TO RENT OR TO OWN

RESIDENTIAL TENURE CHOICES OF CHINESE STUDENTS IN THE US

Honors Thesis

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Acknowledgments

I would like to thank Dr. Brigitte Waldorf for her guidance and constant encouragement. I would also like to thank Dr. Kevin Mumford for his programing support.

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Abstract

The number of Chinese students, in particular undergraduate students, enrolled at American Universities has drastically increased during the last decade. Their out-of-state tuitions as well as living expenditures can be a boost to the local economy, including the local housing market. This thesis focuses on the housing market choices made by Chinese students in the United States. Specifically, it analyzes the factors influencing the residential preferences of Chinese students, focusing on their choice to own or rent a house while they are studying in the US. Using data for 749 Chinese students from the 2009 American Community Survey, the research estimated a logit model of tenure choice. The results suggest that five attributes are significant predictors of whether a student owns or rents: homeowner probabilities increase with household income, length of stay in the US, and family size. Moreover, homeowner probabilities are substantially higher for students who own a car than for those who do not own a car, and they are higher for undergraduate than graduate students. This result has potentially far reaching consequences for local housing markets as the number of Chinese undergraduate students has risen so strongly in recent years.

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Chapter 1

Introduction

The composition of the student body at US universities is changing rapidly and is becoming more diverse along racial and ethnic lines. According to the Institute of International Education (IIE), during the academic year 2010/11, almost 723,000 international students were enrolled at US colleges and universities. Women represent approximately 45 percent of the total number of international students.

At many universities, enrolling more international students is an explicit goal, as it is believed that a mix of cultures provides a beneficial educational experience. Last year, the growth of the international student population in the US was about three percent. Interestingly, each of the top-20 host-universities and each of the top-10 host-states have more international students than in the prior year.[1]

Much of the recent growth of the foreign student body at US universities is due to the huge increase in Chinese student enrollment. Table 1.1 shows the number of Chinese students at US universities over the last five years. It increased from 67,723 in the academic year 2006/07 to almost 160,000 in 2010/11. In the last four years, the annual growth has been at or even above 20 percent. As a result of these dramatic increases, China became the largest sending country of foreign students in the US. Today, 18.5 percent of the foreign students in the US originate from China. Remarkable is that most of the increase is due to the growing number of undergraduate

[1] The top-20 host-universities are comprised of: University of Southern California, University of Illinois-Urbana-Champaign, New York University, Purdue University- main campus, Columbia University, University of California-Los Angeles, Ohio State University-main campus, University of Michigan, Michigan State University, Harvard University, Indiana University, Boston University, University of Florida, University of Texas, Pennsylvania State University, Northeastern University, SUNY University at Buffalo, University of Minnesota-Twin Cities, Georgia Institute of Technology, Arizona State University. The top-10 host states are California, New York, Texas, Massachusetts, Illinois, Pennsylvania, Florida, Ohio, Michigan, Indiana.

students. They accounted for 31.3 percent of the Chinese student population at US universities in 2009/10, compared to only 14.7 percent five years earlier (2006/07). [2]

The rising number of Chinese undergraduate students at US universities[3] is tightly linked to the growth of the Chinese middle class. More and more Chinese parents are willing to pay, and are capable of affording the out-of-state tuition at American universities. Moreover, the intense competition for relatively scarce education resources in China already results in intense pressure on children to invest their energy into education. Under the one-child policy, the aspirations of two parents and four grandparents are all pinned on one student. As per capita household income rises, it is likely that the extra income will be spent on additional education. In other words, the rising salaries will reinforce the trend of Chinese students studying abroad.

Table 1.1 Chinese Students at US Universities, 2006/07 to 2010/11

	All Chinese Students		**Undergraduate Chinese Students**	
Year	**Absolute**	**% Change from Previous Year**	**Absolute**	**% Change from Previous Year**
2010/11	157,558	23.5%	56,976	42.72%
2009/10	127,628	29.9%	39,921	51.94%
2008/09	98,235	21.1%	26,275	59.73%
2007/08	81,127	19.8%	16,450	64.70%
2006/07	67,723	8.2%	9,988	7.35%

Source: Institute of International Education

[2] At Purdue University, the number of foreign students increased from 4,824 in 2006/07 to 6,761 in 2010/11. The number of Chinese students almost tripled during that same time period, increasing from 767 in 2006 to 2,062 in 2010/11. Undergraduates made up 13 percent of the Chinese students in 2006/07. Within five years, the share of undergraduates among the Chinese students at Purdue had increased to 56.4 percent.

[3] US universities are not unique is this regard. Universities in Europe, Australia and New Zealand record similar trends.

1.1 Research Question

Little is known about the preferences and tastes of this growing segment of the student population. This research will focus on the residential preferences and behaviors of Chinese students in the US, focusing on their choice between renting versus owning a house. Specifically, the thesis explores which attributes make Chinese students in the US more likely to own a house rather than live in rental housing.

1.2 Significance

The U.S. Department of Commerce reports that international students contributed more than $20.2 billion to the U.S. economy in 2010/11. More than 70 percent of all international students' primary funding comes from sources outside of the United States. (According to Open Doors IIE data) The rapid rise of the Chinese student population at US universities is likely to have a significant economic impact on the United States. Higher education is among the United States' top service sector exports, as international students provide significant revenue not just to the host campuses but also to local economies of the host states for living expenses, including room and board, books and supplies, transportation, health insurance, and support for accompanying family members (National Association for Foreign Student Advisers, NAFSA).

Since Chinese students are the largest international student group, surpassing the number of students from India for the first time in 2009/10, and growth expected to continue at least in the short term, they and their families will positively contribute to the local economies, from grocery stores to retail to car dealerships. Their impact on the local housing market can be quite influential. In particular if Chinese are prone to living in owner-occupied housing and thereby increasing demand in some sectors of the housing market. Tenure choice among Chinese

students is thus of importance for local governments, landlords, constructor, and university administrators as the demand for rental housing and owner-occupied housing in college towns, especially small college town, may undergo drastic shifts if the enrollment of Chinese students at US universities continues to increase.

1.3 Research Design

The research is based on 2009 ACS data of the US Census Bureau, retrieved from the University of Minnesota's IPUMS database. The data includes information on 749 Chinese students. Less than three-quarter of them live in rental housing.

The analysis begins with an exploratory analysis, focusing on two comparisons. First, I compare the attributes of renters with those of owners. Second, I compare the housing characteristics of students living in rental housing with those of students living in owner-occupied housing.

The most important component of the research design is a tenure choice model used to assess the factors influencing Chinese students' decision to rent or to own a house. The model is specified as a logit model of the binary variable Y that distinguishes between owners (Y =1) and renters (Y= 0). The selection of independent variables is guided by the residential choice literature and includes, for example, information on income, age, and family size.

1.4 Thesis Outline

The thesis is organized in four chapters. Following this introductory chapter, Chapter 2 provides salient background information on homeownership in the US. Moreover, Chapter 2 reports on the literature that deals with factors that influence tenure choice. Special emphasis is

given to studies that focus on the tenure choice of immigrants in the United States. Chapter 3 presents the empirical analysis, with subsections on the data, the exploration of differences between renters and owners, the model specification and estimation results. Chapter 4 provides a summary of the results and suggestions for future research.

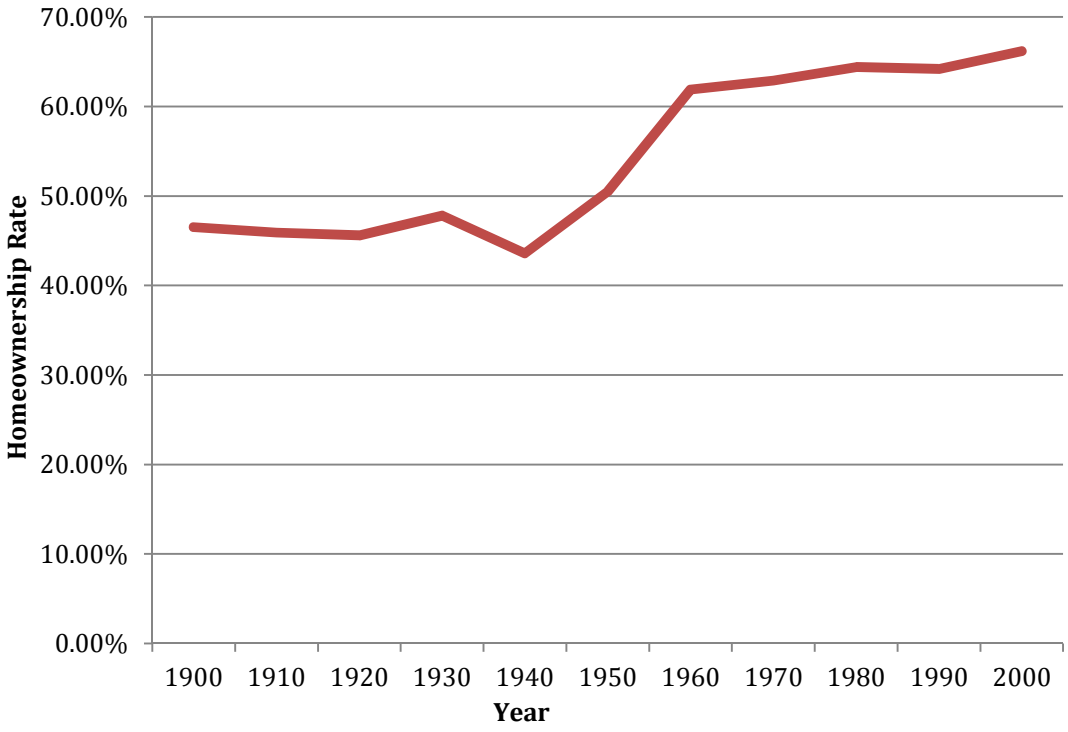
Chapter 2

Background

2.1 Homeownership in the US

Owning one's home has long been considered a part of the "American Dream." In the year 2000, two-thirds of the householders in the United States owned their own homes; in 1900, less than half owned their homes.

Figure 1. Homeownership rates, US 1900 to 2010



At the beginning of the last century, the majority of US households lived in rental units. As shown in Figure 1, a robust economy in the 1920s raised the homeownership rate, but the Great Depression drove the rate to its lowest level of the century of 44 percent in 1940. The post-

World War II surge in homeownership was remarkable. A booming economy, favorable tax laws, a rejuvenated home building industry, and easier financing saw homeownership explode nationally, topping 60 percent in just two decades.

Even so, individual states have seen ups and downs not always closely related to national trends. For example, look at the homeownership rates in North Dakota. In 1900, it had the highest homeownership rate (80 percent) ever recorded by a state. Then the rate fell, even during the 1920. By 1940, its rate had fallen to about 50%. Afterwards, it increased rapidly to well over 60 percent in one decade. Some of its neighbors like South Dakota, Nebraska, and Iowa show a similar trend.

Many southern states had very low homeownership rates with little change during the early decades of the 20th century. However, many of these same states experienced a tremendous boom after World War II, and are now above the national rate. Alabama, Georgia, Louisiana, Mississippi, and South Carolina are good examples of this trend.

Some states have always had high homeownership rates over 50 percent. They were mainly located in the Rocky Mountains, the Midwest, and northern New England, for example, Utah, Michigan, and Maine. Utah is the only state where the homeownership rate has never fallen below 60 percent.

2.2 Factors Influencing Tenure Choice

Andrews and Caldera Sánchez (2011) analyze the factors influencing homeownership rates of OECD countries for recent decades. They argue that the importance of understanding the factors which drive the home ownership rates can never be underestimated since homeownership rates have been linked to better educational outcomes and economic

performance. More specifically, they investigate whether the increases in homeownership rates can be explained by changes in household characteristics (including age, household structure, income and education).[4]

Andrews and Caldera Sánchez (2011) use a regression model, estimated with time series data, to predict the probability of homeownership for each OECD country. A number of their findings are important. Firstly, using dummy variables to describe the 5-year age cohorts (20 to 24, 25 to 29, 30 to 34), it is shown that age has an important impact on the probability of homeownership. For instance, a head of household aged 45-64 years is 37% points more likely to be a homeowner than 20 to 24-year old household heads, holding all else equal. In fact, households aged 45-64 years are estimated to have the highest probability of owning a home.

Secondly, it is shown that family structure and household size (measured by dummy variables indicating couple with dependents; single without dependents; single with dependents; male household head; married and divorced) strongly influence homeownership. Specifically, the results suggest that the probability of homeownership is significantly lower for single-headed households, particularly for those with children. Moreover, household size is positively related to homeownership rates in most OECD countries.

Thirdly, Andrews and Caldera Sánchez (2011) look at the impact of disposable income on homeownership rates. They find that the probability of homeownership increases with real household disposable income, but does so at a diminishing rate. Somewhat related and not surprising, the authors also find that homeownership rates increase with increasing educational attainment levels.

[4] Unlike this thesis, the study by Andrews and Caldera Sánchez (2011) is a cross-country comparison. Thus, they also evaluate the impact of various policies on homeownership rates. Specifically, they look at the impact of tax policies, financial policies, down-payment policies and renting policies.

Overall, Andrews and Caldera Sánchez (2011) find that changes in the population composition can only account for about a third of the increase in aggregate homeownership rates in Canada, Germany, Spain, Switzerland and the United States. Thus, a large portion of the change in homeownership rates still remains unexplained by changes in household characteristics.

It should be noted that Andrews and Caldera Sánchez (2011) do not address the importance of locational characteristics. Other studies, however, find that location matters. Homeownership opportunities in the suburban portions of metropolitan areas have their greatest impact on majority group members. Among minorities, homeownership is more responsive to the composition of the central-city housing stock (Alba and Logan 1992). Looking at aggregate statistics also suggest that tenure choice differences are stark when comparing rural with urban areas. In the biggest US cities, renters even outnumber homeowners, and rental housing affordability becomes an issue of major concern. For example, a report on rental housing in Cook County,[5] Illinois (The State of Rental Housing in Cook County) predicts that the stock of affordable rental units is projected to fall while the demand will increase by 2020. When looking at metropolitan areas, which in addition to the central city include the surrounding suburban and often even rural counties, the share of renter-occupied housing tends to be below 50 percent.

Studies of homeownership within the United States have spent a good deal of attention to rate differences between ethnic and racial groups, and between immigrants and natives. Alba and Logan (1992) investigated homeownership prevalence among twelve ethnic groups using the 1980 PUMS data of the US Census Bureau. They found a number of

[5] Chicago is located within Cook County.

differences between whites, blacks, American Indians, six Asian groups and three Hispanic groups in access to homeownership. They hypothesized that homeownership is well explained by a range of variables including gender, age, household composition, socioeconomic status, and assimilation. Of particular importance are the variables describing family status and the life course. The results suggest that whites have the highest probability of homeownership. They also are the most likely to be able to respond to the housing needs of married persons and households with children by buying a home. Compared to racial and ethnic minorities, white homeownership rates by income are more similar.

Myers and Lee's (1998) study focuses explicitly on immigrant homeownership compared to that of the US-born population. They use demographic methods and data for Southern California to explore how rapidly immigrants and US-born attain homeowner status. They found out that immigrant in Southern California advance into homeownership remarkably fast. Asian immigrants reach high homeownership rates soon after arrival, even exceeding those for native-born residents of the same age. In contrast, among Hispanics, immigrants begin their U.S. housing careers with very low homeownership rates. Myers and Lee (1998) claim that rapid home purchase might be thought to represent rapid assimilation. Indeed, when compared to Hispanics, Asian immigrants' faster transition into homeownership is consistent with their higher naturalization rates, lower return migration rates, and higher rates of English proficiency. However, Asians' immediate and extraordinarily high home purchases, suggest that they are likely to have access to capital at the start of their sojourn in the US. In that regard their fast-track housing careers may not be interpreted as assimilation. Instead, it suggests that many Asian immigrants have an much economically more advantaged status upon arrival.

Borjas (2002) analyzed the determinants of homeownership in immigrant households over the 1980 to 2000 period. He emphasized that the relationship between immigrants and homeownership rates is complex. He found that compared to natives, immigrant households have lower homeownership rates and that the homeownership gap widened significantly since the 1980s. In addition to income and household composition, he identifies location as a key factor responsible for this gap. Immigrants living in an ethnic enclave have higher homeownership rates than those who do not.

The study by Painter, Lihong Yang, and Zhou Yu (2003) specifically addresses homeownership rates of Chinese immigrants in the United States. It is based on the observation that homeownership rates of Chinese immigrants are higher than those of immigrants from other Asian regions. They ask whether assimilation affects homeownership propensities. Using English proficiency to measure assimilation, they found that better English skills increase the likelihood of owning a home for immigrants in general. But, for Chinese immigrants the importance of English skills is less important than for other immigrant groups. The authors also asked whether the Chinese homeownership rates are influenced by regional origin (Taiwan, Hong Kong, and Macau, Mainland China). They find that immigrants from Taiwan and Mainland China have the highest homeownership rate. Interestingly, even the effect of English proficiency varies by regional origin. For example, for households from Taiwan, English proficiency does not contribute to homeownership attainment at all. Moreover, for immigrants from mainland China, the importance of English proficiency for homeownership propensities is smaller than for other Chinese groups.

Interestingly, Painter, Lihong Yang, and Zhou Yu (2003) can also identify an enclave effect. Specifically, they show that living in an area with a high homeownership differential

between Chinese and white households lowers a households' homeownership rate, and that Chinese household – more so than other immigrant groups – are more likely to have higher homeownership rate if they reside in Chinese enclaves with a high Chinese homeownership rate. For all immigrants, including the Chinese immigrants, the authors found that homeownership rates are positively affected by being married, higher education, higher income, lower housing prices, higher rents, and mobility status (moving within LA). Somewhat surprisingly, however, no difference in a household's propensity to own home was found across different educational attainment levels or the length of stay in the United States.

The study by Painter, Gabriel and Myers (2001) uses 1980 and 1990 US census data to assess the determinants of housing tenure choice among racial and ethnic groups in the Los Angeles metropolitan area. Their analysis shows that homeownership among blacks and Latinos is lagging and that the homeownership gap relative to white households had been widening between 1980 and 1990. They explain the gap by differences in endowments such as income, education, and immigrants' status. In contrast, for Asian households, including Asian immigrants, the authors found a significant increase in homeownership between 1980 and 1990, converging towards the rates for white households.

The study by Kochar, Gonzalez-Barrera and Dockterman (2009) looks at the racial and ethnic gaps in homeownership rates in the US. More specifically, they analyze trends in homeownership from 1995 through the middle of 2008 among different racial, ethnic and nativity groups, higher-priced lending to Hispanics and blacks in 2006 and 2007, and differences in foreclosure rates across the nation's 3141 counties. The authors claim that from 1995 through the middle of this decade, homeownership rates rose more rapidly

among all minorities than among whites. But since the start of the housing bust in 2005, rates have fallen more steeply for two of the nation's largest minority groups, namely blacks and native-born Latinos, than for the rest of the population. Kochar, Gonzalez-Barrera and Dockterman (2009) conclude that, overall, the homeownership gap between whites and all racial and ethnic minority groups diminished since 1995. However, a substantial gap still persists. Moreover, blacks and Latinos remain far more likely than whites to borrow in the subprime market where loans are usually higher priced. Most important for this study, Kochar, Gonzalez-Barrera and Dockterman (2009) find that immigrant householders are less likely to be homeowners than those who are native-born, but their losses in recent years were relatively modest. Moreover, the national foreclosure rate tripled from 2006 to 2008, increasing from 0.6 percent to 1.8 percent, and counties with a large immigrant population tend to have higher foreclosure rates.

Chapter 3

Empirical Analysis

3.1 Data

The empirical analysis uses data of the 2009 American Community Surveys. The data are accessed from the Integrated Public Use Micro data series (IPUMS-USA), a project of the Minnesota Population Center intended to collect, harmonize, and distribute United States census data.[6] The ACS is a 1-in-100 national random sample of the US households. Respondents are enumerated by the mail back procedure.

Table 3.1 Sample Selection

Criteria	Specification
Birth place	China
Age at survey	18 to 35
Student at the time of survey	Yes
Gradeatt	undergraduate or post-graduate student at the time of the survey (codes 6 and 7 of Gradeatt)
Ownership	Eliminate respondents with missing information on ownership variable

The extracted sample includes individuals born in China who reside in the United States at the time of the survey. In addition, several important selection criteria were applied (Table 3.1). The sample includes only students of age 18 to 35. In total, the data set includes n = 749

[6] Steven Ruggles, Matthew Sobek, Trent Alexander, Catherine A. Fitch, Ronald Goeken, Patricia Kelly Hall, Miriam King, and Chad Ronnander. *Integrated Public Use Microdata Series: Version 4.0* [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2009. http://usa.ipums.org/usa/

Table 3.2: Variable Names and Definitions

Variable Name	Variable Definition
own	1=owner; 0 = renter
MORTAMT1	First mortgage monthly payment
RENT	Monthly contract rent
HHINCOME	Total household income
INCTOT	Total personal income
POVERTY	Poverty status (income as a percent above poverty threshold)
CC metro	1 = lives in central city of metropolitan area; 0 = otherwise
nocar	1 = car is not available in household; 0 = otherwise
singlefam	1 = unit occupied by one family only; 0 = shared with other family
FAMSIZE	Number of own family members in household
NCHILD	Number of own children in the household
AGE	Age of the household head
Male	1 = man; 0 = woman
Married	1 = married with spouse present; 0 = otherwise
alien	1 = not naturalized; 0 = otherwise
YRSUSA1	Year in the U.S
EngProf	1 = English proficiency good; 0 = does not speak English or speaks English poorly
GradSchool	1 = attends graduate school; 0 = pursues undergraduate degree

Table 3.2 shows the data definitions of the variables used in this study. The variable of interest is the dummy variable ‘own’, defined as one if the person is a homeowner, and zero if the person is a renter. The variables MORTAMT1 and RENT measure the monthly payment for the first mortgage and rent, respectively. HHINCOME and INCTOT measure the household income and personal income, respectively, and POVERTY measures the household income relative to the poverty threshold. ‘CC metro’ indicates whether the household lives in the central city of a metropolitan area, and the dummy variable ‘nocar’ signifies whether there is a car available in the household. The variable ‘singlefam’ indicates whether the housing unit is shared with another household. ‘FAMSIZE’ measures the number of own family members living in the

household, and NCHILD is the number of own children in the household. The next seven variables refer to the household head: the head's age, sex, whether he/she is married, whether he/she has obtained US citizenship, how many years he/she has lived in the US, whether he/she speaks English well, and whether he/she attends graduate school as opposed to undergraduate school.

Table 3.3: Summary Statistics

Variable Name	Mean	Min	Max	Std. Dev.
own	0.228	0	1	0.42
HHINCOME	47512	0	600000	58516
INCTOT	13923	0	568000	27555
POVERTY	181.935	1	501	163.199
CC metro	0.375	0	1	0.484
nocar	0.222	0	1	0.416
singlefam	0.531	0	1	0.499
FAMSIZE	1.925	1	9	1.306
NCHILD	0.135	0	3	0.429
AGE	25.764	18	35	4.307
Male	0.493	0	1	0.500
Married	0.267	0	1	0.443
alien	0.907	0	1	0.291
YRSUSA1	3.607	0	18	3.071
EngProf	0.397	0	1	0.490
GradSchool	0.582	0	1	0.494
Sample Size	749			

Table 3.3 shows the descriptive statistics for variables. In total, 22.8 percent of the Chinese students own their home. The average household income is $47,512, and the average personal income is $13,923. A little bit more than one third of the respondents live in the central city of a metropolitan area, and more than three quarter of the sampled students have a car available. Fifty-three percent share their housing unit with another household. On average, the

average family size is slightly below two persons, and the number of own children in household is with 0.135 children very low. The householders are almost equally split between men and women. The average householder is about 25 years old, has lived in the US for 3.6 years and is more likely than not to be unmarried (73.3 percent), not naturalized (9.3percent), and attending graduate school (58.2 percent). Remarkable is the low percentage (39.7 percent) of Chinese students who self-assess their English proficiency as "good".

3.2 Comparison of Renters versus Owners

In this section I compare renters and owners. I begin with a comparison of the personal and household attributes (section 3.2.1), followed by a comparison of the housing attributes of renters and owners.

3.2.1 Personal and Household Characteristics of Renters and Owners

The household income of renters is about $53,000 per year less than that of homeowners. However, the difference is substantially smaller for personal income, amounting to less than $2,500. Compared to renters, homeowners are substantially more likely to have a car available. The difference amounts to 27.2 percentage points. The average family size of home owners is 2.9 persons, compared to only 1.6 for renters. In particular, very few household include children. The average number of children is 0.3 for owners, and with only 0.08 even smaller for households who rent their home.

The demographic variables indicate that homeowners slightly differ from renters. Homeowners, on average, are a little more than one year older than renters. On average, they are about 1.2 years older than renters. Interestingly, in the subsample of renters, men outnumber

women by a small margin. In contrast, among homeowners women are in the majority. While overall, less than a quarter of the sampled immigrants students are married, among homeowners the share is substantially higher than among the renters with a difference amounting to a statistically significant 16.9 percentage points.

Table 3.4: Personal and Household Attributes of Renters and Owners

	Mean		Std. Dev.		Difference of Means[a]
Variable Name	Renters	Owners	Renters	Owners	
HHINCOME	35,332	88,681	49,429	67559	-53,349***
INCTOT	13360	15828	28266	24983	-2467
POVERTY	149.5	291.57	144.92	173.896	-142.067***
nocar	0.284	0.012	0.451	0.108	0.272***
FAMSIZE	1.625	2.942	1.018	1.626	-1.317***
NCHILD	0.080	0.322	0.329	0.629	-0.242***
AGE	25.486	26.702	4.065	4.940	-1.216***
Male	0.521	0.398	0.500	0.491	0.123***
Married	0.228	0.398	0.420	0.491	-0.169 ***
alien	0.941	0.789	0.235	0.409	0.152***
YRSUSA1	3.147	5.164	2.526	4.084	-2.017***
EngProf	0.377	0.462	0.485	0.500	-0.085**
GradSchool	0.642	0.380	0.480	0.487	0.262***
Sample Size	578	171			

***, **, and * indicate that the difference between renters and owners is significantly different from zero at the 1%, 5%, and 10% level, respectively.

[a] The difference of means test takes the form: $(M_{renter}-M_{owner})$/square root of $(S^2_{renter}/n_{renter} + S^2_{owner}/n_{owner})$. Given the sample size, the distribution of the test statistic can be approximated by a standard normal distribution.

Comparing the averages for renters and owners further suggests that owners are more likely to be proficient in English (46 percent among owners, 37.7 percent among renters). In terms of citizenship, most of the sampled students have not taken on US citizenship. This is expected since the average length of stay in the US is only about three years and it usually takes

at least five years before immigrants become eligible to apply for US citizenship. Moreover, the naturalization rate for renters is significantly lower than for owners: less than six percent of the renters has taken on US citizenship, compared to 21.1 percent among the homeowners. Again, this difference is expected because owners have, on average, stayed in the US two years longer than renters. Moreover, purchasing a home is also an indication that the household intends to stay in the US for a longer time period.

Finally, the two subsamples differ substantially with respect to the shares of graduate students. The homeownership is dominated by undergraduate students (62 percent). In contrast, almost two thirds of the renters are graduate students.

3.2.2 Housing Characteristics of Renters and Owners

Besides the difference from the personal and household characteristics, the housing characteristics of renters and owners are also noticeable. Most important, the monthly housing costs for owners are substantially higher than for renters. The homeowners pay on average $1,300 for their monthly mortgage. In comparison, renting households pay only $960 dollars of rent per month, which is 35 percent less than the monthly mortgage of the owners. From Table 3.5, one can also conclude that for renters the cost of electric, gas, water and fuel of renters are significantly lower than the owners' cost. This cost difference is expected for two reasons: one is that the average family size of renters is smaller than the family size of owners; the other reason is that many rental apartments cover the water and gas fee in their leasing fee. Therefore, the utility costs of renters are substantially lower than those of homeowners.

Moreover, compared to owners, renters are more likely to live inside metropolitan areas' central city. Roughly 26.9 percent of owners choose to live in the central city of metropolitan

areas, and the remaining owners choose to live either in rural areas or in the suburban counties of metropolitan areas.

Table 3.5: Housing Attributes of Renters and Owners

Variable Name	Mean	Std. Dev.	Mean	Std.Dev.	Difference of Means[a]
	Renters		Owners		
MORTAMT1	0.000	0.000	1300.000	1204.220	-1300.000***
RENT	960.554	544.910	0.000	0.000	960.554***
CC metro	0.407	0.492	0.269	0.445	0.138***
singlefam	0.471	0.500	0.737	0.442	-0.266***
COSTELEC[b]	845.581	839.602	1181.637	823.344	-336.092***
COSTGAS	478.707	534.020	913.524	939.524	-434.817***
COSTWATR	365.333	400.510	610.828	589.885	-245.495***
COSTFUEL	403.750	304.347	1421.200	1567.743	-1017.450***
ROOMS	3.967	2.522	6.117	2.398	-2.150***
BEDROOM	3.022	1.346	4.304	1.447	-1.282***
BUILTYR2	4.950	2.613	5.953	3.293	-1.003***
UNITSSTR	7.298	2.022	4.070	2.096	3.228***
UnitSSTR3	0.0657	0.2480	0.6374	0.4822	-0.572***
UnitSSTR4	0.0467	0.2112	0.1571	0.3657	-0.110*
UnitSSTR5	0.0536	0.2255	0.0234	0.1516	0.030
UnitSSTR6	0.1436	0.3510	0.0351	0.1845	0.109
UnitSSTR7	0.1834	0.3837	0.0409	0.1987	0.143**
UnitSSTR8	0.1868	0.3901	0.0058	0.0765	0.181***
UnitSSTR9	0.1644	0.3709	0.0175	0.0137	0.147***
UnitSSTR10	0.1511	0.3569	0.0702	0.2562	0.081
Sample Size	578	171			

***, **, and * indicate that the difference between renters and owners is significantly different from zero at the 1%, 5%, and 10% level, respectively.

[a] The difference of means test takes the form: $(M_{renter}-M_{owner})$/square root of $(S^2_{renter}/n_{renter} + S^2_{owner}/n_{owner})$. Given the sample sizes, the distribution of the test statistic can be approximated by a standard normal distribution.

[b] Note that the sample sizes used to calculate COSTELEC; COSTGAS, COSTWATR, and COSTFUEL for renters an d owners is smaller than the other variables since a lot of rental apartments do not have gas or water fees.

Last but not the least, the basic structure of owners' houses and renters' houses is different. As shown in Table 3.5, owners' houses have, on average, two more rooms than renters'

apartments, and they have 1.3 more bedroom compared to renters' houses. Moreover, the age of owners' house is on average 10 years older than renters' living facility.

3.3 Logit Regression of Tenure Choice

To better understand the factors influencing tenure choices of Chinese students in the US, I estimate a logit regression. The dependent variable is *own*, and the model predicts the probability that a randomly selected Chinese student in the US is a homeowner, that is that the variable *own* takes on the value one. It is hypothesized that the probability if influenced by the many factors discussed in the previous section. More precisely, the model specifies that the probability of being a homeowner is influenced by 13 regressors. Thus, the model takes on the following form:

$$\text{Prob}(own=1) = \exp(\beta_1 X_1 + \ldots + \beta_{13} X_{13}) / [1 + \exp(\beta_1 X_1 + \ldots + \beta_{13} X_{13})]$$

The regressors include all the variables that were discussed in section 3.1 (see Table 3.3). The model was estimated for $n = 749$ observations using the procedure "LOGIT" of the STATA software program.

Before discussing the estimation results, recall that the univariate comparison between renters and owners (see Table 3.4 in the previous section) showed that renters and owners differ significantly. For all attributes included in Table 3.4, except English proficiency and INCTOT (Individual income), the last column of Table 3.3 shows that the differences between renters and owners are significantly different from zero at the one percent significance level; for the English proficiency variable (*engprof* = 1 English proficiency is good; = 0 otherwise), the p-value is 0.046 which is still significant at five percent level. Surprisingly, however, the univariate descriptives did not show a significant difference in individual income between renters and

owners (the z-value is only -1.100). For all other variables included in the model, owners and renters are significantly different from each other. It may, however, be that some variables no longer prove influential in a multivariate model. Thus, the multivariate tenure model specified above allows me to identify the salient characteristics influencing Chinese students' residential tenure choices. Table 3.6 summarizes the estimation results.

Table 3.6: Estimation Results

Variable Name	Coefficient		Std. Err.	P-value	Odds Ratio
HHINCOME[a]	0.013	***	0.002	0.000	1.013
CC metro	-0.379		0.241	0.117	0.685
nocar	-3.984	***	0.988	0.000	0.019
singlefam	-0.118		0.332	0.721	0.888
FAMSIZE	0.504	***	0.125	0.000	1.655
NCHILD	0.076		0.288	0.791	1.079
AGE	-0.042		0.039	0.276	0.959
Male	-0.179		0.224	0.426	0.836
Married	0.091		0.337	0.786	1.096
alien	0.006		0.364	0.987	1.006
YRSUSA1	0.105		0.045	0.020	1.110
EngProf	0.363	(*)	0.226	0.109	1.438
GradSchool	-0.641	***	0.270	0.017	0.527
Sample Size	749				

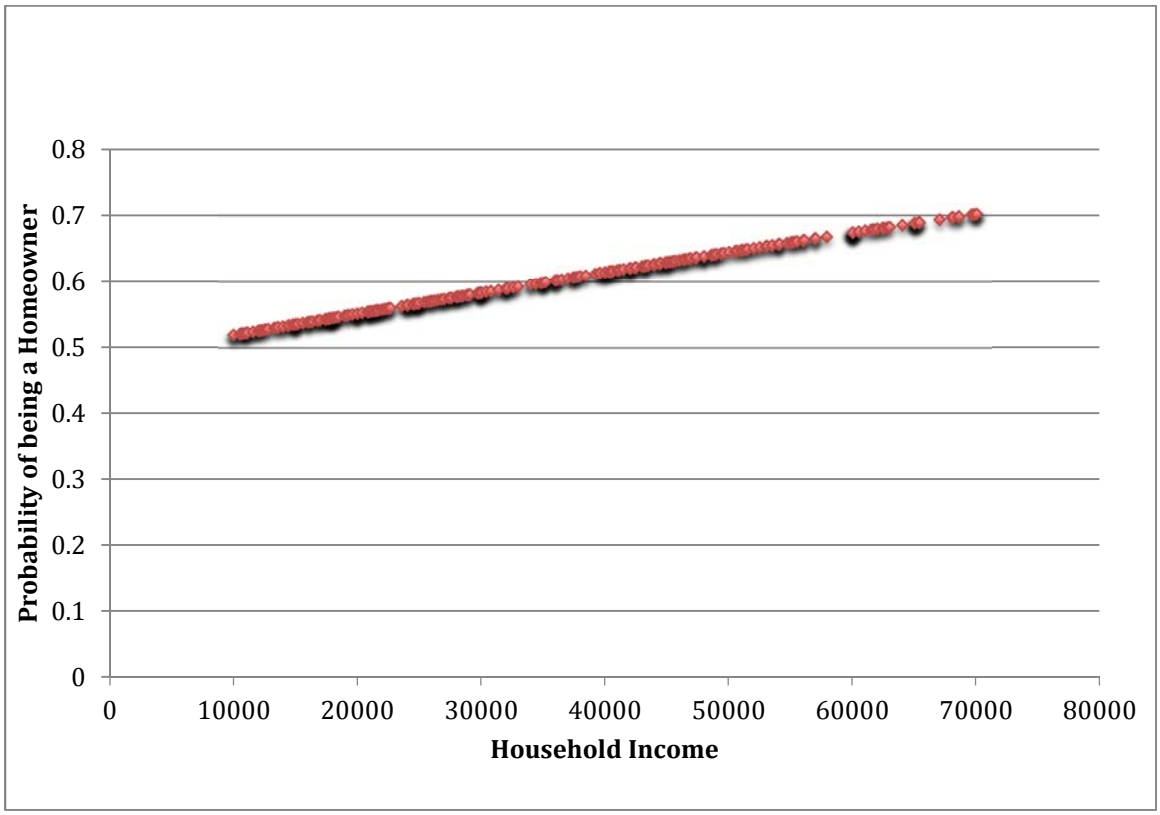
***, **, and * indicate that the impact of the variable on tenure choice is significantly different from zero at the 1%, 5%, and 10% level, respectively.

[a] For the estimation, HHINCOME is measured in US$1,000.

As shown in Table 3.6, only five of the independent variables have a significant impact on the probability that a randomly selected Chinese student residing in the United States is a homeowner as opposed to renting an apartment. First, contrary to the suggestion derived from the univariate descriptive, household income positively affects the probability of owning a home. Given that the logit model is non-linear, the coefficient does not indicate the magnitude of the effect. To get a better idea of the magnitude, Figure 2 shows how the probability of owning a

house changes when the income increases from $10,000 to $70,000. The probabilities are calculated for a male 25-year old undergraduate single Chinese student who does not have US citizenship, owns a car, is proficient in English, does not have children and has lived in the US for four years.

Figure 2. Estimated relationship between household income and the probability of home ownership[a]



[a] The probabilities refer to a male 25-year old undergraduate single Chinese student without US citizenship, who owns a car, is proficient in English, does not have children and has lived in the US for four years.

Figure 2 shows that household income is positively related to the probability to own, holding all other variables constant. In other words, the more a person earns, the higher the

probability that he/she will choose to own a house. For a person with a household income of $10,000 and other attributes as specified above, the probability of owning is about 50 percent. It increases to about 70 percent if the household income rises to $70,000. As a matter of fact, within the specified income range, the graph suggests that the relationship between household income and homeownership is roughly a linear relationship, which means that the increasing rate of probability to own will not slow down when the household income increases, i.e., the second derivative of the relationship is roughly constant if it is a linear relationship. Note however, that eventually the homeownership probability will rise slowly with increasing income, as it converges towards one.

The second significant variable is *nocar*. Chinese students who do not own a car are significantly less likely to own a house than those who do own a car. The effect is very strong as indicated by the odds ratio. The odds[7] of owning a house is 52.6 (=1/0.019) times higher for Chinese students who own a car than for Chinese students who do not own a car. This suggests that Chinese students who do not own a car almost certainly also do not own a house.

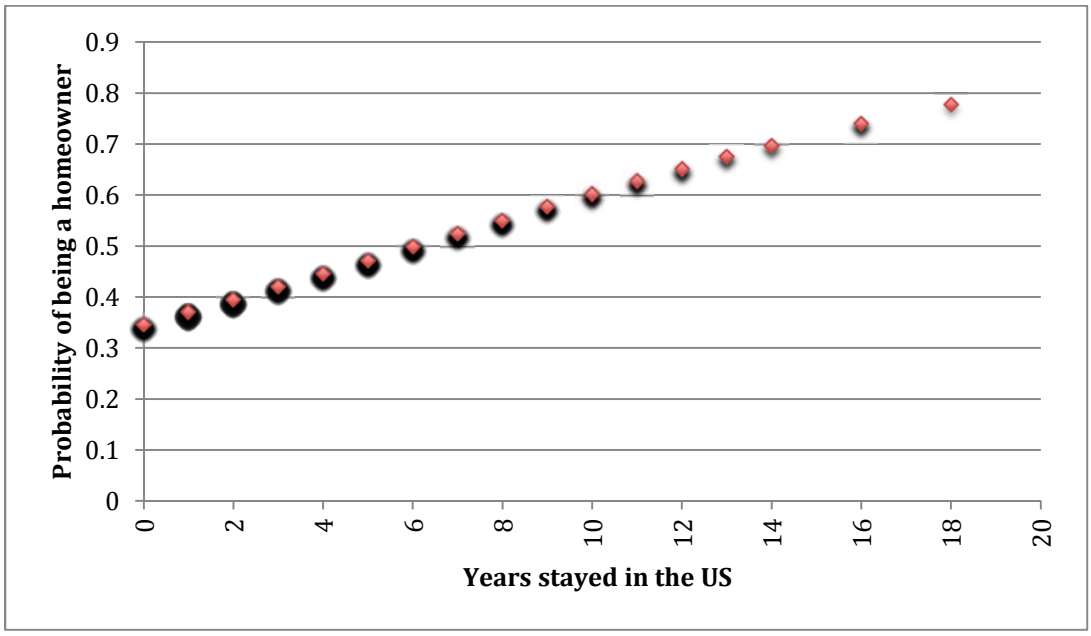
The third significant variable is FAMSIZE. It has a significantly positive parameter. This implies that students with a large family are more likely to be homeowners than those with a small family.

The results also show that length of time spent in the US (YEARSUS1) has a significantly positive effect on homeownership. Those who have stayed in the US for many years are more likely to own a home than those who have stayed for a shorter time period. The estimated relationship is shown in Figure 3 for 30-year old unmarried male undergraduates with a household income of $53,114. Furthermore, it is assumed that they did not adopt US citizenship, speak English well, own a car and live by themselves (FAMSIZE = 1). As Figure 3

[7] The odds are defined as the probability of owning a house divided by the probability of not owning a house.

shows, the estimated homeownership probability rises steadily at an almost constant rate, from about 35 percent upon arrival in the US to almost 80% after 18 years. The mean length of stay is 3.6 years after which the probability to own a home for a student with the attributes as specified above is estimate to be greater than 40 percent

Figure 3. Estimated relationship between years spent in the US and the probability of home ownership[a]



[a] The probabilities refer to 30-year old unmarried male undergraduates. It is further assumed that hhincome = 53114, Ccmetro=0, Nocar=0, Singlefam=1, Famsize=1, Alien=1, Engprof=1.

The last significant variable is GradSchool. Undergraduates are significantly more likely to own a home than graduate students. The odds of owning a home for undergraduates is almost twice (1/0.5266621) as high as for graduate students. This result has potentially far reaching

consequences for local housing markets as the number of Chinese undergraduate students has risen so strongly in recent years.

English proficiency also raises the probability of owning a home, but the estimated coefficient is barely significant (the p-value is 0.109). All other variables included in the logit regression do not have a significant effect on the probability of homeownership. That includes some of the traditional predictors of home ownership, in particular age and marital status. The insignificance of age and marital status may be due to the fact that the model applies to a young population.

Chapter 4

Conclusion

4.1 Summary of Results

According to data from the Open Doors Report published by the Institute of International education (IIE) in partnership with the U.S. Department of State's Bureau of Educational and Cultural Affairs, the number of international students at colleges and universities in the United States increased by five percent to 723,277 during the 2010/11 academic year. This is the fifth consecutive year that Open Doors figures show growth in the total number of international students, and there are now 32 percent more international students studying at U.S. colleges and universities than there were a decade ago. The 2010/11 rate of growth is higher than the three percent increase in total international enrollment reported the previous year, and the six percent increase in new international student enrollment this past year shows more robust new growth than the one percent increase of the previous year.

Increased numbers of students from China, particularly at the undergraduate level, largely account for the growth. The number of Chinese students increased by 23 percent in total and by 43 percent at the undergraduate level. These increases have been felt across the United States, with the top 20 host universities and top 10 host states each having more international students than in the prior year. Women represent approximately 45 percent of the total number of international students.

These strong increases have significant economic impacts on the United States. According to the US Department of Commerce, it is estimated that – through their expenditures on tuition and living expenses – international students contribute more than $21 billion to the U.S. economy. International students' tuitions provide significant revenue to the host

universities. Not surprisingly, thus, higher education is among the United States' top service sector exports. Unlike many domestic students, international students pay the substantially higher out-of-state tuition. Equally important, international students infuse large amounts of money into the local economies to pay for living expenses, including room and board, books and supplies, transportation, health insurance, and to support accompanying family members. This is particularly true for the many Chinese undergraduate students who come from the well-off Chinese families.

Since Chinese students form the largest international student group (just recently, Chinese students outnumbered students from India to become the largest group) and the increasing rate is relatively high for the past five years, they will definitely boom the local economy. The beneficial effects will likely be felt in such diverse sectors as the grocery market, the cars industry and especially the housing market. Regardless of renting or owning, these large numbers of students will definitely shift college towns' housing price, therefore, local government and university offers should pay sufficient amount of attention on this group.

This research uses data from the 2009 American Community Survey. The extracted sample includes 749 students of Chinese origin who were residing in the United States at the time of the survey. Almost a quarter of them (23 percent) lived in an owner-occupied home. The objective of the research was to identify the key predictors of what makes Chinese students more likely to become homeowners.

To analyze the data, I specified and estimated a logit model of tenure choice. That is, the right hand side of the model is the probability of owning a home, and the left hand side is the logit transformation of a linear predictor of potentially influential determinants of tenure choice. In total, 13 regressors were included but only five entered the model with a significant parameter

estimate. The results by and large confirm much of the previous work done in this area. More precisely, my estimated model suggests that the probability that a Chinese student in the US owns a home increases with:

- increasing household income;
- growing family size;
- extended length of stay in the United States.

Moreover, the results also show that the probability of being a homeowner is higher for:

- Undergraduates than for graduate students;
- Students who own a car compared to those who do not.

4.2 Future Research

This thesis has demonstrated that a significant share of Chinese students, in particular undergraduates, choose to own rather than rent a home and that household income, car ownership, family size, and length of stay in the United States are powerful predictors of homeownership. However, the results only refer to the situation in the year 2009. Future research is needed to assess whether the results also hold true in subsequent years. Moreover, future research should also collect additional data from in-depth interviews. Such interviews may shed light on questions such as whether the home purchase is linked to students' intention to stay in the US indefinitely or whether the purchase is part of the parents' investment portfolio,

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