms of the boom indicators described previously in section. Figure 10 plots measures of the severity of the housing boom on the y-axis – the alternative mortgage share (top left panel), the PLS share (top center panel),

**Figure 10:** Other Boom Indicators and the Vacation Share of Housing



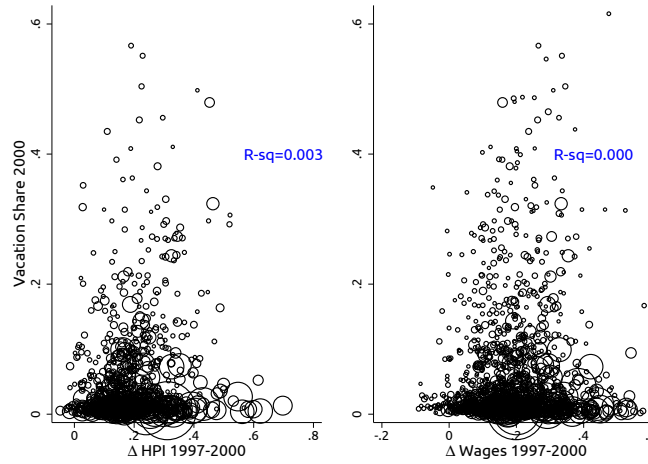
Note: The figure plots other drivers of the housing boom (y-axis) against the vacation share of housing in 2000 (x-axis). The y-axis variables are: the alternative mortgage share (top left panel), the private-label securitization share (top center panel), housing supply elasticities of Saiz (2010) (top right panel), the change in median first-lien mortgage debt (bottom left panel), the subprime share (those with credit score under 620; bottom center panel), and median credit scores (bottom right panel) See text for details. Source: FRBNY Consumer Credit Panel / Equifax, Black Knight McDash, 2000 census, and author’s calculations.

housing supply elasticities (top right panel), the change in median first-lien mortgage debt (bottom left panel), the subprime share (those with credit score under 620; bottom center panel), and median credit scores (bottom right panel) – against the vacation share of housing from the 2000 census. Each series is essentially uncorrelated with the vacation share of housing; the R-squared in each panel is close to zero. In other words, vacation areas allow us to isolate variation in second-home buying that is uncorrelated from various other bubbly characteristics, such as increases in alternative mortgage use and household leverage.

Second, changes in house prices and labor income in vacation localities during the late 1990s expansion were comparable to elsewhere.<sup>15</sup> Figure 11 plots the vacation share of housing on the y-axis against percent changes in house prices and labor income from 1997 to 2000 (left and right panels, respectively) on the x-axis; they are uncorrelated. In other

<sup>15</sup>Real (annualized) GDP growth averaged over 4 percent in 1997, 1998, and 1999.

**Figure 11:**  $\Delta$  HPI, Wages 1997-2000 and the Vacation Share of Housing



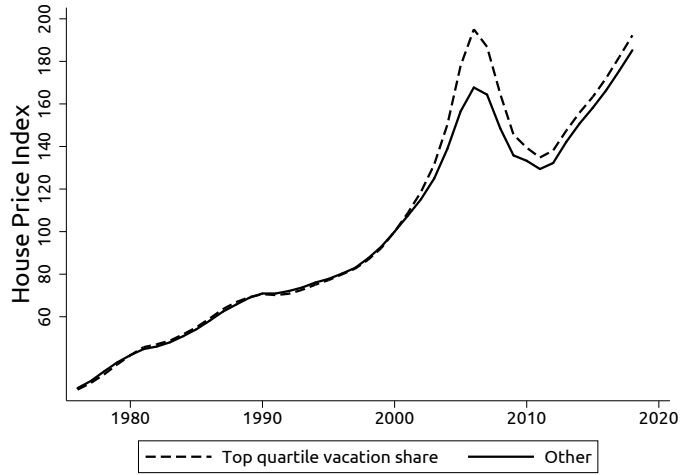
Note: The figure plots the vacation share of housing (y-axis) against changes in against percent changes in house prices (x-axis, left panel) and the wage bill (x-axis, right panel) from 1997-2000. Source: 2000 census, CoreLogic HPI, Quarterly Census of Employment and Wages, and author's calculations.

words, though rising house prices and wages prior to the boom might explain the surge in second-home buying by borrowers in other localities (see Figure 2), those changes did not originate from vacation localities.

The fact that activity in vacation localities was not particularly cyclical during the late 1990s expansion raises a broader question – are house prices in vacation areas generally cyclical? No, at least not during any of the other recessions or expansions for which we have housing data except for the 2000s housing cycle. Figure 12 plots the yearly CoreLogic house price index for two groups: the top quartile of vacation areas and the other localities. CoreLogic house price data goes back to the mid 1970s allowing us to compare differences in vacation areas vs other localities through at least a few expansions and recessions. Figure 12 shows that house prices evolved nearly identically in both groups from the mid 1970s through the 1990s. The two series begin to show differences until the early 2000s, coincidental with the rise in national second-home buying. Therefore, trends in house prices in vacation areas are not appreciably different from national trends prior to 2000.

Third, higher second-home buying in vacation areas reflected out-of-town demand for second homes. Locals of vacation areas were not buying more second homes (relative to

**Figure 12:** HPI in Vacation and Other Areas



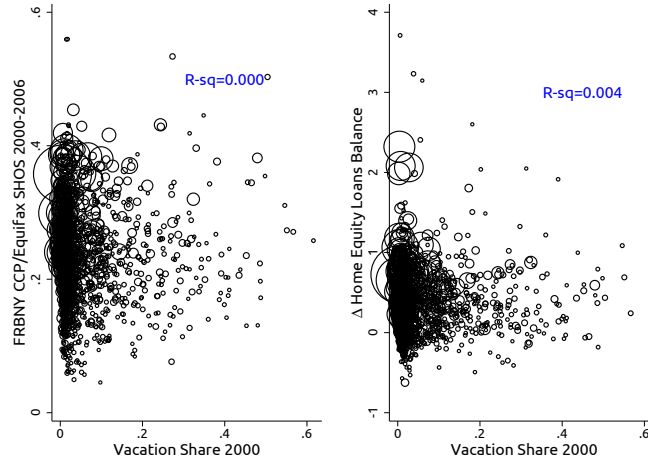
Note: The figure plots house prices against time for two groups: the top quartile of vacation shares in the 2000 census, and the other counties. House prices are indexed to equal 100 in the year 2000. Source: CoreLogic HPI, 2000 census, and author's calculations.

total originations) than locals elsewhere. The left panel in Figure 13 plots FRBNY Consumer Credit Panel/Equifax second-home origination shares during the housing boom (y-axis) against the vacation share of housing (x-axis). The FRBNY CCP/Equifax shares are measured at borrower location, that is, irrespective of where the properties are located. The vacation share of housing is uncorrelated with the FRBNY CCP/Equifax second-home origination shares, indicating that vacation area locals were not buying more or fewer second homes (on average) than locals elsewhere. Therefore, the stronger second-home buying in vacation areas largely reflects out-of-town demand.

Though vacation areas are similar to elsewhere along the dimensions crucial to the housing boom and bust, they do differ in some ways. For example, they tend to be whiter, older, and have a higher share of employment in the services industry. However, those differences are observable and are controlled for in the main specifications.<sup>16</sup> But what about unobserved factors that might be correlated with both the vacation share of housing and local variation in the severity of the housing boom and bust? Figures 10 and 13 alleviate concerns. Unobserved factors, such as stronger local expectations of house prices in vacation areas, might have led vacation area locals to take out more debt through expectations of looser credit constraints

<sup>16</sup>See Table 1.

**Figure 13:** FRBNY CCP/Equifax Second-Home Origination Shares and  $\Delta$  Home Equity Loan Balances vs Vacation Share of Housing



Note: The figure plots FRBNY Consumer Credit Panel/Equifax second-home origination shares (left panel; y-axis) and percent changes in median home equity loan debt balances (right panel; y-axis) against the vacation share of housing. Source: FRBNY Consumer Credit Panel / Equifax, 2000 census, author’s calculations.

and spending wealth effects (Carroll et al. 2011; Mian and Sufi 2011; Kaplan et al. 2017; Aladangady 2017). However, locals of vacation areas had neither stronger second-home buying (left panel in Figure 13), sharper increases in home equity balances (right panel in 13) nor first-lien mortgage debt (bottom left panel in Figure 10) than locals elsewhere. Therefore, judging by the debt behavior of vacation area locals, it does not appear that local price appreciation expectations were appreciably different than elsewhere.

In sum, vacation areas were similar to elsewhere in terms of pretrends, other boom indicators, and second-home buying by locals. The only notable difference (of relevance to the recent housing cycle) was having stronger second-home buying reflecting rising out-of-town demand for second homes.

## 4 Empirical Framework

To estimate the effects of the rise in second-home buying during the housing boom and bust, I isolate the variation in the change in second-home origination shares from 2000 to 2006 as explained by the instrument, the vacation share of housing, conditional on various other

characteristics of localities. To account for observable differences between vacation and other localities, such as demographics, industry composition, and financials, I control for a detailed set of county covariates. The covariates include demographics, such as education, income, and age profiles in 2000; household financial characteristics, such as the fraction of subprime borrowers and median credit scores in 2000; industry composition, including manufacturing, construction, and services employment shares in 2000; and pretrends, such as changes in house prices and employment from 1997-2000 and second-home origination shares in 2000. A full list of county covariates and data sources is provided in table 1. Table 2 provides summary statistics.

Results are based on the following 2SLS specification:

$$\Delta Y_i^j = \theta X_i + \beta \Delta \widehat{Second\ Home\ Origination\ Shares}_{i,2000-2006} + \epsilon_i \quad (1)$$

$$\Delta \widehat{Second\ Home\ Origination\ Shares}_{i,2000-2006} = \delta X_i + \rho Vacation\ Share_{i,2000} + v_i \quad (2)$$

where observations are at the county  $i$  level; changes are taken from 2000 to 2006, 2006 to 2010, and 2000 to 2010 for different outcome variables  $Y^j$  (for example, house prices, construction employment, total private employment) each estimated separately; and  $X_i$  are the county covariates defined in table 1 with summary statistics in table 2.

Data used are for counties with over 10,000 housing units in the 2000 census, which yield slightly over 1,200 counties with house price data, accounting for about 92 percent of aggregate employment. Observations are weighted by the number of households in the 2000 decennial Census, though results are similar without weighting and are also reported in the robustness tables. Extreme observations (1 percent from each tail) are dropped from each dependent variable. Standard errors are clustered at the state level. The baseline specifications include region fixed effects and complementary results with state fixed effects are provided in the robustness section.

**Table 1:** Data Definitions

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
<i>Dependent Variables</i>		
$\Delta$ House prices	Percent change in house prices from 2000-2006, 2006-2010, and 2000-2010	CoreLogic HPI
$\Delta$ Emp <sup><i>j</i></sup>	Percent change in employment category <i>j</i> from 2000-2006, 2006-2010, and 2000-2010	QCEW, CBP
$\Delta$ Delinquency rates	Percentage point change in fraction of 90+ delinquent properties from 2006 to 2010	CoreLogic MarketTrends
$\Delta$ Second-home orig. share	Change in the ratio of home purchase originations for nonprimary residences to total originations, 2000-2006.	Credit Risk Insight Servicing McDash
<i>Preboom Characteristics</i>		
$\Delta$ House Prices	Percent change in house prices 1997-2000	CoreLogic HPI
$\Delta$ Employment	Percent change in total private employment 1997-2000	QCEW
$\Delta$ Construction	Percent change in construction private employment 1997-2000	QCEW
House prices	Log level median house price	2000 census
Household income	Log of median	2000 census
White population	Fraction of population identified as white	2000 census
Poverty rate	Fraction of families below poverty line	2000 census
Age profile	Fraction of population 55 years or older	2000 census
College population	Fraction of population with a college degree or more	2000 census
Urban rate	Fraction of population in urban areas	2000 census
Mortgage use	Fraction of housing stock that had been mortgage-financed	2000 census
Risk Score 3.0	Median	2000 FRBNY Consumer Credit Panel/Equifax
Subprime	Fraction of households in a county with Risk Score less than 620	2000 FRBNY Consumer Credit Panel/Equifax
Second Home Orig. Share	Ratio of home purchase originations for nonprimary residences to total originations, 1999-2001	Credit Risk Insight Servicing McDash
Nontradable share	Nontradable share of employment, as defined in Mian and Sufi (2014)	2000 CBP
Construction share	Share of employment	2000 QCEW
Manufacturing share	Share of employment	2000 QCEW
Services share	Share of employment	2000 QCEW
Health and education share	Share of employment	2000 QCEW

Note: This table provides definitions and sources for the data used throughout the paper. CBP is County Business Patterns; QCEW is Quarterly Census of Employment and Wages.



**Table 2: County Summary Statistics**

<i>Dependent Variables</i>						
	Mean	SD	p10	Median	p90	N
$\Delta$ House Prices 2000-2006	0.52	0.37	0.18	0.40	1.13	1217
$\Delta$ Construction Emp 2000-2006	0.18	0.38	-0.14	0.13	0.57	1217
$\Delta$ Other Emp 2000-2006	0.05	0.15	-0.09	0.04	0.22	1217
$\Delta$ Nontradable Emp 2000-2006	0.11	0.18	-0.07	0.09	0.31	1217
$\Delta$ House Prices 2006-2010	-0.12	0.15	-0.34	-0.10	0.03	1217
$\Delta$ Delinquency Rate 2006-2010	0.04	0.03	0.02	0.03	0.08	1217
$\Delta$ Construction Emp 2000-2006	-0.23	0.33	-0.46	-0.26	-0.01	1212
$\Delta$ Other Emp 2006-2010	-0.04	0.08	-0.13	-0.04	0.05	1217
$\Delta$ Nontradable Emp 2006-2010	-0.03	0.13	-0.14	-0.04	0.09	1217
$\Delta$ House Prices 2000-2010	0.30	0.24	0.03	0.28	0.61	1217
$\Delta$ Construction Emp 2000-2010	-0.12	0.32	-0.40	-0.15	0.20	1217
$\Delta$ Other Emp 2000-2010	0.02	0.19	-0.17	-0.01	0.22	1217
$\Delta$ Nontradable Emp 2000-2010	0.08	0.24	-0.13	0.04	0.31	1217
Second-Home Origination Share 2000-2006	0.21	0.08	0.14	0.19	0.32	1217
<i>County Characteristics</i>						
# Housing units (thousands), 2000	79.13	164.95	11.35	32.95	183.15	1217
Second-Home Origination Share, 1999-2001	0.18	0.09	0.10	0.16	0.29	1217
% Educ $\geq$ College, 2000	0.21	0.09	0.11	0.18	0.33	1217
Home Value (\$thousands), 2000	104.15	46.87	63.40	92.50	155.90	1217
% Equifax Risk Score $3.0 \leq 620$ , 2000	0.26	0.08	0.17	0.25	0.38	1217
Median Equifax Risk Score 3.0, 2000	703.91	29.73	661.00	711.00	738.00	1217
% White Pop, 2000	0.87	0.12	0.72	0.91	0.98	1217
% Families below poverty line, 2000	0.08	0.04	0.04	0.08	0.13	1217
$\Delta$ Emp 1997-2000	0.07	0.08	-0.01	0.06	0.15	1217
$\Delta$ Construction Emp 1997-2000	0.15	0.19	-0.05	0.13	0.37	1217
$\Delta$ House Prices 1997-2000	0.18	0.10	0.08	0.16	0.31	1217
$\Delta$ Other Emp 1997-2000	0.06	0.08	-0.01	0.06	0.15	1217
% Urban population	0.61	0.25	0.26	0.64	0.94	1217
HH Median Income (\$thousands), 2000	40.75	9.32	30.95	38.83	53.38	1217
Construction Share of Emp, 2000	0.07	0.03	0.04	0.06	0.11	1217
Manufacturing Share of Emp, 2000	0.20	0.12	0.06	0.18	0.38	1217
Nontradable Share of Emp, 2000	0.21	0.05	0.16	0.21	0.28	1217
Services Share of Emp, 2000	0.70	0.12	0.54	0.72	0.84	1217
Health & Edu Share of Emp, 2000	0.13	0.05	0.07	0.13	0.19	1217
% Age $\geq 50$ , 2000	0.29	0.05	0.22	0.29	0.35	1217

Note: The table provides summary statistics for localities with over 10,000 households in the 2000 decennial Census and with house price data. Changes for delinquency rates are in percentage point, all other are percent changes.

## 5 Results

Areas where second-home origination shares increased faster (instrumented with the vacation share of housing) experienced a more pronounced boom and bust in activity. Those areas experienced faster increases in construction employment and house prices from 2000 to 2006. However, those gains were lost over the next years. From 2006 to 2010, declines in house prices and construction employment and increases in delinquency rates were sharper in areas where second-home shares had risen faster during the mid 2000s expansion. Overall, when looking at differences in activity for the whole decade from 2000 to 2010, the effects are roughly offsetting for changes in house prices and construction employment.

Table 3 shows 2SLS coefficient estimates for the 2000-06 changes in house prices and employment (for construction, nontradable, and total private employment) models.<sup>17</sup> In table 3, columns 1 and 2 show that a 10 percentage point increase in second-home originations shares led to 18 and 13 percentage point faster growth in house prices and construction employment, respectively. Despite faster growth in house prices and construction employment, those gains in real estate do not appear to have led to gains in overall employment. Columns 3 and 4 show results for nontradable employment and other employment (total private employment excluding construction).<sup>18</sup> The coefficient estimates are not significant and small, especially in the nontradable employment model (Column 3).

Over the next years, the increase in activity associated with the increase in second-home buying during the boom was largely reversed. Second-home buyers were typically more levered during the boom and had higher default rates during the recession (Haughwout et al. 2011; Albanesi 2018). Table 4 shows 2SLS coefficient estimates for the 2006-2010 period. On average, areas where second-home origination shares increased more from 2000 to 2006 experienced steeper declines in activity from 2006 to 2010. A 10 percentage point relative increase from 2006 to 2010 led to house price and construction employment declines that were 10 percentage points and 12 percentage points stronger on average (columns 1 and

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<sup>17</sup>The instrument is strong, with the Kleibergen-Paap first stage F statistic about 100, about ten times as large as the rule of thumb F statistic value of 10 that is commonly used in the literature to indicate weak instrument problems.

<sup>18</sup>Nontradable employment is a category of local employment accounting for about 20 percent of total private employment, comprised mostly of local retail and food; see Mian and Sufi (2014).

3, respectively); delinquency rates were on average about 2 percentage points higher (column 2). The overall employment effects are mostly restricted to construction, with changes in nontradable employment and other employment not significant.

Looking at changes in activity for the whole decade, estimated effects are small and not significant. Table 5 shows results for the 2000-2010 period. For localities with a 10 percentage point increase in second-home origination shares from 2000 to 2006, changes in house prices from 2000 to 2010 were on average 6 percentage points higher though not statistically different from zero (column 1), and construction employment changes were on average 4 percentage points lower though not significantly different from zero (column 2).<sup>19</sup> Similarly, for broader employment categories, the effects on employment losses are not significant. When looking at changes in activity over a longer horizon, such as from 2000 to 2014, the results are similar. Overall the results are consistent with those in Chinco and Mayer (2016), who find that second-home buying contributed to mispricing in housing.

In sum, areas with plausibly exogenous stronger increases in second-home buying had a sharper boom-and-bust in housing markets: Construction employment and house prices grew more during the boom years, but those gains were reversed during the recession years. The effects appear contained within residential activity – the effects on broader employment categories are not statistically different from zero in either the run-up or the bust. However, a limitation of the county-level empirical strategy is that spillover effects across localities are not well captured. For example, high default rates for second-home buyers likely contributed to the poor health of the financial system during the recession, and so likely affected overall credit supply. In turn, lower credit supply during the recession likely contributed to the job losses (Duygan-Bump et al. 2015; Chodorow-Reich 2014; Garcia 2018). Nonetheless, the lack of significance in the nontradable and other employment models does ameliorate concerns about instrument validity, as the instrument is not correlated with local shocks affecting overall employment.

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<sup>19</sup>The net negative effect in construction is consistent with Rognlie et al. (2018), which predicts that the recovery from housing boom-bust episodes is asymmetric, with the overbuilt sector left behind. That said, the net negative effect in construction appears small and is not estimated to be significantly different from zero.

## 5.1 Robustness

The 2SLS coefficient estimates contrast with their OLS counterparts, with the latter 2-4 times as large as the 2SLS estimates. Tables 6 and 7 report OLS coefficient estimates for the 2000-06 and 2006-10 periods, respectively. The OLS coefficient estimates are larger, suggesting that the OLS estimates are biased upward because of other factors such as reverse causality or omitted variable bias. For example, the coefficient on the change in second-home origination shares in the 2000-2006 2SLS house price model (Table 3 Column 1) is 1.821, while the OLS analog is 3.742 in table 6 column 1, with the difference statistically significant. The difference between 2SLS and OLS estimates is particularly large for the nontradable and other employment models. For example, the coefficient on second-home origination shares in the 2000-2006 2SLS nontradable employment model (table 3 column 3) is 0.023 and not significant, while the OLS analog is 0.487 and is highly significant (Table 6 Column 3).

The results are also robust to using state fixed effects. Table 8 provides results for the 2000-2006 models with state fixed effects. The second-home origination shares coefficient is similar to the baseline estimates in Table 3 – the coefficient on the house price model is slightly larger (column 1), while the coefficient in the construction employment models is slightly smaller (column 2), with neither difference being statistically significant. Table 9 provides results for the 2006-10 models with state fixed effects. Again, the results are very similar with coefficient estimates not statistically different.

The results reported are weighted by the number of housing units in 2000, though they are robust to alternatives. Table 10 reports unweighted results for the 2000-2006 2SLS models when limiting the sample to counties with at least 25,000 housing units in the 2000 census, accounting for about 80 percent of the population. The results are qualitatively the same: areas with larger increases in second-home origination shares during the boom experienced significantly higher growth in house prices and construction employment, though not in broader employment categories. The coefficient estimates are very similar to their counterparts in the baseline (table 3).

The results are also robust to controlling for differences across localities in housing supply elasticities. The baseline results do not control for differences in elasticities, because these are

available only for the smaller sample of counties located within metropolitan statistical areas (MSAs). Table 11 report results for the counties for which the housing supply elasticity of Saiz (2010) is available. Since coefficient estimates may change because of the sample change (counties in MSAs only), or the inclusion of the housing supply elasticity control, I report results for the MSA sample with and without the housing supply elasticity on the right-hand side. Columns 1 and 2 report coefficient estimates for the house price and construction employment models without the elasticity control, while columns 3 and 4 add the control. The coefficient estimates for the MSA subsample tend to be larger than the full sample, though they are not statistically different. When adding the housing supply elasticity as a control (columns 3 and 4), the coefficient of interest are similar to those in the baseline, with differences within one standard error.

Overall, the qualitative and quantitative results are robust to using alternative specifications, such as the inclusion of state fixed effects, alternative weighting schemes, and sample restrictions (for example, counties in MSAs only) and controlling for differences in supply constraints.

**Table 3:** 2000–2006 2SLS Estimates of the Effects of Second Home Buying

Dependent variables 2000-06:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ NonTrd. Emp Coef./SE	$\Delta$ Other Emp Coef./SE
$\Delta$ SHOS 2000-06	1.821 (0.82)	1.311 (0.46)	0.023 (0.22)	0.191 (0.14)
All other controls	Yes	Yes	Yes	Yes
R-squared	0.74	0.57	0.49	0.61
Kleibergen-Paap F	91.54	105.51	102.58	108.65
Observations	1096	1101	1105	1098

Note: This table shows 2SLS results from regressing changes in local outcomes on the change in second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 4:** 2006–2010 2SLS Estimates of the Effects of Second Home Buying

Dependent variables 2006-10:					
	$\Delta$ HPI Coef./SE	$\Delta$ Del. Rate Coef./SE	$\Delta$ Cnstr. Emp Coef./SE	$\Delta$ NT. Emp Coef./SE	$\Delta$ Oth. Emp Coef./SE
$\Delta$ SHOS 2000-06	-1.014 (0.31)	0.189 (0.09)	-1.194 (0.26)	0.067 (0.10)	-0.073 (0.10)
All other controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.61	0.63	0.49	0.22	0.40
Kleibergen-Paap F	115.12	118.82	106.28	108.72	104.30
Observations	1095	1096	1106	1109	1112

Note: This table shows 2SLS results from regressing changes in local outcomes on the change in second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 5:** 2000–2010 2SLS Estimates of the Effects of Second Home Buying

Dependent variables 2000-10:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ NonTrd. Emp Coef./SE	$\Delta$ Other Emp Coef./SE
$\Delta$ SHOS 2000-06	0.603 (0.53)	-0.380 (0.35)	0.214 (0.21)	0.068 (0.17)
All other controls	Yes	Yes	Yes	Yes
R-squared	0.54	0.33	0.45	0.59
Kleibergen-Paap F	115.13	108.98	108.59	107.54
Observations	1098	1105	1102	1100

Note: This table shows 2SLS results from regressing changes in local outcomes on the change in second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 6:** 2000-2006 OLS Estimates of Second Home Buying

Dependent variables 2000-06:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ NonTrd. Emp Coef./SE	$\Delta$ Other Emp Coef./SE
$\Delta$ SHOS 2000-06	3.742 (0.53)	1.582 (0.24)	0.487 (0.12)	0.249 (0.06)
All other controls	Yes	Yes	Yes	Yes
R-squared	0.76	0.57	0.50	0.61
Observations	1096	1101	1105	1098

Note: This table shows OLS results from regressing changes in local outcomes on the change in second-home origination shares measured over 2000-2006. The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 7:** 2006–2010 OLS Estimates of Second Home Buying

Dependent variables 2006-10:					
	$\Delta$ HPI Coef./SE	$\Delta$ Del. Rate Coef./SE	$\Delta$ Cnstr. Emp Coef./SE	$\Delta$ NT. Emp Coef./SE	$\Delta$ Oth. Emp Coef./SE
$\Delta$ SHOS 2000-06	-1.790 (0.21)	0.326 (0.05)	-1.615 (0.19)	-0.340 (0.10)	-0.257 (0.06)
All other controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.63	0.65	0.50	0.25	0.41
Observations	1095	1096	1106	1109	1112

Note: This table shows OLS results from regressing changes in local outcomes on the change in second-home origination shares measured over 2000-2006. The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 8:** 2000–2006 2SLS Estimates of the Effects of Second Home Buying, with State Fixed Effects

Dependent variables 2000-06:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ NonTrd. Emp Coef./SE	$\Delta$ Other Emp Coef./SE
$\Delta$ SHOS 2000-06	2.399 (0.56)	1.150 (0.42)	-0.017 (0.22)	0.174 (0.15)
FE	State	State	State	State
All other controls	Yes	Yes	Yes	Yes
R-squared	0.90	0.67	0.58	0.67
Kleibergen-Paap F	164.86	161.18	158.38	172.90
Observations	1096	1101	1105	1098

Note: This table shows 2SLS results from regressing changes in local outcomes on second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. State fixed effects are included. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.



**Table 9:** 2006–2010 2SLS Estimates of the Effects of Second Home Buying, with State Fixed Effects

Dependent variables 2006-10:					
	$\Delta$ HPI Coef./SE	$\Delta$ Del. Rate Coef./SE	$\Delta$ Cnstr. Emp Coef./SE	$\Delta$ NT. Emp Coef./SE	$\Delta$ Oth. Emp Coef./SE
$\Delta$ SHOS 2000-06	-0.710 (0.17)	0.165 (0.06)	-1.136 (0.27)	0.025 (0.10)	-0.048 (0.09)
FE	State	State	State	State	State
All other controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.86	0.84	0.66	0.37	0.54
Kleibergen-Paap F	196.52	173.09	169.20	170.00	164.97
Observations	1095	1096	1106	1109	1112

Note: This table shows 2SLS results from regressing changes in local outcomes on second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 10,000 housing units in the 2000 census. All equations include the controls listed in table 1. State fixed effects are included. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 10:** 2000–2006 2SLS Estimates of the Effects of Second Home Buying (Unweighted)

Dependent variables 2000-06:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ NonTrd. Emp Coef./SE	$\Delta$ Other Emp Coef./SE
$\Delta$ SHOS 2000-06	1.675 (0.86)	1.365 (0.64)	-0.061 (0.16)	0.249 (0.20)
All other controls	Yes	Yes	Yes	Yes
R-squared	0.65	0.43	0.44	0.52
Kleibergen-Paap F	87.06	93.88	84.31	95.21
Observations	725	729	732	725

Note: This table shows 2SLS results from regressing changes in local outcomes on second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes localities with over 25,000 housing units in the 2000 census. All equations include the controls listed in table 1. State fixed effects are included. Observations not weighted. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

**Table 11:** 2000–2006 2SLS Estimates of the Effects of Second Home Buying in MSAs

Dependent variables 2000-06:				
	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE	$\Delta$ HPI Coef./SE	$\Delta$ Constr. Emp Coef./SE
$\Delta$ SHOS 2000-06	3.074 (0.94)	2.160 (0.59)	2.965 (1.02)	2.193 (0.64)
Elasticity			-0.020 (0.03)	0.005 (0.01)
All other controls	Yes	Yes	Yes	Yes
R-squared	0.79	0.65	0.79	0.65
Kleibergen-Paap F	31.54	33.68	35.21	37.14
Observations	610	612	610	612

This table shows 2SLS results from regressing changes in local outcomes on second-home origination shares (using the vacation share of housing in the 2000 decennial census as an instrument). The sample of counties includes those located in MSAs for which housing supply elasticity data is available. All equations include the controls listed in table 1. State fixed effects are included. Observations weighted by the number of housing units in the 2000 decennial census. Dependent variable outliers (1 percent of each tail) are dropped. Standard errors are clustered at the state level. \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

## 5.2 Aggregate Implications

To gain a sense of the aggregate implications of second-home buying, I perform a partial equilibrium aggregation exercise which combines the estimated causal effects of increases in second-home origination shares during the housing boom, together with a counterfactual time path of second-home origination shares in which the shares stay fixed at their 1999–2001 levels.

To begin, define the counterfactual 2000–2006 change in construction employment in county  $i$ ,  $\Delta Constr. Emp_i^{cf}$ , as the predicted construction employment change if county  $i$  second-home origination shares had stayed at their preboom level, that is,  $\Delta SHOS_{i,2000-2006} = 0$ :

$$\Delta Constr. Emp_i^{cf} = \Delta \widehat{Constr. Emp}_i - \beta \Delta SHOS_{i,2000-2006},$$

where  $\Delta \widehat{Constr. Emp}_i$  denotes the fitted value from the baseline construction employment 2SLS model including all covariates  $X_i$ , and  $\beta$  is the estimated elasticity of construction employment with respect to second-home origination shares. I then recover 2006 construction employment levels corresponding to both the counterfactual and fitted changes in employment, using the initial-period employment level:  $Constr. Emp_{i,2006}^{cf} = Constr. Emp_{i,2000}(1 + \Delta Constr. Emp_i^{cf})$  and  $\widehat{Constr. Emp}_{i,2006} = Constr. Emp_{i,2000}(1 + \Delta \widehat{Constr. Emp}_i)$ .

The fraction in construction employment changes explained by second-home buying is given by:

$$\frac{\sum_i [Constr. Emp_{i,2006}^{cf} - \widehat{Constr. Emp}_{i,2006}]}{\sum_i [Constr. Emp_{i,2006} - Constr. Emp_{i,2000}]} \quad (3)$$

I also perform the analogous exercise for house prices.<sup>20</sup> I find that the increase in second-home buying could explain about 29 percent and 11 percent of the run-up in construction employment and house prices from 2000 to 2006, respectively, using the 2SLS baseline esti-

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<sup>20</sup>Aggregate changes in house prices are computed as the average house price change weighted by housing units in 2000.

mates reported in table 3. In other words, construction employment would have increased by about 10 percent rather than 14 percent, and house prices by 59 percent rather than 66 percent, respectively, from 2000 to 2006. When repeating the aggregation exercise using the 90 percent confidence intervals for the second-home origination shares coefficients in the construction employment and house price models, the conclusion is second-home buying could have explained between 13 percent to 47 percent of the runup in construction employment, and between 3 percent and 19 percent of the increase in house prices from 2000 to 2006.

The accuracy of the aggregation exercise depends on a number of factors. To arrive at an aggregate estimate, the counterfactual exercise treats counties as independent units and tallies the differences in evolution of house prices and construction employment had second-home origination shares remained at their preboom level rather than rising. But the exercise does not take into account intercounty or general equilibrium effects. For example, shocks in one county could have spilled over to other counties via trade. Moreover, changes in second-home lending likely affected the health of the financial system, first by contributing to the perception of a robust financial system by bolstering house prices during the boom, and later, by contributing to the rise in mortgage delinquencies and the financial crisis. Therefore, my interpretation is that the aggregation exercise has value as a robustness check, as the sum of the individual county effects is reasonably moderate. However, the true aggregate effects may have been larger.

## 6 Conclusion

Second-home buying was a key feature of the housing boom (Haughwout et al. 2011; Bhutta 2015; Chinco and Mayer 2016). The share of home purchase mortgages issues for existing homeowners rose from about 20 to 40 percent from 2000 to 2006. What drove the increase in second-home buying? Though a full answer is a promising area for future research, rising fundamentals during the late 1990s expansion, such as rising income and wealth, appear to have contributed to the increase in second-home buying. The rise in second-home buying could have had important macroeconomic implications – contributing to mispricing in housing, overconstruction, and the rise in foreclosures during the recession – but isolating

plausibly exogenous variation in second-home buying is a priori challenging. As an example, cities in the sand states such as Los Angeles, Miami, and Phoenix all had high second-home buying, but were also in the 90th percentile or higher for other boom-bust indicators, making it difficult to isolate the effects of second-home buying from those localities alone.

To estimate the effects of second-home buying I leverage the experience of vacation areas, where out-of-town second-home buying rose faster on average than elsewhere. Vacation areas appear otherwise ordinary across many dimensions crucial to the housing boom – they were about average in terms of pretrends, credit scores, use of alternative and PLS mortgages, changes in household leverage, and second-home purchases by locals. The rise in out-of-town demand for second homes in vacation areas led to a sharper boom and bust in residential activity in those areas. First, house prices and construction employment rose more quickly than elsewhere from 2000 to 2006. Then, residential activity contracted more sharply over 2006 to 2010, reflecting falling demand for second homes as well as the damaging effects from the rise in foreclosures.

Overall, rising fundamentals likely contributed to an increase in demand for second homes. In turn, the increase in second-home buying amplified the housing boom and bust, leading to a steeper run-up in residential activity during the boom, followed by a sharper contraction during the bust years. These findings are consistent with changes in credit demand playing an important role in amplifying the housing boom and bust. Do they also imply that changes in credit supply were unimportant? No, the results are consistent with credit supply mattering elsewhere and in the aggregate. Indeed, the rise in second-home buying was likely facilitated by easier credit conditions, given that mortgage rates were about flat during the peak years of the housing boom. A common factor, such as stronger expectations of house prices, might have bolstered both credit demand and supply in the mid 2000s (Foote et al. (2016); Kaplan et al. (2017); DeFusco et al. (2017)). Whichever the underlying factors, a macroprudential implication of this paper is that monitoring of second-home buying is likely worthwhile.

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