

Local Effects of Global Capital Flows: A China Shock in the U.S. Housing Market

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This paper studies the real effects of foreign real estate capital inflows. Using transaction-level data, we document (i) a “China shock” in the U.S. housing market characterized by surging foreign Chinese housing purchases after 2008, and (ii) “home bias” in these purchases, as they concentrate in neighborhoods historically populated by ethnic Chinese. Exploiting their temporal and spatial variation, we find that these capital inflows raise local employment, with the effect transmitted through a housing net worth channel. However, they displace local lower-income residents. Our results show that real estate capital inflows can both stimulate the real economy and induce gentrification. (*JEL* F21, F38, E20, J21, R21)

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A nontraditional, opaque form of international capital flows—residential real estate capital flows—has become increasingly prominent. Ranging from 3% to 11% of gross capital inflows into the United States over the past decade, these flows possess characteristics of both foreign portfolio investment and foreign direct investment (FDI)—two traditional forms of international capital flows typically viewed as mutually exclusive.¹ Real estate capital flows are often contentious, as they are perceived to worsen housing affordability for domestic residents. In response, a number of countries have enacted regulations on purchases by foreign buyers.² Despite their unique characteristics and prominence as a policy concern, we still have a limited understanding of the economic significance of residential real estate capital flows. Whereas a few recent studies highlight their house price effects (e.g., [Badarinza and Ramadorai 2018](#)), this paper aims to provide causal evidence on the real effects of these capital flows.

In this paper, we quantify residential real estate capital inflows and estimate the effects of these capital inflows on local employment. Using transaction-level housing purchase data in California from 2001 to 2013, we document two salient phenomena: (i) a “China shock” in the U.S. real estate market characterized by an unprecedented surge in housing purchases by one particular group of foreigners, the Chinese, after 2008, and (ii) “home bias” in foreign Chinese housing purchases—namely, that these purchases tend to be concentrated in ZIP codes historically populated by ethnic Chinese.³ Exploiting the temporal and spatial variation of real estate capital inflows from China, we show that they have a strong positive effect on local employment. The effect is driven by two competing forces—a housing net worth channel and a displacement channel. On the one hand, the capital inflows increase local house prices, which raises housing net worth and hence demand for nontradable goods. On the other hand, these inflows displace local residents, lowering the demand for nontradable goods. Our results reveal that the housing net worth channel plays a dominant role, as foreign Chinese real estate capital inflows significantly increase nontradable-sector employment. Further, we find that these capital inflows displace local residents, especially low-income

¹ Estimates of the share of residential real estate capital inflows in gross capital inflows are based on data published by the International Monetary Fund Balance of Payments and the National Association of Realtors (NAR). However, it is unclear how these flows are recorded in the official balance of payments statistics, making them opaque and little understood.

² Regulations are often in the form of stamp taxes or additional duties. Multiple national and local governments around the world, including Singapore, Australia, New Zealand, Hong Kong, London, Vancouver, and Toronto, have implemented or are considering laws to curb foreign investment in local housing markets. For example, the Singaporean government introduced an additional buyer's stamp duty of 10% of the purchase price for foreigners who buy residential property in 2011 and increased it to 20% of the purchase price by 2018. In 2016, the British Columbian provincial government in Canada imposed an additional property transfer tax of 15% on all residential property purchased by foreign buyers.

³ In this paper, we use “foreign” and “nonresident” interchangeably to refer to individuals who do not regularly reside in the referenced location.

ones, suggesting that these inflows may give rise to adverse distributional consequences.

Though foreign Chinese housing purchases in the United States have grabbed many headlines in the popular press over the past decade, our paper is the first to provide a formal quantification of the phenomenon and directly estimate the elasticities of real economic outcomes with respect to these purchases.⁴ A key difficulty in studying this issue lies in the lack of detailed data on real estate capital inflows. To overcome the challenge, we turn to housing transaction data to identify foreign homebuyers. Even though information on the origin of buyers is often unavailable because of legal restrictions, we devise a three-step algorithm to impute the amount of foreign housing purchases. First, we identify the ethnicities of buyers by applying the ethnic name-matching technique from Kerr (2008a) to their first and last names. We keep only transactions made by buyers belonging to one of eight non-Anglo-American ethnic groups with a probability of one. Second, we keep only transactions that are made in all cash, as foreigners have limited access to U.S. mortgage markets. Third, we adjust our measures to keep only transactions made by nonresident foreigners. Using the algorithm, we construct two measures of foreign housing purchases for each of the eight foreigner groups, foreign housing transaction value and foreign housing transaction count, which capture the intensive and extensive margins of residential real estate capital inflows, respectively.

Using these measures, we document two facts. First, we observe a China shock in the California real estate market: housing purchases by foreign Chinese buyers began to surge in 2008 and soared as much as 30- to 40-fold in terms of transaction share by value and count over 2008–2013, reaching 3.5% of total housing transactions. Second, housing purchases by foreign Chinese buyers exhibit a form of home bias, as they are concentrated in locations historically populated by ethnic Chinese. Housing transaction share by foreign Chinese in ZIP codes in the top two deciles of historical ethnic Chinese population shares was 6 percentage points higher than the share in ZIP codes in the bottom eight deciles by 2013. These two facts reveal variations in these purchases in both the time-series and cross-sectional dimensions, which we exploit to estimate the employment effects of Chinese capital flows.

We develop a conceptual framework to generate testable qualitative predictions for the employment effects of foreign housing purchases. Our model improves upon existing frameworks such as the one in Mian and Sufi (2014) by dissecting the forces driving local employment. The model predicts that foreign housing capital inflows push up local employment, and the

⁴ Examples of media coverage of the surge in foreign Chinese housing purchases in the United States include “Chinese buying up California housing,” 25 Nov. 2013, CNBC; “Chinese take lead among foreign buyers of U.S. homes,” 18 Jun. 2015, *Financial Times*; and “Chinese cash floods U.S. real estate market,” 28 Nov. 2015, *New York Times*. According to the NAR, the Chinese have taken the lead among all foreign buyers of U.S. real estate by a wide margin in both value and quantity.

employment effect is influenced by two forces. On the one hand, foreign capital inflows increase local house prices, which raises housing net worth and hence demand for local nontradable goods and nontradable-sector employment. On the other hand, foreign housing demand displaces local residents because of higher living costs, which lowers the demand for nontradable goods and nontradable-sector employment. Our simulation shows that the housing net worth channel is likely the dominating force, predicting that foreign housing demand increases nontradable-sector employment, and that the impact on tradable-sector employment is ambiguous given the dispersed supply of tradable goods. Directed by this framework, we test the effects of the China shock on local employment, house prices, displacement, and employment by sector.

The challenge in establishing a causal relation between foreign Chinese capital inflows and local economic conditions stems from an issue of endogeneity: there may be unobserved factors that influence both foreign Chinese housing purchases and local economic conditions. To alleviate potential bias due to omitted variables, we apply an instrumental variables (IV) approach, where the foreign Chinese housing transaction value (count) is instrumented by the weighted aggregate foreign Chinese housing transaction value (count) in California, with historical ethnic Chinese population share at the ZIP code level as weights—a strategy that exploits the home bias phenomenon. The exclusion restriction relies on the assumption that, conditioning on our ZIP code-level controls and county-year fixed effects, the historical ethnic Chinese population distribution is uncorrelated with factors that influence changes in local economic outcomes after the China shock.⁵ Our subsequent analysis supports the exclusion restriction assumption and shows that our IVs have strong predictive power for measures of foreign Chinese housing purchases. In addition, our main specification utilizes a difference-in-differences (DID) framework to capture the China shock and a potential regime change. The combination of a DID and IV approaches enhances identification relative to a traditional time-series analysis in estimating the economic effects of international capital flows.⁶

Our results show that foreign Chinese housing purchases have a significant and positive effect on local employment. A 1% increase in foreign Chinese

⁵ We include county-year fixed effects in the regressions to rely exclusively on within-county cross-ZIP code variation for identification, which relieves concerns about confounding factors such as heterogeneous land policy or county-level economic conditions (e.g., the tech boom in Silicon Valley). We also control for ZIP code-level characteristics that may systematically affect local economic conditions, including pre-sample period population, population density, education, and pretrends of income and of the respective outcome variable.

⁶ The international finance literature traditionally employs aggregate time-series analysis to study the effects of capital flows, which suffer from simultaneity: the timing of capital inflows is rarely exogenous and often coincides with unobserved factors that influence the economy concurrently. This empirical challenge partly explains the conflicting viewpoints on whether the effect of capital flows is beneficial (Summers 2000; Harrison, Love, and McMillan 2004; Tong and Wei 2010), detrimental (Stiglitz 2002; Aizenman and Jinjarak 2009; Gourinchas and Obstfeld 2012), or negligible (Rodrik 1998) for recipient countries.

transaction value (count) increases local employment by 0.124% (0.247%). To dissect the channels underlying the employment effect, we test for the potential roles of a housing net worth channel and a displacement channel. We find that foreign Chinese housing purchases significantly increase local house prices. A 1% increase in foreign Chinese transaction value (count) increases local home prices, as measured by the Zillow Single-Family Home Value Index, by 0.108% (0.195%). At the same time, we find foreign Chinese real estate capital inflows induce displacement of local residents. A 1% increase in foreign Chinese transaction value (count) increases the displacement of local residents by 0.035% (0.061%). Between the two opposing forces, we find that the housing net worth channel plays a dominant role, as real estate purchases by foreign Chinese significantly increase local nontradable-sector employment. In addition, we show that foreign Chinese house purchases displace local low-income residents in particular, suggesting that foreign real estate capital inflows may contain adverse distributional consequences, in contrast to their positive employment effect.

We run a battery of tests to examine the validity of our research design and the robustness of our results, including an event study analysis to test the parallel trends assumption, a reverse causality test to study whether the foreign Chinese-targeted neighborhoods systematically differ in preexisting economic conditions, and an analysis examining whether these neighborhoods were affected by the financial crisis of 2007–2008 differently. First, we show that, consistent with the parallel trends assumption, the estimated coefficients of interest are not statistically different from zero until the post-China shock period. Second, we find that foreign Chinese are not targeting areas that are systematically different in preexisting economic conditions. Third, our results hold for the postcrisis period and are robust to controlling for variables that plausibly capture neighborhoods' differential ability to withstand the crisis.

This paper contributes to a growing literature on the local effects of foreign housing purchases. Recent studies show that they push up house prices in the United Kingdom (Sa 2016; Badarinza and Ramadorai 2018) and the United States (Gorback and Keys 2020). While these papers are mostly based on reduced-form evidence using discrete proxies of foreign house purchases, we directly estimate elasticities of specific outcomes with respect to these purchases. We also go beyond the asset price effects and study their real effects. In doing so, this paper adds to the line of research exploring the link between the housing market and the real economy (Green 1997; Case 2000; Glaeser and Parker 2000; Davis and Van Nieuwerburgh 2015).

Our paper is also related to Mian, Rao, and Sufi (2013) and Mian and Sufi (2014), which show that the deterioration in household balance sheets due to the housing market crash in 2007–2009 induced a decline in consumption and employment. Although the context of our study is a positive housing price shock due to foreign inflows, our estimate of the elasticity of employment to housing net worth is consistent with that in Mian and Sufi (2014), which

provides further evidence supporting the housing net worth channel and confirms the external validity of our results. Moreover, our paper adds to the research on the distributional consequences of foreign housing purchases, such as [Favilukis and Van Nieuwerburgh \(2021\)](#). Our findings on the real and distributional impacts of foreign housing purchases bring a new perspective to the ongoing policy debates about the need for government regulations to curb these purchases.

In addition, our study contributes to the literature on the external impacts of China's integration into the global economy. Existing research mainly focuses on the effects of rising Chinese import competition on foreign labor markets, showing that Chinese imports have negative effects on local economies abroad ([Autor, Dorn, and Hanson 2013](#); [Balsvik, Jensen, and Salvanes 2015](#); [Acemoglu et al. 2016](#)).⁷ While China's role in international trade has been notable, China has also been increasingly integrated into global finance. This paper is the first to probe into the local economic effects of a China shock on the finance side, namely, the surge of residential real estate capital inflows from China to the United States.⁸ In contrast to prior studies, we find that this particular China shock has a positive real effect but contains potentially adverse distributional consequences.

1. Foreign Residential Real Estate Capital Inflows

We begin by quantifying the amount of residential home purchases by foreigners in the United States, which captures the extent of foreign residential real estate capital inflows. A key challenge in measuring these purchases is that U.S. county offices do not collect data on homebuyers' country of origin because of legal restrictions. The only available data are aggregate estimates published annually by the NAR based on voluntary survey responses from realtors, but the response rate tends to be extremely low (e.g., 3% in 2016). To overcome the data limitation, we use transaction-level data and devise a three-step algorithm to impute the amount of foreign real estate purchases. We show that the foreigner group that most significantly increased home purchases in the United States over the sample period from 2001 to 2013 is the Chinese. In particular, we document two new facts—a China shock in the U.S. real estate market and home bias of foreign Chinese home purchases. Given the dominance of the Chinese, we focus on the real effects of their real estate purchases in the subsequent analysis.

⁷ Besides labor market effects, subsequent papers find that rising Chinese import competition also affects political polarization ([Autor et al. 2020](#)) and the marriage market in the United States ([Autor, Dorn, and Hanson 2019](#)).

⁸ Our work is partly related to a few recent papers in international finance pointing out hidden capital coming out of China, including [Horn, Reinhart, and Trebesch \(2021\)](#) and [Coppola et al. \(2021\)](#). In some sense, the foreign Chinese real estate capital we study in this paper is another source of hidden capital from China.

1.1 Real estate transaction data

Our main data source is housing transaction records from DataQuick, which contain detailed purchase information collected from the County Register of Deeds and Assessor Offices in the United States. These records cover both resident- and nonresident-initiated transactions. For each home sale, the data include the sales price, closing date, address of the home, home characteristics, information on home financing, and names of the buyers and sellers. In our analysis, we focus on single-family residential home transactions in the three largest core-based statistical areas in California, comprising 17 counties and 773 ZIP codes, from 2001 to 2013.

1.2 Three-step imputation algorithm

Using the housing transaction data, we develop a three-step algorithm to impute the amount of foreign residential real estate purchases. We construct two measures to capture the intensive and extensive margins of real estate capital inflows for seven foreigner groups: foreign housing transaction value (*fHTV*) and foreign housing transaction count (*fHTC*).

Step One. We identify the ethnicities of the homebuyers in our sample based on first and last names using the ethnic name-matching algorithm from Kerr (2008a), Kerr (2008b), and Kerr and Lincoln (2010). The algorithm applies the ethnic-name database from the Melissa Data Corporation and manually codes any remaining unmatched names. Exploiting the fact that certain names are unique to one ethnicity or prevalent across multiple ethnicities, this algorithm assigns each homebuyer a probability of belonging to a specific ethnicity based on their first and last names. If a name is unique to one ethnicity, the buyer will be assigned to the respective ethnicity with a probability of one. For names common among multiple ethnicities, the technique uses the demographic breakdown in the metropolitan statistical area (MSA) where the property is located for assigning probabilities. For example, a person with the name Jia Li would be assigned to the Chinese ethnicity group with a probability of one. Someone with the name John Lee, who could be of Chinese, Korean, or American ethnicity, would be assigned to each of the three ethnic groups with probabilities based on the proportion of Chinese, Korean, and Americans in the MSA where the purchase took place. In total, eight ethnicities are distinguished by the name-matching technique: Anglo-Saxon/English, Chinese, European, Hispanic, Indian, Japanese, Korean, and Russian. The match rate of the names from the housing transaction data is 97%.

As the first step of constructing the measures of foreign housing transactions, we keep only transactions made by buyers belonging to one of the seven non-Anglo-American ethnic groups with a probability of one.⁹

⁹ Continuing with the example of Jia Li and John Lee from above, the first step of our algorithm would keep Jia Li's housing purchase in our sample but drop John Lee's purchase given the ambiguity of his ethnicity.

Step Two. We keep only all-cash housing transactions made by non-Anglo-Americans.

This step is motivated by the fact that foreigners have limited access to the U.S. mortgage market: non-U.S. citizens without lawful residency in the United States are not eligible for Fannie Mae, Freddie Mac, or Federal Housing Administration home loans, and have difficulty obtaining financing through private lenders.¹⁰ Furthermore, the NAR reports that most nonresident foreign buyers make all-cash home purchases, while a much smaller fraction of resident foreign buyers do so.¹¹ While our measures may be on the conservative side of the true magnitude as a result of this filtering because they do not reflect foreign purchases financed by U.S. private lenders, focusing on cash-only transactions allows us to more accurately identify foreign purchases, especially considering the opacity of the mortgage market for nonresident foreigners. Moreover, given the small size of non-all-cash transactions made by nonresident foreigners, they likely play a minor role in driving real economic conditions.

Step Three. Restricting the sample to all-cash purchases by non-Anglo-Americans is a necessary but insufficient criterion for identifying foreign real estate transactions, as the sample may still include purchases by resident non-Anglo-Americans—those who normally reside in the United States. We thus adjust our measures to keep only nonresident transactions.¹²

For each non-Anglo-American foreigner group, we construct its nonresident all-cash housing transaction value (or count) as the difference between its overall all-cash housing transaction value (or count) and that of its corresponding U.S. resident population. Our estimates for the latter are based on the assumption that resident non-Anglo-Americans' propensity to make all-cash purchases is comparable to that of Anglo-Americans. This assumption is motivated by the fact that all lawful residents in the United States have similar access to home loans. It is supported in the data, as most non-Anglo-American foreign ethnic groups indeed behave similarly to Anglo-Americans in their propensity for making all-cash real estate purchases, as shown in [Internet Appendix Figure IA.1](#).

Given the three-step imputation algorithm, the formula for constructing the total adjusted housing transaction value (*fHTV*) of each foreigner group *f* at

¹⁰ Mortgages for foreigners through private lenders carry high interest rates and require borrowers to make large down payments in the range of 30% to 50%.

¹¹ According to the “2014 Profile of International Activity in U.S. Residential Real Estate” published by the NAR, 76% of nonresident foreign buyers made all-cash purchases, while merely 33% of resident foreign buyers paid all cash.

¹² While the overall real effects may be driven by both resident and nonresident purchases, we focus on nonresident transactions to isolate foreign capital inflows and identify their effects on local economies.

ZIP code z and year t is

$$fHTV_{zt} = \left[HTV_{fzt}^{\text{cash}} - \frac{HTV_{Azt}^{\text{cash}}}{HTV_{Azt}} \times HTV_{fzt} \right] \frac{HTV_{Azt}}{HTV_{Azt} - HTV_{Azt}^{\text{cash}}}, \quad (1)$$

where HTV_{fzt}^{cash} denotes the unadjusted all-cash housing transaction value of foreigner group f at ZIP code z and year t , and A denotes the Anglo-American ethnic group. The formula for constructing $fHTC$ is analogous. Details on the derivation of the formulas are presented in [Internet Appendix A](#).

Our algorithm provides a tractable method for quantifying foreign housing purchases in the United States using available data.¹³ While previous studies often divide neighborhoods into binary groups based on the “home bias abroad” assumption that foreign groups are more likely to buy into areas with more preexisting source-country residents (see, e.g., [Badarinza and Ramadorai 2018](#); [Gorback and Keys 2020](#)), our measures reveal the intensity of foreign housing purchases, which enables us to estimate the elasticity of local real outcomes with respect to foreign capital inflows.

1.3 Patterns of foreign real estate capital inflows

Using the measures $fHTV$ and $fHTC$, we examine home-purchasing behavior by each foreigner group f in the United States over time and across neighborhoods.

Fact 1: A China shock in the U.S. real estate market. We begin by examining the evolution of housing purchases made by foreigners in the Californian real estate market over the sample period. Figure 1A illustrates the share of total housing transactions, as measured by dollar value, made by seven foreigner groups: Chinese, European, Hispanic, Indian, Japanese, Korean, and Russian. While purchases by six of the seven groups appear negligible over the entire period, those by foreign Chinese increased sharply from 2008 to 2013. The percentage of housing transactions by foreign Chinese, while comparable to the other groups before 2008, soared in 2008 and stayed persistently high thereafter, reaching 3.5% of total housing transaction value in California by 2013. That is more than a 30-fold increase in transaction value.

Figure 1B plots the share of housing transactions by count made by the seven foreigner groups. It shows a similar pattern to Figure 1A. The fact that the pattern of foreign Chinese housing transaction count is similar to that of value suggests that Chinese buyers have been purchasing residential real estate across a full spectrum of homes, not only high-end ones.

¹³ While our algorithm does not account for foreign residential real estate purchases through corporations (e.g., for tax avoidance)—a consideration in [Badarinza and Ramadorai \(2018\)](#) about the London housing market—such purchases are uncommon in our sample, as less than 6% of the transactions originate from business entities. Moreover, this issue is likely not notable in our context because we focus on single-family homes, whereas corporate purchases tend to be concentrated in high-end properties. Indeed, our subsequent analysis shows that the real effects of foreign housing transaction count are just as strong as, if not stronger than, those of housing transaction value, which indicates that our results are not driven by purchases of high-end properties.

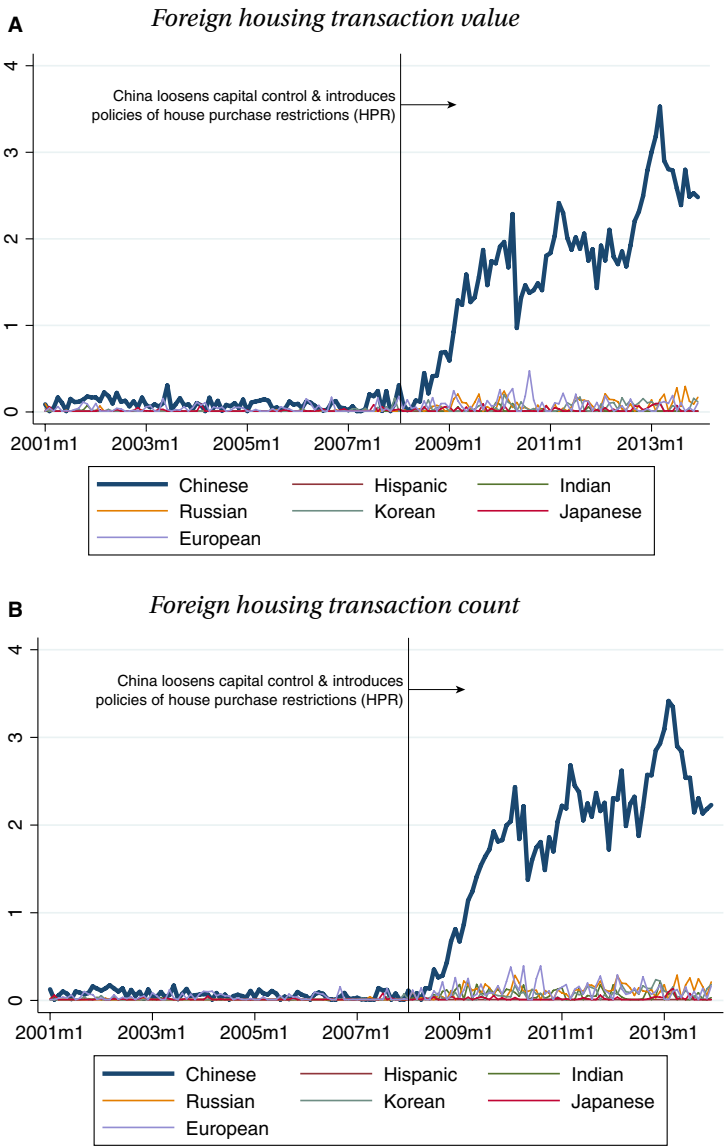


Figure 1
Foreign home purchases in the Californian real estate market

Panel A plots the share of total housing transactions by dollar value made by seven groups of foreigners in the three largest core-based statistical areas (CBSAs) in California. Panel B plots the analog for the share of housing transactions by count. The vertical line marks the timing of China's policies of capital control loosening and housing purchase restrictions. The sample period runs monthly from 2001 to 2013. Source: DataQuick and authors' calculations.

Figure 1 also reveals the noncyclical nature of real estate capital inflows: those by foreign Chinese were persistent during periods of both economic decline and growth in the United States. This characteristic differentiates real estate capital flows from traditional forms of international capital flows, which tend to be procyclical (Kaminsky, Reinhart, and Végh 2004; Avdjiev et al. 2022).

In sum, we document a China shock in the U.S. real estate market in 2008, and that the surge has persisted thereafter. This observation echoes reports from the NAR that the Chinese have become the leading group of foreign buyers in the U.S. real estate market (see, e.g., “2015 Profile of International Activity in U.S. Residential Real Estate”). Moreover, the timing of the shock in 2008 is consistent with initial reports of increasing foreign Chinese home purchases by the NAR and anecdotes of such activities in the media.¹⁴ In Internet Appendix B.1, we discuss how the relaxation of capital controls in China and a series of housing purchase restrictions (HPRs) introduced by the Chinese government in late 2007 likely played a key role in inducing the China shock.

Fact 2: Home bias of foreign Chinese housing purchases. We next examine the spatial distribution of these home purchases by foreign Chinese buyers. We explore the cross-sectional relation between foreign Chinese housing purchases and historical ethnic Chinese population share. Panels A and B of Figure 2 show foreign Chinese housing transaction value and count, normalized by total housing transaction value and count, respectively, from 2008 to 2013 as a function of the historical ethnic Chinese population share at the ZIP code level by decile. ZIP codes with a greater concentration of ethnic Chinese population historically witness significantly more housing purchases by foreign Chinese, as measured by both value and count. In particular, foreign Chinese housing purchases in ZIP codes in the 9th and 10th deciles of the historical ethnic Chinese population share are about two and four times higher, respectively, than those in the 8th decile.¹⁵

Panels A and B of Figure 3 illustrate the difference in foreign home purchases between ZIP codes in the top two deciles of the ethnic Chinese population share based on data from the 2000 Census Bureau survey and those in the bottom eight deciles. For foreign Chinese housing transactions, the difference amounts to 6% of the total real estate transaction value and count

¹⁴ For instance, multiple news articles in 2008 report that waves of cash-rich Chinese formed tour groups to house-hunt in the United States. See “Chinese tourists’ hot souvenir: U.S. homes,” 7 Dec. 2008, *Los Angeles Times*; “Chinese arriving to buy bargain U.S. homes,” 12 Feb. 2009, *Daily Bulletin*.

¹⁵ We have run a test to identify whether there exists a structural break in foreign Chinese housing purchases using a bootstrap data set (sampled 1,000 times with replacement). The test shows that a structural break, as reflected by a significant jump in the slope of the fitted regression line, occurs at ZIP codes in the 8th decile of the historical ethnic Chinese population.

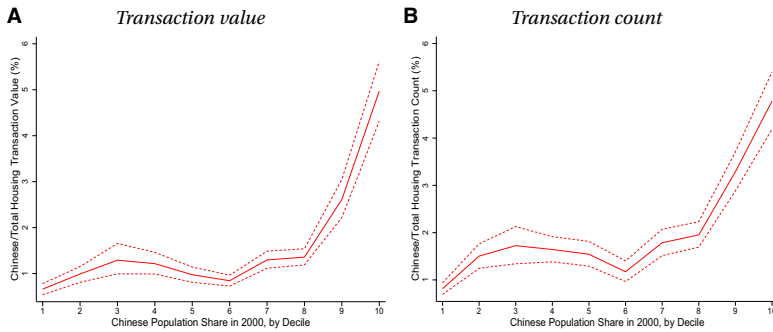


Figure 2

Foreign Chinese housing purchases versus historical ethnic Chinese population

Panel A shows foreign Chinese housing transaction share, as measured by value, between 2008 and 2013 as a function of historical ethnic Chinese population at the ZIP code level by decile based on the 2000 Census Bureau Survey. Panel B shows the analog for foreign Chinese housing transaction share, as measured by count. The dotted lines denote the 95% confidence intervals based on 1,000 bootstrap samples. Source: DataQuick, Census Bureau, and authors' calculations.

by 2013.¹⁶ This pattern reveals a form of home bias: housing purchases made by foreign Chinese tend to be concentrated in areas historically populated by ethnic Chinese.

The pattern of home bias in foreign Chinese housing purchases is consistent with the “preferred habitats” theory in finance, which contends that heterogeneous investors prefer different subsets of assets within a broader asset class. Moreover, this phenomenon verifies the “home bias abroad” assumption in [Badarinza and Ramadorai \(2018\)](#). Recent literature has proposed explanations that could explain this kind of clustered housing purchase behavior including preferences for neighborhood amenities ([Bayer, Ferreira, and McMillan 2007](#); [Wong 2013](#)) and lower information and contractual frictions because of trust or cultural affinity ([Chaney 2014](#); [Badarinza, Ramadorai, and Shimizu 2022](#)). We explore whether these forces drive the home bias observed in our context. We find that foreign Chinese tend to buy into neighborhoods with better school quality and a greater presence of Chinese restaurants, and they are more likely to buy from ethnic Chinese sellers than non-Chinese buyers. Therefore, the spatial distribution of foreign Chinese housing purchases is plausibly influenced by both preferences and information frictions. [Internet Appendix B.2](#) provides the details of our analysis.

Given the dominance of home purchases by foreign Chinese buyers relative to all other foreigner groups, we focus on the real effects of foreign Chinese housing purchases in the subsequent analysis. The measures for foreign Chinese housing purchases are Chinese housing transaction value (*CHTV*) and

¹⁶ In absolute terms, foreign Chinese housing transactions make up approximately 7% of the total housing transaction value and count in the top-two-decile neighborhoods.

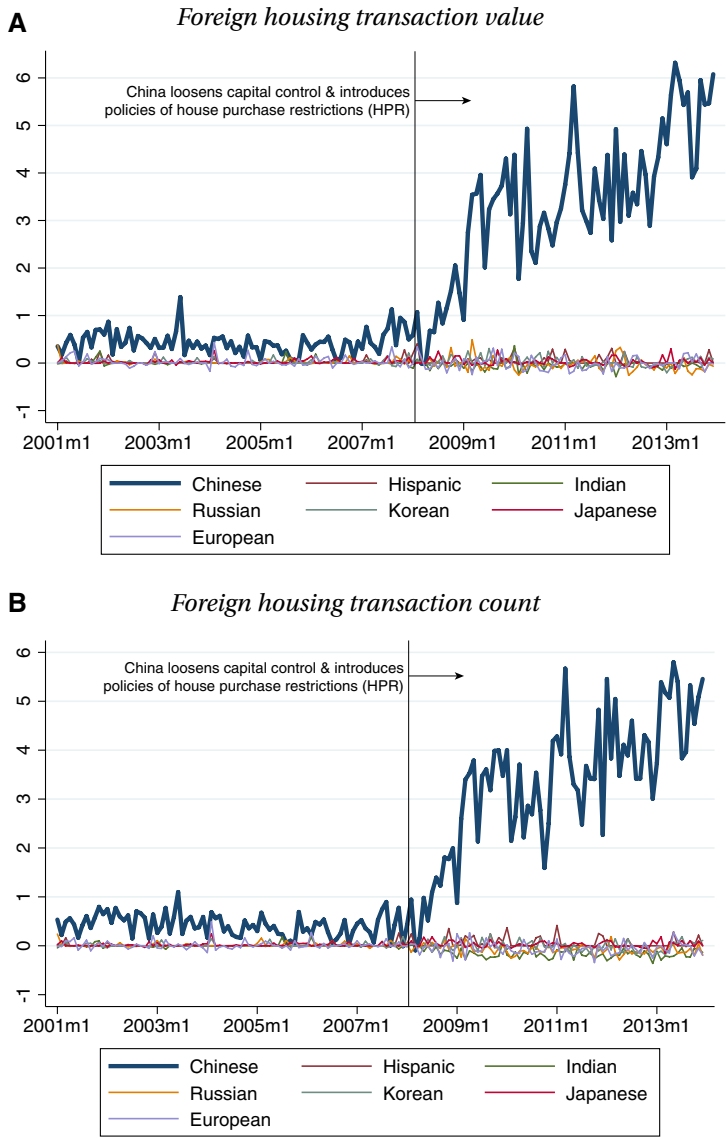


Figure 3
Foreign home purchases in the Californian real estate market: Difference between ZIP codes in top two versus bottom eight deciles of the ethnic Chinese population share
Panel A plots the difference in foreign housing transaction share, as measured by value, between ZIP codes in the top two and bottom eight deciles of the ethnic Chinese population (based on the 2000 Census Bureau survey) in the three largest core-based statistical areas (CBSAs) in California. Panel B plots the analog for foreign housing transaction share by count. The vertical line marks the timing of China's policies of capital control loosening and housing purchase restrictions. The sample period runs monthly from 2001 to 2013. Source: DataQuick and authors' calculations.

Chinese housing transaction count (*CHTC*), constructed based on Equation (1), where $f=C$ for Chinese.

2. Conceptual Framework

In this section, we present a stylized framework to conceptualize the real effects of foreign housing capital inflows for local economies and generate testable qualitative predictions for the subsequent empirical analysis. Our model builds upon [Mian and Sufi \(2014\)](#) and extends it in three key dimensions: we introduce a housing sector, allow mobility in cross-regional commuting, and characterize the underlying channels.

2.1 Environment and initial equilibrium

Consider an economy composed of two regions, $z \in \{0, 1\}$. Each region produces two types of goods, nontradable (denoted with superscript N) and tradable (denoted with superscript T), and has a fixed housing stock ($H_z = H$).¹⁷ The tradable good is freely traded across regions, but residents in each region must consume the nontradable good produced locally.¹⁸ Workers are allowed to switch between sectors within a region and commute between regions (i.e., work in one region and reside in another). For simplicity, we assume that space is a divisible good; as such, equilibrium housing prices are determined by the interaction between local workers' demand for space and the fixed supply of housing.¹⁹

Let D_z denote the nominal income in each region, which consists of wage and rental income (rebated to local residents). Workers residing in region z have Cobb-Douglas preferences over nontradable good (C_z^N), the tradable good (C_z^T), and housing (C_z^H), with prices P_z^N , P_z^T , and P_z^H , respectively. The consumption of goods and housing can be expressed as $P_z^N C_z^N = \alpha D_z$, $P_z^T C_z^T = \beta D_z$, and $P_z^H C_z^H = (1 - \alpha - \beta) D_z$, where α , β , and $1 - \alpha - \beta$ are the income shares on the respective goods. Suppose that production is governed by a constant returns technology with employed labor, e , as the sole input. Outputs of the nontradable and tradable good are then given by $y_z^N = a e_z^N$ and $y_z^T = b e_z^T$,

¹⁷ We assume a fixed housing stock both for simplicity and to highlight the core mechanism of the model. This assumption is reasonable given our empirical setting because i) our data focus on housing transactions in California, which imposes one of the most stringent requirements on residential housing permits in the country, and ii) our analysis is at the ZIP code level at an annual frequency, and there is likely little fluctuation in the stock of single-family homes at this level of variation. If the model were extended to incorporate a housing supply function, the key insights of the model would stay the same as long as housing supply is not perfectly elastic.

¹⁸ This assumption, which follows [Mian and Sufi \(2014\)](#), captures the fact that consumption of nontradable goods depends on local demand, while consumption of tradable goods relies more diffusely on national demand.

¹⁹ The assumption that housing is divisible implies that there is no utility penalty from downsizing into a smaller unit. Accounting for nondivisible housing consumption would require modeling the dynamic decision of renting or owning houses, which we do not do to maintain tractability and highlight the key mechanisms driving the real effects of foreign real estate capital inflows.

respectively, where a and b are productivity parameters. Total employment in each region is normalized such that $e_z^T + e_z^N = 1$.

We first solve the model under a set of symmetric assumptions. In the initial state, the local economy is self-sufficient and achieves full employment, and all workers work and consume at the location of their residence (i.e., no commuting). Using the tradable good as the numeraire, wages in the two sectors are given by $w_z^N = aP_z^N$ and $w_z^T = bP_z^T = b$. Free mobility of labor between sectors means that wage is equal between them, $w_z^N = w_z^T = w_z = b$. The equilibrium prices, wage, output, and employment are as follows, where superscript (*) denotes the initial equilibrium:

$$\text{Prices: } P_z^{N*} = \frac{b}{a}; \quad P_z^{T*} = 1; \quad P_z^{H*} = \frac{1-\alpha-\beta}{\alpha+\beta} \frac{b}{H};$$

$$\text{Wage: } w_z^{N*} = w_z^{T*} = b \equiv w;$$

$$\text{Nominal income: } D_z^* = w + P_z^{H*} H = b + \frac{1-\alpha-\beta}{\alpha+\beta} b = \frac{b}{\alpha+\beta};$$

$$\text{Employment: } e_z^{N*} = \frac{\alpha}{\alpha+\beta}; \quad e_z^{T*} = \frac{\beta}{\alpha+\beta}.$$

2.2 Equilibrium under a real estate capital inflow shock

Suppose now that Region 1 faces an exogenous increase in housing demand from a group of foreigners, resulting in a surge in real estate capital inflows:

$$H = C_1^H + C_f^H,$$

where C_1^H denotes housing demand by local workers, and C_f^H denotes housing demand by the foreigner group f .²⁰

We proceed to solve for the new equilibrium. Departing from the initial equilibrium, commuting is now relevant. A share of workers, δ ($\in [0, 1]$), from Region 1 may choose to live in Region 0 and commute to Region 1 for work. These commuters (indexed by i) have to pay an individual-specific commuting cost, ϕ_i , which varies across individuals based on their commuting distance between work and residence and takes on the distribution $\phi_i \sim F(\phi)$.²¹ In addition, we assume that each commuter consumes a share of goods, λ , at the location of residence, and the remaining share, $1-\lambda$, at the location of employment.

²⁰ We treat a real estate capital inflow shock as a housing demand shock, an approach commonly used in contemporaneous studies, including Gorbach and Keys (2020), Cvijanović and Spaenjers (2021), and Favilukis and Van Nieuwerburgh (2021).

²¹ Our assumption that commuting cost is heterogeneous across workers follows the convention in papers using spatial models such as Desmet and Rossi-Hansberg (2013). It is also consistent with empirical evidence documented in the literature, including Roberto (2008) and Le Barbanchon, Rathelot, and Roulet (2021).

In the new equilibrium, nominal incomes for goods consumption in Region 1 and Region 0 are $D_1 = b(1 - \lambda\delta) + P_1^H H$ and $D_0 = b(1 + \lambda\delta) + P_0^H H$, respectively.²² Housing market clearing conditions are $H = C_1^H + C_f^H = (1 - \alpha - \beta) \frac{b(1 - \delta) + P_1^H H}{P_1^H} + C_f^H$ for Region 1 and $H = C_0^H = (1 - \alpha - \beta) \frac{b(1 + \delta) + P_0^H H}{P_0^H}$ for Region 0, which can be rewritten as

$$\text{Region 1: } P_1^H = \frac{(1 - \alpha - \beta)b(1 - \delta)}{(\alpha + \beta)H - C_f^H}; \quad (2a)$$

$$\text{Region 0: } P_0^H = \frac{(1 - \alpha - \beta)b(1 + \delta)}{(\alpha + \beta)H}. \quad (2b)$$

Workers will choose to commute if their real wage conditional on commuting is greater: $\frac{w_1}{(P_1^N)^{\alpha}(P_1^T)^{\beta}(P_1^H)^{1-\alpha-\beta}} < \frac{w_1(1-\phi_i)}{(P_0^N)^{\alpha}(P_0^T)^{\beta}(P_0^H)^{1-\alpha-\beta}}$.²³ That is,

$$P_1^H > P_0^H \left(\frac{1}{1 - \phi_i} \right)^{\frac{1}{1-\alpha-\beta}}. \quad (3)$$

If the housing price in Region 1 is too high, some workers will choose to commute. Substituting Equations (2a) and (2b) into (3) yields the cutoff commuting cost:

$$\phi_i < 1 - \left[\left(1 - \frac{C_f^H}{(\alpha + \beta)H} \right) \left(\frac{1 + \delta}{1 - \delta} \right) \right]^{1-\alpha-\beta}. \quad (4)$$

Let this (endogenous) cutoff be denoted by ϕ . Workers with commuting cost $\phi_i < \phi$ will choose to commute, and the equilibrium number of commuters is $\delta = F(\phi)$.

We can thus solve for ϕ with

$$1 - \left[\left(1 - \frac{C_f^H}{(\alpha + \beta)H} \right) \left(\frac{1 + F(\phi)}{1 - F(\phi)} \right) \right]^{1-\alpha-\beta} = \phi. \quad (5)$$

This equation shows that a positive foreign housing demand shock increases the number of commuters.²⁴ Equations (2a), (2b), and (5) jointly determine the equilibrium house prices, P_0^H and P_1^H , and number of commuters, δ .

²² We assume that foreign buyers do not physically move into the purchased properties, which gives rise to vacancy in Region 1. This assumption is motivated by anecdotal and empirical evidence. Our subsequent finding that foreign Chinese housing purchases are not accompanied by a significant inflow of immigrants also supports the assumption (see Section 4.2). Given this assumption, foreign buyers do not demand local goods.

²³ Since all commuters earn the same wage in equilibrium based on our simple model setup, commuting cost can be considered to be a fraction of wage for simplicity. This modeling choice does not qualitatively affect the model predictions.

²⁴ By applying the implicit function theorem to Equation (5), we can show that $\partial\phi/\partial C_f^H \geq 0$, and thus $\partial\delta/\partial C_f^H \geq 0$.

Employment effect. Given our interest in understanding the real effects of foreign housing purchases, we focus on analyzing the impact of a foreign housing demand shock on local employment and the underlying channels. Total employment in the two regions is affected by the number of commuters.²⁵ As the number of commuters increases in response to a positive foreign housing demand shock, total employment in Region 1 increases, while that in Region 0 declines.

Local employment in the nontradable sector in equilibrium is pinned down by the demand for the nontradable good:

$$e_1^N = \frac{\alpha D_1}{\alpha P_1^N} = \frac{\alpha b(1-\lambda\delta) + \alpha P_1^H H}{b} = \underbrace{\frac{\alpha}{b} P_1^H H}_{\text{housing net worth channel}} + \underbrace{\alpha(1-\lambda\delta)}_{\text{displacement channel}}; \quad (6a)$$

$$e_0^N = \frac{\alpha D_0}{\alpha P_0^N} = \frac{\alpha b(1+\lambda\delta) + \alpha P_0^H H}{b} = \underbrace{\frac{\alpha}{b} P_0^H H}_{\text{housing net worth spillover}} + \underbrace{\alpha(1+\lambda\delta)}_{\text{displacement spillover}}. \quad (6b)$$

Equation (6a) shows that a foreign housing demand shock affects local nontradable-sector employment in Region 1 through two opposing forces. On the one hand, greater foreign housing demand increases local house prices, which raises local housing net worth and hence demand for the local nontradable good, driving up local nontradable-sector employment—a housing net worth channel. On the other hand, the resulting higher living costs in Region 1 drive out some local residents, lowering the demand for local nontradable goods—a displacement channel. In Region 0, a positive foreign Chinese housing demand shock increases local nontradable-sector employment through two spillover forces that work in the same direction, as shown in Equation (6b).²⁶

Local employment in the tradable sector can be determined by taking the difference between total employment and employment in the nontradable sector. A positive foreign housing demand shock also affects local tradable-sector employment in Region 1 through two opposing forces. On the one hand, the increased labor demand in the nontradable sector in Region 1 due to the housing net worth channel lowers the amount of available labor to produce the tradable good there. On the other hand, workers from Region 0 who commute to Region 1 constitute an extra supply of labor and contribute to the production

²⁵ In practice, workers may choose to commute to another region for work because of higher wages, better amenities, lower job search frictions, or agglomeration forces. One could consider introducing these elements in a more elaborate model.

²⁶ The first force is a housing net worth spillover channel: because of the displacement effect in Region 1, house prices in Region 0 are pushed up, which raises local housing net worth, the demand for the local nontradable good, and thereby nontradable-sector employment. The second force is a displacement spillover channel: for the commuters who are driven out of Region 1, a portion of their consumption now occurs in Region 0, which also pushes up demand for Region 0's nontradable good and nontradable-sector employment.

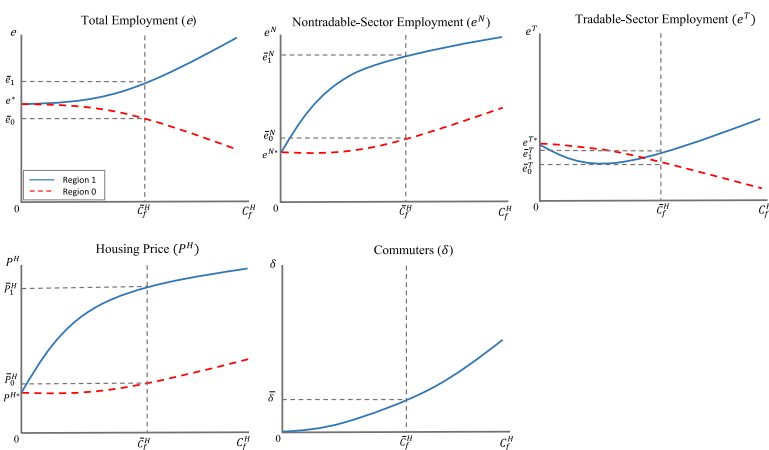


Figure 4

Local effects of a positive foreign housing demand shock, stylized diagram

This figure provides a stylized illustration of the effects of a positive foreign housing demand shock (C_f^H) on local total employment (e), nontradable-sector employment (e^N), tradable-sector employment (e^T), house prices (P^H), and number of commuters (δ) in Regions 1 (the directly impacted region) and 0. The lines show the comparative statics across different equilibria under different amounts of foreign housing demand shock, where the blue solid line denotes the set of equilibria for Region 1 and the red dotted line denotes that for Region 0. When there is no foreign housing demand shock, $C_f^H = 0$, the local economy for both regions is at the initial equilibrium, with total employment at e^* , nontradable-sector employment at e^{N*} , tradable-sector employment at e^{T*} , housing price at P^{H*} , and number of commuters at zero. The gray dotted lines plot the equilibrium under a positive foreign demand shock of magnitude \bar{C}_f^H . The total employment in Regions 1 and 0 is \bar{e}_1 and \bar{e}_0 , respectively, nontradable-sector employment is \bar{e}_1^N and \bar{e}_0^N , tradable-sector employment is \bar{e}_1^T and \bar{e}_0^T , housing price is \bar{P}_1^H and \bar{P}_0^H , and the number of commuters is $\bar{\delta}$.

of the tradable good. The overall effect on the tradable-sector employment depends on which of the two forces dominates, which in turn depends on the size of the foreign demand shock. In Region 0, these two forces work in the same direction and lower employment in the tradable sector.

We simulate the model to examine its predictions on the real effects of a positive foreign housing demand shock, which reveal the relative importance of the housing net worth and displacement channel in driving local nontradable- and tradable-sector employment. The simulation is discussed in detail in [Internet Appendix C](#), and Figure 4 summarizes the key qualitative predictions of the model through a stylized diagram. It illustrates the impact of a positive foreign housing demand shock on local (total, nontradable-sector, and tradable-sector) employment, house prices, and number of commuters. The plot shows the comparative statics across different equilibria in the two regions for different amounts of foreign housing demand shock, C_f^H , with the blue solid line denoting the set of equilibria for Region 1 and the red dotted line denoting that for Region 0. When there is no foreign housing demand shock, that is, $C_f^H = 0$, the economy is at the initial equilibrium, where total employment is

e^* and housing price is P^{H*} in both regions, and there are no commuters. When there is a positive foreign demand shock of magnitude \bar{C}_f^H , total employment in Regions 1 and 0 is \bar{e}_1 and \bar{e}_0 , respectively, as denoted by the gray dotted lines. Similarly, nontradable-sector employment is e_1^N and e_0^N , tradable-sector employment is \bar{e}_1^T and \bar{e}_0^T , housing price is \bar{P}_1^H and \bar{P}_0^H , and the number of commuters is $\bar{\delta}$. Taken together, our model predicts that a positive foreign housing demand shock increases nontradable-sector employment in the directly impacted region, as the housing net worth channel tends to dominate the displacement channel, while the effect on tradable-sector employment is ambiguous.

Model predictions. In sum, the model yields the following predictions on the effects of a positive foreign housing demand shock on the local economy:

1. A positive shock in foreign housing demand increases total employment in the directly impacted region.
2. The employment effect is driven by a housing net worth channel: an increase in foreign housing demand leads to a rise in local housing prices.
3. The employment effect is also affected by a displacement channel: an increase in foreign housing demand leads to a rise in the displacement of local residents.
4. The employment effect is concentrated in the nontradable sector, driven by the housing net worth channel as the dominant force.

3. Empirical Framework

Directed by the conceptual framework, we proceed to empirically test the employment effect of the China shock in the U.S. real estate market and study the underlying roles of the housing net worth and the displacement channels. To that end, we estimate an empirical model of the following general form:

$$\ln(Y_{zt}) = \alpha + \theta \ln(CHTV_{zt}) + \beta \ln(CHTV_{zt}) \times \mathbb{I}\{t \geq 2008\} + \gamma' X_{z,0} + \eta_{ct} + \varepsilon_{zt} \quad (7a)$$

$$\ln(Y_{zt}) = \tilde{\alpha} + \tilde{\theta} \ln(CHTC_{zt}) + \tilde{\beta} \ln(CHTC_{zt}) \times \mathbb{I}\{t \geq 2008\} + \tilde{\gamma}' X_{z,0} + \tilde{\eta}_{ct} + \tilde{\varepsilon}_{zt}, \quad (7b)$$

where Y_{zt} denotes the outcome variables of interest in ZIP code z and year t ; $CHTV_{zt}$ denotes foreign Chinese housing transaction value measured based on Equation (1); $CHTC_{zt}$ denotes the corresponding count measure; $\mathbb{I}\{t \geq 2008\}$ is an indicator variable that takes the value 1 if the year is 2008 or later, and 0 otherwise, intended to capture the timing of the China shock in the U.S. real estate market; $X_{z,0}$ is a vector of ZIP code-level socioeconomic and geographic controls, including population, population density, and education (measured as the share of the population with a bachelor's degree) from the presample

year 2000, an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (calculated as the change in income between 1998 and 2001) and of the respective dependent variable (calculated as its change between 1996 and 2000); η_{ct} and $\tilde{\eta}_{ct}$ are county-year fixed effects; and ε_{zt} and $\tilde{\varepsilon}_{zt}$ are disturbance terms.

Our coefficients of interest, β and $\tilde{\beta}$, measure the extent to which ZIP codes that received more foreign Chinese real estate capital inflows (i.e., faced a greater China shock) experienced a greater change in economic conditions after 2008—when the Chinese government introduced policies of capital control loosening and HPR, and foreign Chinese housing purchases surged in the United States. We are able to directly estimate the elasticities of real outcomes with respect to these inflows because we have carefully quantified their magnitudes, which is a key contribution of our analysis, as existing studies mostly use reduced-form evidence based on discrete proxies of foreign capital.

Our estimations rely exclusively on within-county cross-ZIP code variation for identification given the county-year fixed effects, which relieves concerns about confounding factors such as heterogeneous county-level economic developments (e.g., the tech boom in Silicon Valley). The ZIP code-level controls account for characteristics that may systematically affect local labor and housing markets. We condition the effects on the postshock period because of the clear trend break in capital inflows from China to the U.S. real estate market shown in Figures 1 and 3. A specification with such an interaction term allows for more flexibility in the estimation because it accounts for potentially different effects in pre- and postshock regimes and identifies the impact of foreign Chinese housing purchases off of the trend break.²⁷

However, ordinary least squares (OLS) estimates of Equations (7a) and (7b) may suffer from omitted variables bias. There may be unobserved factors that correlate with both foreign Chinese housing capital inflows and local economic conditions, such as crowding out of domestic homebuyers from ZIP codes that experience large Chinese capital inflows and growth potential of the targeted neighborhoods.²⁸ These factors could lead to either negative or positive bias in the OLS estimates.

²⁷ Essentially, this specification applies a generalized difference-in-differences framework with continuous treatment: we are comparing economic outcomes of locations that witnessed large amounts of foreign Chinese housing purchases to those with few foreign Chinese purchases before and after the China shock. This empirical strategy is similar to that in Berger, Turner, and Zwick (2020), which studies the effects of a housing market stimulus policy. Moreover, we show in Internet Appendix Table IA.4 that our results remain qualitatively the same using a specification unconditioned on the postshock period. Nevertheless, one does not know ex-ante whether the conditioning matters. Therefore, a specification that compares pre-to-post differences in economic conditions between regions with high versus low foreign Chinese housing purchases tends to be more flexible and conservative.

²⁸ Increased foreign Chinese housing demand in specific neighborhoods could crowd out domestic buyers from these neighborhoods and shift their focus to the surrounding ones. This could have a positive effect on the employment and home prices of the latter neighborhoods and, in turn, dampen the relative impact of Chinese capital inflows on the real economy of the targeted ZIP codes. This scenario would lead to a negative bias in the OLS estimates of Equations (7a) and (7b). The growth potential of neighborhoods may be another unobserved factor that could result in omitted variable bias. On the one hand, foreign Chinese may seek neighborhoods with

To address the concern, we implement an IV approach that exploits the second fact—home bias in foreign Chinese housing purchases. We utilize cross-ZIP code variation in the concentration of historical ethnic Chinese to identify differential exposure to real estate capital inflows from China. We instrument foreign Chinese housing transaction value ($CHTV$) and count ($CHTC$) with weighted aggregate foreign Chinese housing transaction value and count in California, respectively, with preexisting shares of ethnic Chinese population at the ZIP code level as weights. Specifically, our instrumental variables are $CHShare_{z,0} \times CHTV_t$ and $CHShare_{z,0} \times CHTC_t$, where $CHShare_{z,0}$ is the ethnic Chinese population share in ZIP code z from the presample year 2000 and $CHTV_t$ ($CHTC_t$) is a time-varying measure of the total housing transaction value (count) by foreign Chinese in California.²⁹

Our IV strategy fundamentally uses cross-sectional variation in local ethnic Chinese population share to identify foreign Chinese housing demand. The approach is numerically equivalent to that using a Bartik (1991) instrument, whose underlying identification lies in cross-sectional variation (Goldsmith-Pinkham, Sorkin, and Swift 2020).³⁰ Similar approaches that exploit the spatial variation of historical immigrant distribution have been applied to study the effects of immigrants on the labor markets (Card 2001); the effects of ancestral composition on FDI (Burchardi, Chaney, and Hassan 2019); and, similar to our context, the effects of foreigners' house purchases on house prices (Badarinza and Ramadorai 2018).

Our research design essentially combines an IV approach with a DID framework. This combination enhances identification over the traditional time-series analysis on the effects of capital inflows because it makes use of both the cross-sectional and time-series variation of those flows in the estimation. The exclusion restriction relies on the assumption that, conditioning on ZIP code-level characteristics and county-year fixed effects, the historical ethnic Chinese population shares do not systematically influence changes in local economic conditions including employment and house prices except through higher Chinese real estate capital inflows (i.e., via home bias abroad).³¹ We

better prospects of house price appreciation and employment opportunities, leading to a positive bias in OLS estimation. On the other hand, they may buy in locations where demand by local residents has already peaked and house prices have plateaued, which would lead to a negative bias in OLS estimation (Cvijanović and Spaenjers 2021).

²⁹ We take the logarithm of the instrumental variables to account for the skewness of their distribution, as illustrated in Figure 2.

³⁰ A typical Bartik instrument is constructed by taking the product of ex-ante regional industry shares and industry-level aggregate shocks, making the instrument varying at the regional level. In our context, the parallel to "industry" is foreigner group, and we focus on one group—the foreign Chinese. When the instruments are applied to Equations (7a) and (7b), the time-varying component of the IVs, total foreign Chinese housing transaction value or count in California ($CHTV_t$ or $CHTC_t$), is absorbed by the county-year fixed effects.

³¹ Because the ethnic Chinese population distribution varies at the ZIP code level, we do not control for ZIP code fixed effects in the regressions, as doing so would absorb the useful variation we leverage for identification. In Internet Appendix D, we apply a standard DID specification in which ZIP code fixed effects are included, and our results remain robust.

recognize that, unconditionally, the historical ethnic Chinese population may be correlated with certain local characteristics, such as income and education, that could affect local conditions. We thus control for such characteristics, including pre-sample period population, education, income trend, and trends in the outcome variable of interest. We also include population density and proximity to universities as urban controls.

There may be concerns that the exclusion restriction is violated because our instruments may be correlated with a few other demand- or supply-side factors that in turn affect local real outcomes. On the demand side, the local ethnic Chinese population is conceivably related to the immigration inflow from China. However, our subsequent analysis suggests that housing capital inflows from China are not accompanied by an inflow of immigrants. This is not surprising as studies have shown that foreign Chinese tend to leave their houses abroad vacant (Rosen et al. 2017, Simons et al. 2016). Also, data from the *Yearbook of Immigration Statistics*, published by the U.S. Department of Homeland Security, show that there was not a significant jump in the admission of immigrants from China after the China shock. In fact, the number declined slightly: the number of Chinese who obtained permanent residence in the United States was 87,307 in 2006, decreased to 64,238 in 2009, and reverted to 71,798 in 2013.

On the supply side, one may wonder whether a productivity boom or land regulations in the United States confounds the estimated effects of real estate capital inflows from China. For example, if locations with higher ethnic Chinese population density happened to experience an employment boom after 2008 (the Silicon Valley tech boom), this would contaminate the estimated employment effects. Another potential concern is that these locations may impose stricter land regulations and hence have a more restrictive housing supply, which would drive up house prices. Given that our identification relies on variation at the ZIP code level with the inclusion of county-year fixed effects, we control for shocks at the county level, which ameliorates worries about differential technology booms and land policy. Moreover, we later show that the positive employment effect is concentrated in the nontradable sectors, which further abates concerns related to confounding effects from technology-led jobs.

Summary statistics of key variables. To construct the outcome and control variables for estimating Equations (7a) and (7b), we collect several ZIP code-level data, in addition to the real estate transaction data described in Section 1 for imputing foreign Chinese housing capital inflows. Our two key sets of outcome variables are ZIP code-level employment and house prices. Data for employment come from the Census Bureau ZIP Codes Business Patterns, which provides annual statistics on employment size and number of establishments at the ZIP code level, with the former also available at the level of two- through six-digit North American Industry Classification System

Table 1
Summary statistics of key variables

	All periods (2001–2013)		Preshock period (2001–2007)		Postshock period (2008–2013)	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Chinese transaction						
$CHTV$ (\$)	2.43M	4.95M	1.04M	1.54M	3.11M	5.83M
$CHTC$	5.53	10.69	1.69	2.22	7.43	12.55
$\ln(CHTV)$	13.76	1.40	13.24	1.23	14.02	1.46
$\ln(CHTC)$	0.79	1.30	0.11	0.88	1.13	1.34
Total housing transaction						
Value (\$)	138.18M	98.31M	188.65M	120.33M	113.13M	73.40M
Count	303.89	224.95	372.44	249.63	269.85	203.26
Top-two-decile Chinese ZIP codes						
$\ln(CHTV)$	14.50	1.34	13.83	1.18	15.01	1.23
$\ln(CHTC)$	1.15	1.30	0.47	1.06	1.67	1.23
Bottom-eight-decile Chinese ZIP codes						
$\ln(CHTV)$	13.45	1.31	12.86	0.91	13.68	1.37
$\ln(CHTC)$	0.64	1.27	−0.12	0.65	0.95	1.33
Outcome variables						
Log total employment	9.20	0.95	9.31	0.90	9.15	0.97
Log nontradable employment	8.11	0.90	8.21	0.84	8.06	0.92
Log tradable employment	5.95	1.93	6.17	1.94	5.84	1.92
Log establishment number	6.53	0.76	6.59	0.70	6.51	0.79
Log house price	13.21	0.59	13.19	0.55	13.22	0.61
Log number of tax filings	9.63	0.55	9.61	0.50	9.64	0.56
Log household income	11.07	0.53	11.05	0.51	11.08	0.54

This table presents the summary statistics of the key variables in the data set at the ZIP code-year level. Columns 1–2 show the annual means and standard deviations across ZIP codes for the whole sample period (2001–2013). Columns 3–4 show the summary statistics for the pre-China shock period (2001–2007), and columns 5–6 for the post-China shock period (2008–2013). Foreign Chinese housing transaction value ($CHTV$) and count ($CHTC$) are constructed using the three-step imputation algorithm described in Section 1.2. “Top-two-decile Chinese ZIP codes” refer to ZIP codes in the top two deciles of the historical ethnic Chinese population share—ZIP codes that received more foreign Chinese housing capital inflows. “Bottom-eight-decile Chinese ZIP codes” refer to those in the bottom eight deciles of the historical ethnic Chinese population share—ZIP codes that received less foreign Chinese housing capital inflows. Source: DataQuick, Zillow, Census Bureau, Internal Revenue Service, and authors’ calculations.

(NAICS) code. For house prices, we use the Zillow Home Value Index for single-family homes, which is a smoothed, seasonally adjusted measure of the median home value in each ZIP code. For control variables, we collect information on ZIP code-level population and education (measured as the share of population with a bachelor’s degree) from the Census Bureau as well as that on income from the Internal Revenue Service.

Table 1 shows the summary statistics of the key variables at the ZIP code-year level. Columns 1 and 2 show the means and standard deviations of the variables for the full sample period of 2001–2013. To give a sense of their evolution, we also present the summary statistics for two subperiods—the pre-China shock period from 2001 to 2007 and the post-China shock period from 2008 to 2013—in columns 3–4 and columns 5–6, respectively.

The top panel shows the summary statistics of the dollar value and count of housing transactions by foreign Chinese buyers ($CHTV$ and $CHTC$, respectively) and by all buyers in the sample. The average per-unit value of

housing transactions of foreign Chinese buyers is comparable to that of the average buyer in the sample, which suggests that the results in this study are not skewed by high-end real estate purchases. Housing transactions by foreign Chinese increased dramatically after 2007. Whereas each ZIP code witnessed 1.69 housing transactions by foreign Chinese for a total value of \$1.04 million per year during the pre-China shock period on average, these figures jumped to 7.43 transactions and \$3.11 million, respectively, during the postshock period. It is interesting to note that foreign Chinese housing transactions surged at a time when overall transactions declined relative to the pre-China shock level.

The middle panel presents the annual means and standard deviations of $\ln(CHTV)$ and $\ln(CHTC)$, the two key regressors in Equations (7a) and (7b), separately for ZIP codes that received more foreign Chinese housing capital inflows—those in the top two deciles of the historical ethnic Chinese population share as shown in Figures 3 and 2 and analogous to Region 1 in our conceptual framework—and ZIP codes that received less—those in the bottom eight deciles. ZIP codes in the top two deciles saw an average increase of 1.18 for $\ln(CHTV)$ and 1.20 for $\ln(CHTC)$ between the preshock and postshock periods, while those in the bottom eight deciles saw corresponding increases of 0.82 and 1.07, respectively. These differences in $\ln(CHTV)$ and $\ln(CHTC)$ across locations and time will help interpret the economic magnitudes of the estimation results in the next section.

The bottom panel shows the summary statistics of the outcome variables. While their mean values appear similar between the two subperiods, there is considerable heterogeneity across ZIP codes, which we exploit to estimate the real effects of foreign Chinese housing purchases.

4. Real Effects of Foreign Chinese House Purchases

In this section, we present the main results on the employment effect of foreign Chinese house purchases and analyze the roles of the housing net worth and displacement channels in driving the effect.

4.1 Employment effect

To test the model prediction on the employment effect of foreign Chinese house purchases (prediction 1 from Section 2), we estimate Equations (7a) and (7b) with employment size as the outcome variable and report the results in columns 1–2 of Table 2. In all results tables, those from specifications using $\ln(CHTV)$ as the main regressor are shown in odd-numbered columns, and those using $\ln(CHTC)$ are shown in even-numbered columns.

The results show that foreign Chinese home purchases have a positive and significant effect on the local labor market. A 1% increase in housing demand by foreign Chinese, as measured by transaction value and count, raises local employment by 0.124% and 0.247%, respectively. These results

Table 2
Foreign Chinese housing demand and total employment

	Total Employment		Number of Establishments	
	(1)	(2)	(3)	(4)
$\ln(CHTV) \times Post$	0.124** (0.060)		0.128*** (0.045)	
$\ln(CHTV)$	0.043 (0.092)		-0.014 (0.070)	
$\ln(CHTC) \times Post$		0.247*** (0.095)		0.236*** (0.074)
$\ln(CHTC)$		-0.024 (0.112)		-0.077 (0.086)
Controls	Yes	Yes	Yes	Yes
County-year FE	Yes	Yes	Yes	Yes
First Stage <i>F</i> -statistic	56	30	59	30
Obs.	4,166	4,166	4,166	4,166

This table reports regression results from Equations (7a) and (7b) with log total employment size (columns 1–2) and log number of establishments (columns 3–4) as dependent variables. *CHTV* (*CHTC*) denotes foreign Chinese housing transaction value (count) instrumented by the weighted aggregate Chinese housing transaction value (count) in California, with the preexisting shares of ethnic Chinese population across ZIP codes as weights. *Post* is an indicator variable that takes the value 1 if the year is 2008 or after, and 0 otherwise. All regressions control for pre-sample period ZIP code-level population, population density, education (share of population with a bachelor's degree), an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (1998–2001) and of the outcome variable (1996–2000). Standard errors, shown in parentheses, are clustered at the ZIP code level. **p* < .1; ***p* < .05; ****p* < .01.

support the model prediction on the employment effect of foreign real estate capital inflows. The finding that the marginal effect of an additional unit of foreign Chinese purchase is greater than that of an additional dollar indicates that the employment effect is not driven by purchases of higher-end homes.

The first-stage regression *F*-statistics, reported at the bottom of Table 2, range from 30 to 59, indicating that our instrumental variables have strong predictive power for foreign Chinese housing purchases, consistent with Figure 2.³² In addition, the coefficients on $\ln(CHTV)$ and $\ln(CHTC)$ capture any preexisting differences in economic conditions between neighborhoods with high and low Chinese housing purchases before the China shock, providing a natural pre-trend test. These coefficients are small in magnitude and insignificant statistically, supporting that our results are driven by the China shock.

To understand the economic magnitude of our results, we compute the differential employment effect of the China shock between neighborhoods that received more foreign Chinese housing capital inflows—ZIP codes in the top two deciles of the historical ethnic Chinese population share—and neighborhoods that received less—ZIP codes in the bottom eight deciles. More specifically, we gauge the impact of the China shock—defined as the change in mean $\ln(CHTV)$ and $\ln(CHTC)$ from the preshock period to the postshock period—on employment between the two groups of ZIP codes. We multiply

³² More detailed first-stage results are shown in Internet Appendix Table IA.1.

the key coefficients of interest from Table 2 (0.124 and 0.247 in columns 1 and 2) by the corresponding differences in mean $\ln(CHTV)$ and $\ln(CHTC)$ between the two groups of ZIP codes and between the pre- and postshock periods shown in the middle panel of Table 1 (0.36 and 0.13, respectively).³³ Our results imply that employment in ZIP codes in the top two deciles increased by 3.2%–4.5% more than those in the bottom eight deciles in response to the China shock, conditional on their pre-shock period differences in foreign capital inflows.

Next, we dive deeper into the employment effect by exploring the extensive margin of adjustment: namely, did foreign Chinese capital inflows increase total employment size by inducing new establishments? As shown in columns 3 and 4 of Table 2, we find a strong positive effect at the extensive margin. A 1% increase in housing demand by foreign Chinese, as measured by transaction value and count, increases the number of local establishments by 0.128% and 0.236%, respectively. In terms of economic magnitude, our results imply that the number of establishments in ZIP codes in the top two deciles of the historical Chinese population share increased by 3.1%–4.6% more than those in the bottom eight deciles in response to the China shock.

4.2 Channels underlying the employment effect

We next turn to dissect the channels underlying the employment effect of foreign Chinese housing demand. Specifically, we test the model predictions on the role of the housing net worth channel versus the displacement channel in driving the effect (predictions 2–3) and assess whether the former channel dominates the latter (prediction 4).

Housing net worth channel. The housing net worth channel posits that higher foreign housing demand increases local employment through a positive effect on local house prices: higher house prices raise local housing net worth and hence demand for local goods and local employment in the nontradable sector. To test these predictions, we first examine the effect of the surge in foreign Chinese housing purchases on local house prices.

We estimate regression Equations (7a) and (7b) with house prices, measured by (log) Zillow Single-Family Home Value Index, as the outcome variable. The results in columns 1–2 of Table 3 show that real estate capital inflows from China significantly increase local house prices, consistent with the housing net worth channel prediction. A 1% increase in housing demand by foreign Chinese, as measured by transaction value and count, increased the local Zillow

³³ The figure 0.36 is calculated from $(15.01 - 13.83) - (13.68 - 12.86)$, where the first difference is the difference in the mean values for $\ln(CHTV)$ between the pre- and postshock periods for the top-two-decile ZIP codes, and the second difference is the corresponding difference for the bottom-eight-decile ZIP codes. Similarly, 0.13 is calculated from the corresponding differences for $\ln(CHTC)$. We take the difference in average foreign Chinese housing transactions between the pre- and postshock periods in addition to that between the two decile groups to account for preexisting differences in transactions between the two groups in the preperiod. This calculation method is used to compute all the economic magnitudes mentioned subsequently.

Table 3
Foreign Chinese housing demand, local home prices, and displacement

	Home Prices (Zillow)		Home Prices (Transactions)		Number of Tax Returns	
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(CHTV) \times Post$	0.108*** (0.021)		0.145*** (0.019)		-0.035*** (0.013)	
$\ln(CHTV)$	-0.030 (0.027)		-0.058** (0.024)		0.021 (0.017)	
$\ln(CHTC) \times Post$		0.195*** (0.042)		0.251*** (0.043)		-0.061*** (0.022)
$\ln(CHTC)$		-0.084** (0.040)		-0.125*** (0.037)		0.039* (0.024)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
County-year FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage <i>F</i> -stat.	58	25	65	27	53	22
Obs.	3,893	3,893	4,152	4,152	3,927	3,927

This table reports regression results from Equations (7a) and (7b) with log Zillow Single-Family Home Value Index (columns 1–2), log housing transaction values from DataQuick (columns 3–4), and log number of tax filers (columns 5–6) as dependent variables. *CHTV* (*CHTC*) denotes foreign Chinese housing transaction value (count) instrumented by the weighted aggregate foreign Chinese housing transaction value (count) in California, with the preexisting shares of ethnic Chinese population across ZIP codes as weights. *Post* is an indicator variable that takes the value 1 if the year is 2008 or after, and 0 otherwise. All regressions control for pre-sample period ZIP code-level population, population density, education (share of population with a bachelor's degree), an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (1998–2001) and of the outcome variable (1996–2000). Columns 3–4 additionally control for home characteristics, including number of bathrooms, square footage, and age of the home. * $p < .1$; ** $p < .05$; *** $p < .01$.

Single-Family Home Value Index by 0.108% and 0.195%, respectively. In terms of economic magnitude, our results imply that the China shock increased house prices in ZIP codes in the top two deciles of the historical Chinese population share by 2.5%–3.9% more than those in ZIP codes in the bottom eight deciles. Also, the finding that foreign Chinese housing purchase count induces a greater marginal effect than volume supports the role of the housing net worth channel because a higher quantity of foreign purchases likely reduces the housing stock available for local residents to a greater degree than does higher volume.

Additionally, we run the regressions using housing transaction prices from DataQuick as a dependent variable, which allows us to study the effects of Chinese capital inflows on local house prices through the lens of newly transacted houses. For these regressions, we control for ZIP code averages of the hedonic characteristics of the houses, including number of bathrooms, square footage, and age of the home, in addition to the baseline controls. The results, shown in columns 3–4 of Table 3, are slightly larger in magnitude than those using the Zillow Home Price Index as a dependent variable: a 1% increase in the housing demand by foreign Chinese, as measured by transaction value and count, increases local home transaction prices by 0.145% and 0.251%, respectively.

Our results on the positive house price effect of foreign Chinese housing purchases are consistent with findings in the existing literature, such as

Badarinza and Ramadorai (2018) and Gorbach and Keys (2020).³⁴ We contribute to it by going beyond the asset price effect and showing that house prices serve as a mechanism through which foreign Chinese housing demand shocks are transmitted to the local real economy.

Displacement channel. Besides the housing net worth channel, our conceptual framework posits that a competing channel—a displacement channel—could also be at play underlying the employment effect of foreign Chinese real estate capital inflows: foreign housing demand could drive out local residents and demand for local goods, leading to a decline in local nontradable-sector employment.

To test this mechanism, we examine how foreign Chinese housing transactions affect the number of income tax returns at the ZIP code level, a measure that has been used as a proxy for the number of local residents in the literature (see, e.g., Greenland, Lopresti, and McHenry 2019).³⁵ The data are based on administrative records of individual income tax returns (Forms 1040) from the IRS. All Chinese who earned income or studied in the United States should be reflected in the tax returns. Foreign Chinese without appropriate work or student visas can stay in the United States only on a temporary basis (typically less than six months) and are unlikely to drive the employment results. While the change in the number of tax filers is not a perfect measure of migration, it provides a reasonable approximation.

The regression results are shown in columns 5 and 6 of Table 3. We find a negative and significant relation between foreign Chinese housing transactions and the number of tax filings, which suggests that, on net, foreign Chinese house purchases drive out local residents. A 1% increase in foreign Chinese housing demand, as measured by transaction value and count, lowers the number of tax filings by 0.035% and 0.061%, respectively. This result is consistent with the displacement channel and implies that real estate capital inflows from China did not induce a significant immigration wave.

The observation that foreign Chinese housing purchases are not accompanied by a significant inflow of immigrants can be reconciled with studies and anecdotal evidence showing that foreign Chinese tend to leave their houses abroad vacant. Studies by Rosen et al. (2017) and Simons et al. (2016) find that foreign Chinese real estate buyers tend to use their purchased properties in the United States as neither primary residences nor rental properties. In some cases, their housing purchases are positively related to the number of

³⁴ It is, however, difficult to quantitatively benchmark our estimates of the elasticity of house prices with respect to foreign real estate capital inflows because most of the previous studies do not estimate such an elasticity due to a lack of precise measures of foreign real estate capital inflows. Instead, they estimate the difference in house prices between neighborhoods with high and low preexisting source-country residents, applying the “home bias abroad” assumption.

³⁵ A more direct outcome variable for this test would be migration inflow and outflow counts. However, to our knowledge, migration data are not collected at the ZIP code level.

Chinese investors in the EB-5 Immigrant Investor Visa Program, who tend to be more interested in obtaining green cards for their children than extracting returns from their real estate investments. The tendency of foreign Chinese real estate buyers to leave housing properties vacant is not surprising in light of a similar practice in China. Glaeser et al. (2017) show that housing vacancy rates in China are much higher than those in the United States, reaching more than 20% in major Chinese cities in 2012. Cvijanović and Spaenjers (2021) find a similar pattern using data on nonresident real estate purchases in Paris. They show that few properties bought by nonresidents are rented out, which echoes reports about foreign Chinese real estate owners acting as “absentee landlords.”

Housing net worth versus displacement channel. To assess the relative importance of the housing net worth versus the displacement channel, we examine the effect of foreign Chinese housing demand on local nontradable-sector employment, as guided by our theoretical framework. If the housing net worth channel dominates, we anticipate an increase in nontradable-sector employment in response to higher foreign Chinese housing purchases, and vice versa. Additionally, we investigate the relation between foreign Chinese demand and tradable-sector employment, which our model predicts to be ambiguous.

To test these predictions, we reestimate the baseline regression equations using nontradable-sector and tradable-sector employment as dependent variables. We categorize the sectors based on the industry classification from Mian, Rao, and Sufi (2013). A four-digit NAICS industry is defined as tradable if it has imports plus exports equal to at least \$10,000 per worker, or if its total exports plus imports exceed \$500 million, while nontradable industries include retail, restaurant, and sectors related to construction, real estate, or land development.

Table 4 reports the regression results. Housing purchases by foreign Chinese have a positive and significant effect on local nontradable-sector employment but do not appear to strongly affect tradable-sector employment. A 1% increase in *CHTV* and *CHTC* raises nontradable-sector employment by 0.160% and 0.282%, respectively (columns 1 and 2). In terms of economic magnitude, our estimates imply that nontradable employment in ZIP codes in the top two deciles of the historic Chinese population share increased by 3.7%–5.8% more than those in the bottom eight deciles in response to the China shock. These results support the model prediction that a housing net worth channel serves as the dominant mechanism in driving the employment effect of Chinese capital inflows. The insignificant effect on tradable-sector employment is also consistent with the model prediction.

One may wonder whether the strong relation between foreign Chinese housing purchases and nontradable-sector employment is driven by an increase in construction-sector employment since higher house prices could stimulate housing construction projects. We test this conjecture by rerunning

Table 4
Foreign Chinese housing demand, employment by sector, and average income

	Nontradable		Tradable		NT excl. Const.		Average Income	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(CHTV) \times Post$	0.160*** (0.057)		−0.006 (0.139)		0.103* (0.059)		0.073*** (0.021)	
$\ln(CHTV)$	−0.054 (0.089)		0.378* (0.206)		−0.010 (0.092)		−0.084** (0.034)	
$\ln(CHTC) \times Post$		0.282*** (0.090)		0.120 (0.205)		0.190** (0.089)		0.114*** (0.033)
$\ln(CHTC)$		−0.130 (0.107)		0.342 (0.244)		−0.062 (0.110)		−0.121*** (0.043)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage <i>F</i> -stat.	55	30	54	30	55	30	53	22
Obs.	4,164	4,164	4,098	4,098	4,164	4,164	3,927	3,927

This table reports regression results from Equations (7a) and (7b) with log nontradable-sector employment (columns 1–2), log tradable-sector employment (columns 3–4), log nontradable non-construction-sector employment (columns 5–6), and log average household income (columns 7–8) as dependent variables. *CHTV* (*CHTC*) denotes the foreign Chinese housing transaction value (count) instrumented by the weighted aggregate foreign Chinese housing transaction value (count) in California, with the preexisting shares of ethnic Chinese population across ZIP codes as weights. *Post* is an indicator variable that takes the value 1 if the year is 2008 or after, and 0 otherwise. All regressions control for pre-sample period ZIP code-level population, population density, education (share of population with a bachelor's degree), an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (1998–2001) and of the outcome variable (1996–2000). Standard errors, shown in parentheses, are clustered at the ZIP code level. * $p < .1$; ** $p < .05$; *** $p < .01$.

the regressions excluding the construction sector from nontradable-sector employment. The results are reported in columns 5 and 6 of Table 4. We still find a positive and significant link between foreign Chinese housing purchases and nontradable-sector employment. While the magnitude of coefficients is smaller, these results show that most of the employment effect is concentrated in the nontradable, nonconstruction sectors, further supporting the housing net worth channel prediction.

While the housing net worth channel appears to be the dominant mechanism, the displacement of local residents in response to foreign Chinese housing purchases could also affect local employment through a change in the composition of local residents in terms of household income. If displacement leaves only households with higher income in the original neighborhoods, demand for local nontradable goods and thereby employment could increase with an endogenous shift in neighborhood amenities towards those catering to higher-income households, a channel demonstrated by [Almagro and Domínguez-Iino \(2021\)](#). We explore this idea by examining the impact of foreign Chinese housing purchases on average local household income. As shown in columns 7 and 8 of Table 4, the average income of households in the ZIP codes that experienced a surge in foreign Chinese housing purchases increased significantly. A 1% increase in *CHTV* and *CHTC* is associated with a 0.073% and 0.114% increase in average income, respectively. This result suggests that endogenous adjustment in neighborhood amenities resulting from the

displacement effect may be an additional avenue through which Chinese real estate capital inflows could impact local employment.

5. Robustness and Discussion

In this section, we first test the validity of our identification strategy and assess the robustness and external validity of our results. We then discuss their distributional implications.

5.1 Validation and robustness

Event study and parallel trends. A key assumption underlying our estimation is that of parallel trends, which stipulates that, in the absence of the surge in real estate capital inflows from China, employment and house prices between the more ethnic Chinese-concentrated neighborhoods and others would have similar trajectories, conditioning on our ZIP code-level controls and county-time fixed effects. To test the validity of this assumption, we estimate the event-study versions of regressions (7a) and (7b), in which we interact *CHTV* and *CHTC* with a series of year dummies, controlling for the same set of ZIP code-level controls and fixed effects:

$$\ln(Y_{zt}) = \alpha + \theta \ln(CHTV_{zt}) + \sum_{k=2001}^{2013} \beta_k \ln(CHTV_{zt}) \times \mathbb{I}\{t=k\} + \gamma X_{z,0} + \eta_{ct} + \varepsilon_{zt} \quad (8a)$$

$$\ln(Y_{zt}) = \tilde{\alpha} + \tilde{\theta} \ln(CHTC_{zt}) + \sum_{k=2001}^{2013} \tilde{\beta}_k \ln(CHTC_{zt}) \times \mathbb{I}\{t=k\} + \tilde{\gamma} X_{z,0} + \tilde{\eta}_{ct} + \tilde{\varepsilon}_{zt}, \quad (8b)$$

where $\mathbb{I}\{t=k\}$ are indicator variables for the years k . The coefficients β_k and $\tilde{\beta}_k$ estimate the dynamic effects of the China shock, with 2007 used as the reference year (i.e., the coefficients for that year are set to zero). For the parallel trend assumption to hold, these time-varying coefficients on the interaction terms should be significantly different from zero only for the post-China shock years.

Figure 5 plots the estimated coefficients on the dynamic effects of the China shock on total employment (panels A and B), nontradable-sector employment (panels C and D), and tradable-sector employment (panels E and F). The left panels are based on *CHTV* as the main regressor, and the right panels are based on *CHTC*. Focusing first on the effect on total employment, we find that the key coefficients are not statistically different from zero before the China shock in 2008, which indicates that the employment conditions of neighborhoods across varying ethnic Chinese concentration shares exhibit parallel pretrends, conditioning on the controls. The coefficients turn positive and significant at the 10% level in the postshock period from the specification

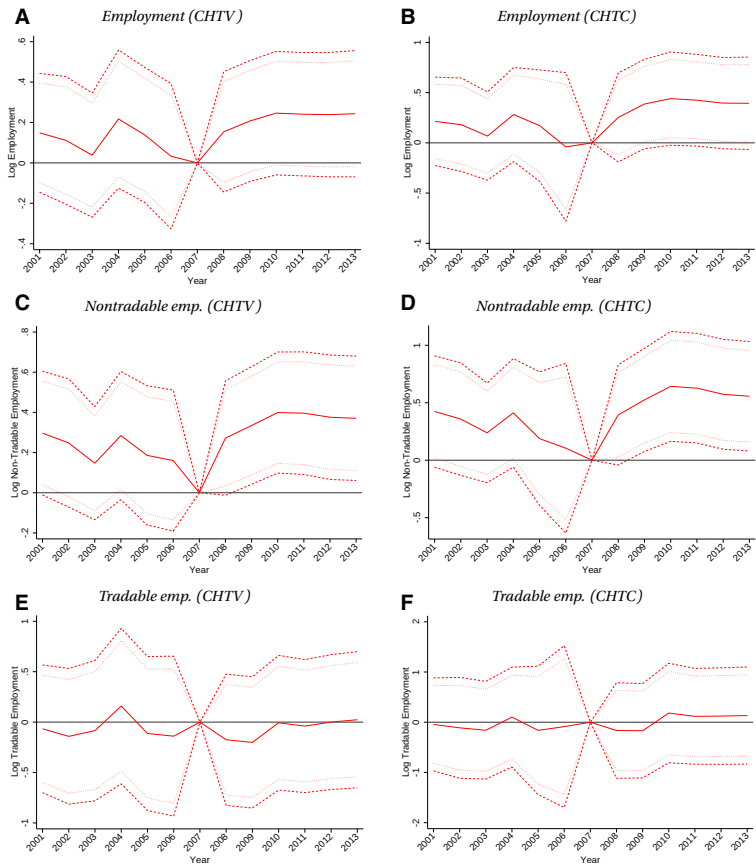


Figure 5
The dynamic effects of foreign Chinese housing demand on local employment

This figure plots the coefficients on the interaction terms between foreign Chinese housing transaction value or count (*CHTV* or *CHTC*) and a series of year dummies from regression Equations (8a) and (8b). The dependent variables are log total employment size (panels A–B), log nontradable-sector employment (panels C–D), and log tradable-sector employment (panels E–F). The left panels are based on *CHTV* as the main regressor, and the right panels are based on *CHTC*. The regressions control for pre-sample period ZIP code-level population, population density, education (population share with a bachelor's degree), and pretrends of income (1998–2001) and of the outcome variable (1996–2000), as well as county-year fixed effects, with 2007 used as the reference period. The 95% and 90% (in a lighter color) confidence intervals are drawn based on standard errors clustered at the ZIP code level.

with *CHTC* as the main regressor, while the postshock effects using *CHTV* are weaker statistically (just outside the 10% level of significance). Estimating the coefficients dynamically year by year comes at the expense of reduced statistical power given the lower degree of freedom, resulting in wider confidence intervals. Our baseline specifications improve the statistical power of the estimations by comparing the pooled effects from the preshock to the postshock years.

For the dynamic effects of the China shock on nontradable-sector employment, we also find that the key coefficients are not statistically different from zero before the China shock in 2008 and turn positive and significant in the postshock period. For tradable-sector employment, the estimated coefficients for the post-China shock period are statistically indistinguishable from those for the preshock period. These results support the parallel trend assumption and are consistent with our findings on the housing net worth channel from Section 4.2. Figure IA.6 of the Internet Appendix illustrates the dynamic effects of the China shock on local home prices, which also supports the parallel trend assumption.

Reverse causality test. Furthermore, we conduct a reverse causality test to examine whether foreign Chinese have been targeting neighborhoods that systematically differ in preexisting economic conditions. We estimate the following regression specifications:

$$\Delta(Y_{\text{pre},z}) = \alpha_0 + \beta_0 \ln(\text{CHTV}_{08-13,z}) + \gamma_0 X_z + \eta_c + \epsilon_z \quad (9a)$$

$$\Delta(Y_{\text{pre},z}) = \tilde{\alpha}_0 + \tilde{\beta}_0 \ln(\text{CHTC}_{08-13,z}) + \tilde{\gamma}_0 X_z + \tilde{\eta}_c + \tilde{\epsilon}_z, \quad (9b)$$

where $Y_{\text{pre},z}$ denotes employment size and household income from two preshock periods, the pre-China capital control and HPR policy shock period of 2001–2007 and the presample period of 1996–2000 for employment and of 1998–2001 for income, in ZIP code z ; $\text{CHTV}_{08-13,z}$ denotes foreign Chinese housing transaction value between 2008 and 2013 for ZIP code z ; X_z denotes ZIP code-level control variables including population, population density, and education; and η_c denotes county fixed effects. The coefficient of interest is β_0 . If the ZIP codes that attracted more foreign Chinese capital inflows had systematically better economic conditions, β_0 would be positive and significant.

Table 5 shows the regression results. The estimates of β_0 are statistically and economically insignificant, indicating that ex-post foreign Chinese capital inflows are not correlated with ex-ante local employment and household income, conditioning on our controls. In other words, it does not appear that neighborhoods that attracted more foreign Chinese capital inflows after 2008 had better economic conditions before the shock.

Financial crisis. Despite the observation that ZIP codes with a higher ethnic Chinese concentration are not systematically different from other ZIP codes before the China shock, we are still concerned that the differences in their real outcomes after 2008 may be driven by factors other than foreign Chinese housing capital inflows. In particular, given that the timing of the initial surge in capital inflows coincided with the global financial crisis of 2007–2008, one concern may be that neighborhoods populated by more ethnic Chinese were affected by the crisis differently than other neighborhoods. For instance,

Table 5
Reverse causality test

	Pre-policy shock period				Presample period			
	Employment		Income		Employment		Income	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(CHTV_{08-13})$	0.014 (0.012)		-0.005 (0.004)		-0.016 (0.012)		0.008 (0.009)	
$\ln(CHTC_{08-13})$		0.016 (0.013)		-0.006 (0.005)		-0.018 (0.013)		0.010 (0.010)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F -stat.	161	127	161	127	163	129	162	127
Obs.	628	628	628	628	629	629	627	627

This table reports regression results from Equations (9a) and (9b). The dependent variables are log change in total employment size and income from either the pre-China shock (2001–2007) or presample period (1996–2000 for employment and 1998–2001 for income). $CHTV_{08-13}$ ($CHTC_{08-13}$) denotes the log change in foreign Chinese housing transaction value (count) between 2008 and 2013, which is instrumented by the pre-sample period shares of ethnic Chinese population across ZIP codes. All regressions control for ZIP code-level population, population density, education (population share with a bachelor's degree), and county fixed effects. Standard errors, shown in parentheses, are clustered at the ZIP code level. * $p < .1$; ** $p < .05$; *** $p < .01$.

these neighborhoods may have weathered the crisis better and thus experienced smaller declines in employment and house prices.

We address this concern in two ways. First, we analyze the employment and house price effects of foreign Chinese real estate capital inflows for the postcrisis period of 2012–2013.³⁶ The results, reported in columns 1–2 of Table 6, are in line with our baseline results in both magnitude and significance. These results are also reflected in the event study plots in Figure 5. The fact that our results hold for both the crisis and postcrisis periods alleviates concern about potential confounds due to the financial crisis.

Second, we include an additional set of control variables that plausibly capture neighborhoods' differential ability to withstand the financial crisis in the regressions: (i) the share of foreclosed homes in each ZIP code, as neighborhoods that experienced more foreclosures were likely more affected by the crisis (Campbell, Giglio, and Pathak 2011; Mian, Sufi, and Trebbi 2015); (ii) the share of all-cash housing transactions in each ZIP code, as neighborhoods that saw more all-cash transactions were likely more insulated from the crisis; and (iii) the share of employment in the financial sector in each ZIP code, as neighborhoods more exposed to the financial sector—which was hit the hardest by the crisis—were likely more affected by the crisis. The results, shown in columns 3–8 of Table 6, are qualitatively and quantitatively similar to the baseline results, which further alleviates our concern about potential confounding effects.

³⁶ We consider 2012–2013 to be the postcrisis period because house prices in California were on a declining trend until 2012Q1 based on the California House Price Index from the U.S. Federal Housing Finance Agency.

Table 6
Foreign Chinese housing demand, employment, and house prices: Controlling for financial crisis confounding factors

A. Total employment								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(CHTV) \times Post$	0.137** (0.066)		0.164** (0.065)		0.116* (0.062)		0.129** (0.059)	
$\ln(CHTV)$	0.052 (0.099)		0.001 (0.091)		0.058 (0.099)		0.030 (0.093)	
$\ln(CHTC) \times Post$		0.243** (0.102)		0.293*** (0.105)		0.233** (0.094)		0.251*** (0.094)
$\ln(CHTC)$		0.013 (0.117)		-0.083 (0.116)		0.000 (0.119)		-0.037 (0.112)
Standard Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Foreclosure	Foreclosure	All-cash Transactions	All-cash Transactions	Financial Sector	Financial Sector
County-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Postperiod	2012-13	2012-13	2008-13	2008-13	2008-13	2008-13	2008-13	2008-13
First-stage F -stat.	46	31	51	22	63	29	57	31
Obs.	2,410	2,410	3,877	3,877	4,166	4,166	4,166	4,166
B. Home prices (Zillow)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(CHTV) \times Post$	0.120*** (0.022)		0.074*** (0.020)		0.102*** (0.020)		0.108*** (0.021)	
$\ln(CHTV)$	-0.019 (0.028)		-0.015 (0.025)		-0.020 (0.029)		-0.031 (0.027)	
$\ln(CHTC) \times Post$		0.199*** (0.041)		0.128*** (0.035)		0.184*** (0.039)		0.195*** (0.042)
$\ln(CHTC)$		-0.054 (0.037)		-0.050 (0.035)		-0.065 (0.041)		-0.085** (0.040)
Standard Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Foreclosure	Foreclosure	All-cash Transactions	All-cash Transactions	Financial Sector	Financial Sector
County-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Postperiod	2012-13	2012-13	2008-13	2008-13	2008-13	2008-13	2008-13	2008-13
First-stage F -stat.	46	25	58	21	64	24	59	25
Obs.	2,249	2,249	3,645	3,645	3,893	3,893	3,893	3,893

This table reports regression results from Equations (7a) and (7b) with log total employment size (panel A) and log Zillow Single-Family Home Value Index (panel B) as dependent variables. $CHTV$ ($CHTC$) denotes the foreign Chinese housing transaction value (count) instrumented by the weighted aggregate foreign Chinese housing transaction value (count) in California, with the pre-sample period shares of ethnic Chinese population across ZIP codes as weights. $Post$ is an indicator variable that takes the value 1 if the year is 2008 or after, and 0 otherwise. All regressions control for the pre-sample period ZIP code-level population, population density, education (population share with a bachelor's degree), an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (1998–2001) and of the outcome variable (1996–2000). Columns 1–2 show the results for the post-global financial crisis period of 2012–2013. Columns 3–4 additionally control for the share of foreclosed homes in each ZIP code. Columns 5–6 additionally control for the share of all-cash house transactions in each ZIP code. Columns 7–8 additionally control for the size of the financial sector, measured as the share of financial sector employment in each ZIP code. All the additional controls are time-varying. Standard errors, shown in parentheses, are clustered at the ZIP code level. * $p < .1$; ** $p < .05$; *** $p < .01$.

Additional analyses. We conduct additional analyses to assess the validity of our identification strategy and the robustness of the baseline results. We present the key takeaways below and relegate the details to [Internet Appendix D](#). First, we perform a balance test to detect any potential violation of the exclusion restriction in the cross-sectional variation of our IV before the China shock, following [Goldsmith-Pinkham, Sorkin, and Swift \(2020\)](#). [Internet Appendix Table IA.2](#) shows that the historical ethnic Chinese population distribution is uncorrelated with the preshock outcomes. Second, we

apply a standard difference-in-differences empirical design to provide a simple estimate of the differential employment and house price effects between ZIP codes in the top two deciles of the historical ethnic Chinese population and those in the bottom eight deciles. Consistent with our baseline findings, [Internet Appendix Table IA.3](#) shows that after the China shock in 2008, employment and house prices in the top-two-decile ZIP codes are significantly higher than the rest, conditioning on either ZIP code-level characteristics or ZIP code and time fixed effects. Third, we run a version of Equations (7a) and (7b) without the post-China shock period interaction, which gives the average effects of foreign Chinese housing purchases for the entire sample period. [Internet Appendix Table IA.4](#) shows that foreign Chinese home purchases have a positive and significant effect on the local labor and housing market on average, again in line with the baseline results.

External validation. We assess the external validity of our results by comparing the elasticity of employment to housing net worth implied by our estimates to those in the literature. Using data from the 2010 Survey of Consumer Finances and the American Community Survey, we compute an age-weighted housing asset-to-equity ratio for each ZIP code in our sample.³⁷ They range from 1.89–2.70, excluding outliers outside the 1st and 99th percentiles. We combine the reciprocal of these housing asset-to-equity ratios (i.e., leverage ratios) with the estimated coefficients of interest from column 1 of Table 2 and column 1 of Table 3 to calculate the elasticity of total employment with respect to housing net worth, yielding a range of 0.43–0.61.³⁸ Using the same computation formula and coefficient estimates from columns 1 and 5 of Table 4, we obtain a range of 0.55–0.78 (0.35–0.50) for the elasticity of nontradable- (nontradable non-construction-) sector employment with respect to housing net worth.³⁹

These estimates are mostly in line with the estimated range of 0.2–0.5 from [Mian and Sufi \(2014\)](#), although the former are slightly higher at the upper bound. This may be because of two differences in our empirical settings. First, our analysis is at the ZIP code level while that of [Mian and Sufi \(2014\)](#) is at the county level. Thus, we capture the employment effect that arises from workers who commute across ZIP codes, which may not be as prevalent across counties. Second, our sample period covers both economic booms and busts,

³⁷ To be more specific, the computation uses data on asset and debt holdings associated with the primary residence across age groups from the 2010 Survey of Consumer Finances and ZIP code-level homeowner age distribution from the 2010 American Community Survey.

³⁸ We use the following formula to calculate the elasticity of total employment with respect to housing net worth: $\frac{\text{employment coefficient}}{\text{home price coefficient} \times \text{asset-to-equity ratio}}$. The calculations are $0.124/(0.108 \times 1.89) = 0.61$ and $0.124/(0.108 \times 2.7) = 0.43$.

³⁹ The calculations for the range of the elasticity of nontradable-sector employment with respect to housing net worth are $0.160/(0.108 \times 1.89) = 0.78$ and $0.160/(0.108 \times 2.7) = 0.55$. The analogs for the elasticity of nontradable non-construction-sector employment are $0.103/(0.108 \times 1.89) = 0.50$ and $0.103/(0.108 \times 2.7) = 0.35$.

Table 7
Foreign Chinese housing demand and displacement of residents by income

	No. of Low-Income Tax Returns (under \$50,000)		No. of High-Income Tax Returns (above \$50,000)	
	(1)	(2)	(3)	(4)
$\ln(CHTV) \times Post$	-0.063*** (0.014)		-0.023 (0.031)	
$\ln(CHTV)$	0.027 (0.019)		0.127*** (0.044)	
$\ln(CHTC) \times Post$		-0.112*** (0.028)		-0.006 (0.051)
$\ln(CHTC)$		0.061** (0.028)		0.133** (0.059)
Controls	Yes	Yes	Yes	Yes
County-year FE	Yes	Yes	Yes	Yes
First-stage <i>F</i> -stat.	53	22	53	22
Obs.	3,927	3,927	3,927	3,927

This table reports regression results from Equations (7a) and (7b) with the log number of income tax returns by households with income less than \$50,000 (columns 1–2) and greater than \$50,000 (columns 3–4) as dependent variables. *CHTV* (*CHTC*) denotes the foreign Chinese housing transaction value (count) instrumented by the weighted aggregate foreign Chinese housing transaction value (count) in California, with the pre-sample period share of ethnic Chinese population across ZIP codes as weights. *Post* is an indicator variable that takes the value 1 if the year is 2008 or after, and 0 otherwise. All regressions control for pre-sample period ZIP code-level population, population density, education (population share with a bachelor's degree), an indicator variable for whether there is a college within a five-mile distance, and pretrends of income (1998–2001) and of the outcome variable (1996–2000). Standard errors, shown in parentheses, are clustered at the ZIP code level. * $p < .1$; ** $p < .05$; *** $p < .01$.

while Mian and Sufi (2014) focus on the Great Recession period, when the labor market was sluggish.

5.2 Distributional consequences

Finally, we consider the implications of our findings. Despite the positive real effects of foreign Chinese real estate capital inflows, do these flows potentially carry adverse distributional consequences? The house price effect of foreign Chinese housing purchases suggests that these purchases worsen local housing affordability, and the displacement effect suggests that foreign Chinese real estate capital inflows contain implications for gentrification. We further explore the distributional consequences by studying whether the displacement effect is concentrated in a particular segment of the income distribution.

Specifically, we assess the effect of foreign Chinese housing purchases on the displacement of low-income and high-income households separately. As in Section 4.2, we use the number of income tax returns to proxy for the number of local residents. We divide the income tax returns into two groups based on household income: households with annual income less than \$50,000 are categorized as low-income households, and those with more than \$50,000 are categorized as high-income households. We run Equations (7a) and (7b) using the number of low-income and high-income tax filers as the outcome variables.

The results, presented in Table 7, show that the displacement effect is concentrated in the low-income resident group. A 1% increase in foreign Chinese housing transactions, as measured by transaction value and count,

lowers low-income household count by 0.063% and 0.112%, respectively (columns 1 and 2). The magnitudes of the estimated coefficients are nearly twice as large as those from the full-sample regressions shown in columns 5 and 6 of Table 3. By contrast, the effect on the number of high-income households is statistically insignificant (columns 3 and 4). Our results suggest that foreign Chinese housing purchases have driven out low-income households in particular.⁴⁰

6. Conclusion

In this paper, we study the real effects of foreign real estate capital inflows—a nontraditional and opaque form of international capital flows. Using transaction-level housing purchase data, we document two salient phenomena: (i) a China shock in the U.S. real estate market as characterized by a surge of foreign Chinese housing purchases after 2008, and (ii) home bias in these purchases as they are concentrated in ZIP codes historically populated by ethnic Chinese. We exploit the temporal and spatial variation of the real estate capital inflows from China and find that they significantly increase local employment. We show that the employment effect is mainly transmitted through a housing net worth channel: these capital inflows increase local house prices, raising local housing wealth and, in turn, demand for local nontradable goods and nontradable-sector employment. At the same time, foreign Chinese housing purchases displace local residents, especially lower-income ones, and thus induce gentrification.

Our analysis highlights both the positive real effects and potentially adverse distributional consequences of foreign real estate capital flows. However, the study contains a few limitations. First, our estimates represent the local general equilibrium effects of foreign capital inflows on the local labor and housing markets and may understate the true magnitude of the impact, as they do not capture the aggregate effects across all U.S. regions. Second, we have not thoroughly examined the welfare implications of foreign purchases on homeowners and renters. Potential negative effects on domestic homeownership and gentrification have ignited intense policy debates on whether and how to control real estate capital flows from foreign countries. More research on the aggregate effects and welfare consequences of real estate capital flows will help inform optimal policies on this issue.

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⁴⁰ Given that low-income households are more likely to be renters, our results imply that foreign real estate capital inflows may have induced displacement of local renters. We do not examine the effects on rent or migration by tenancy status because, to our knowledge, no reliable data are available to capture these outcomes at the ZIP code level.

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