

**Where Do Talents Go in China:  
Factors at Play in Their City Choice**

A thesis submitted by

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## **Abstract**

Compared with the rural-urban migration widely discussed in the literature, urban-urban migration has been a new trend in China, characterized by migrants' high education attainment. College graduates' migration decision, or their city location choice is important to municipalities to enhance local economic development. In this thesis, I conducted a discrete choice experiment by designing and disseminating a survey to study college graduates' individual city choice decision in Chinese cities. I find that recent graduates value short-term effects more than long-term effects when choosing a Chinese city after graduation. Monthly rents and monthly income are the most important factors among the studied variables (such as housing price, Hukou, and commute time, etc.); while housing price and hukou are deemed less important. City preferences also differ significantly by gender and education level. This thesis can be helpful for municipalities to adjust policies to attract talents to their cities.

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## Table of Contents

<b>Abstract</b> .....	<b>ii</b>
<b>Acknowledgements</b> .....	<b>iii</b>
<b>Table of Contents</b> .....	<b>iv</b>
<b>List of Tables</b> .....	<b>v</b>
<b>List of Figures</b> .....	<b>vi</b>
<b>Chapter 1 Introduction</b> .....	<b>7</b>
<b>Chapter 2 Literature Review</b> .....	<b>11</b>
<b>2.1 Migration theories</b> .....	<b>11</b>
<b>2.2 Empirical findings about migration</b> .....	<b>12</b>
2.2.1 The western context .....	13
2.2.2 The China context .....	15
2.2.3 Migration by people’s skill level.....	16
<b>Chapter 3 Methodology</b> .....	<b>20</b>
<b>3.1 Discrete choice experiment</b> .....	<b>20</b>
<b>3.2 Survey design</b> .....	<b>21</b>
<b>3.3 Survey implementation</b> .....	<b>25</b>
<b>3.4 Model</b> .....	<b>27</b>
<b>3.5 Data analysis software</b> .....	<b>28</b>
<b>Chapter 4 Data</b> .....	<b>30</b>
<b>Chapter 5 Results and Findings</b> .....	<b>35</b>
<b>5.1 Impact of city attributes on individual city choice</b> .....	<b>35</b>
<b>5.2 Personal attributes’ impact on city choice</b> .....	<b>47</b>
5.2.1 Gender .....	48
5.2.2 Degree type .....	50
5.2.3 Home city level .....	50
5.2.4 Major and school types .....	51
<b>Chapter 6 Local Talent Recruiting Policies</b> .....	<b>53</b>
<b>Chapter 7 Discussion and Conclusions</b> .....	<b>56</b>
<b>Appendices</b> .....	<b>59</b>
<b>Bibliography</b> .....	<b>67</b>

## **List of Tables**

TABLE 1. VARIABLES IN MIGRATION DECISIONS.....	18
TABLE 2. ATTRIBUTE TABLE OF THE SURVEY .....	22
TABLE 3. A SAMPLE CHOICE SET PRESENTED IN THE SURVEY .....	24
TABLE 4. DESCRIPTIVE STATISTICS OF RESPONSE TIME AND RESPONDENTS' AGE.....	30
TABLE 5. GENDER OF RESPONDENTS .....	31
TABLE 6. HOME CITY LEVEL OF RESPONDENTS.....	31
TABLE 7. PROVINCE DISTRIBUTION OF RESPONDENTS.....	32
TABLE 8. CURRENT LOCATION OF RESPONDENTS .....	33
TABLE 9. MAJOR OF RESPONDENTS .....	34
TABLE 10. TYPE COLLEGE/UNIVERSITIES OF RESPONDENTS .....	34
TABLE 11. PARAMETER ESTIMATES OF MODEL 1 AND MODEL 3 .....	40
TABLE 12. MODEL EFFECTS SUMMARY .....	59
TABLE 13. MARGINAL PROBABILITY AND MARGINAL UTILITY FOR MODEL 1 AND 3 .	61

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## List of Figures

FIGURE 1. NEOCLASSICAL ECONOMIC THEORY ON MIGRATION LEADING TO EQUILIBRIUM. ....	12
FIGURE 2. PROBABILITY PROFILER.....	38
FIGURE 3. PROBABILITY PROFILER.....	38
FIGURE 4. THIRD CASE OF PROBABILITY PROFILER .....	39
FIGURE 5. UTILITY PROFILER OF A FEMALE .....	49
FIGURE 6. UTILITY PROFILER OF A MALE WITH SAME SETTING EXCEPT FOR GENDER	49

## Chapter 1 Introduction

Migration in China traditionally refer to rural-urban migration that rural population flooded into cities to get lucrative job opportunities. Due to low-level of education attainment, most of the time rural migrants can only find jobs with labor-intensive nature in cities. Over the last few decades, rural-urban migration has fueled the rapid economic growth in the coastal provinces, where economic development first took place in China. Despite their contributions, rural migrants have faced tremendous difficulties in assimilating into urban life. In addition to lifestyle changes, institutional factors such as the hukou system<sup>1</sup> (a household registration policy that resulted in discriminated provision of public goods between local and non-local people) also exacerbated this situation. In recent years, it has been reported that rural migrant workers started to return to rural area, as many of them did not intend to permanently stay in the cities when they left the countryside (Zhiling Wang and Chen 2019).

Meanwhile, a new trend, urban-urban migration has attracted increasing attention as China's economy has grown rapidly in the past two decades. A large fraction of urban-urban migrants are highly educated people in search of better jobs and life. Statistics shows that, 70 million born in between 1990 and 2000, and 3.5 million born in between 1980 and 1990, are college degree holders in China. It also projects that over 250 million Chinese will receive a college degree in the near future (Wang 2019). Compared to rural-migrants, highly educated urban-migrants find it easier to obtain jobs with satisfactory salaries in cities resulting a greater mobility level, which allows them to migrate between

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<sup>1</sup> Also known as household registration system. It classifies each person as a rural or urban resident, and a person needs to register to an address. It is a major way to determine the eligibility for state-provided services and welfare.

cities in pursuit of a better life.

Though driven by the same goal of living a better life, some urban migrants are leaving small cities for large ones, while others are migrating in the opposite direction. Their underlying preferences play a great role in directing people with same motive to distinct migration behaviors. Large cities provide better amenities and job opportunities (usually accompanied with higher wages as well). The migrants have to trade-off between living costs and quality of public services (such as health care, school systems).

Differentiated by population, market size, economic performance, and degree of urbanization economic development level, three-tier cities have been widely discussed and acknowledged in China. The first-tier cities are the four largest cities, including Beijing, Shanghai, Guangzhou, and Shenzhen. They are popular destinations for urban-urban migration. Resident populations in Guangzhou and Shenzhen have increased by 459,000 and 620,000 respectively in 2017 alone (Wang 2019). Many headquarters of large companies and transnational corporations have agglomerated in the first-tier cities, providing abundant high-wage job opportunities to attract highly educated workers. The cluster of skilled workers further attracts education elites who want to build social networks with people similar to themselves, magnifying first-tier cities' attractiveness.

There are different classification lists of second- and third-tier cities based on different criteria. In this thesis, I adopt the list given by the magazine of Yicai ("2020 List of First- to Fifth-tier cities in China" 2020). The list was created based on business resources, transportation centrality, people's vitality in consumption and on social media, diversity of lifestyles, potential for development. Second-tier cities also provide rich options in terms of lifestyles, consumptions and so forth, thus they are increasingly attractive too. Among the 337 prefecture-level cities in China, there are 45 second-tier

cities<sup>2</sup>, 70 third-tier cities, and 118 lower-tier cities.

Having greatly benefited from low-cost labor since the economic reform in China, cities in coastal provinces now seek new drivers for economic growth. Highly educated people, indispensable for upgrading of industries from labor-intensive to innovation-intensive, have been wooed by large and small cities alike. Municipal governments across the country have announced policies to attract talents since the mid 2010s ( Zhang 2018; J. Chen 2019; H. Dong 2019; J. Wang 2019). However, these talent recruiting policies are not well examined in the literature in regard to why certain incentives are adopted but not others, and how effective these policies might be. It is partly because the recruiting policies have been in effect for only a short time and their effects have not been able to fully manifest themselves. Similarly, few research could be found in the literature focusing on the migration decision of college graduates - a young but important subset of the population. First-tier cities has long been the most popular destinations for college graduates; however, second-tier cities have surpassed first-tier cities in the spring job search season of 2020 in terms of popularity, according to Boss Zhipin (2020), a job search website in China. If municipalities do not well understand the preferences of the target population, the incentives they are offering may not be efficient enough to achieve their goals and will become an unnecessary spending of municipal revenues.

In this context, this thesis asks following questions. First, what are the factors that college graduates consider when they decide city location choice? And how do these factors influence their decision? Second, Are preferences for cities influenced by their individual characteristics? Lastly, are current municipal talent recruiting policies in Chinese cities effective in attracting young talents?

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<sup>2</sup> For the sake of simplicity, the category of “emerging first-tier cities” is incorporated into second-tier cities.

To answer these questions, I designed a discrete choice experiment (DCE) using a survey instrument for data collection. DCE a stated preference method traditionally used in market research and health economics – to elicit preference information from respondents. I surveyed a random sample of more than 1300 college graduates in China, and received valid responses from 720 of them. This thesis extends current understanding of migration in China by looking into the highly skilled population, i.e., college graduates, and provides new evidence important to municipal governments to design talent recruitment incentives and policies.

## Chapter 2 Literature Review

This thesis seeks to contribute to the ongoing discussion in urban economics and public policy about the determinants of migration decisions. In this chapter, I first review migration theories and empirical findings on factors that influence migration. I then summarize literature findings about migration in both western societies and in the Chinese context, as migration is closely related to social contexts, institutions, and culture. Finally, I discuss literature focusing on migrants with different skill-levels to better understand how college graduates' city choice might differ from low-skilled migrants.

### 2.1 Migration theories

Migration is the movement of people from one place to another with a purpose of permanent or temporary settling down in the destination. Based on political boundaries the movement crosses, migration is categorized into international migration and domestic migration. The latter, of concern of this thesis, takes place within the boundary of a geographical entity. Common reasons for this type of migration includes travel for education and economic improvement. Rural-urban migration, a general trend in developing countries that accompanies the process of urbanization, is one major kind of domestic migration. As a human activity with great economic, demographic, social and cultural impact, migration has received great academic attention from various disciplines including sociology, economics, human geography, etc.

Neoclassical economic models typically assume that real wage differences between regions are the root cause of migration. As low-skilled labor from low-wage countries migrate to high-wage countries, a capital flow goes in the reversed direction in the form of cross-region investments. As the two flows keep going on, a new equilibrium is formed between regions and migration will stop then (Oeberg 1995).

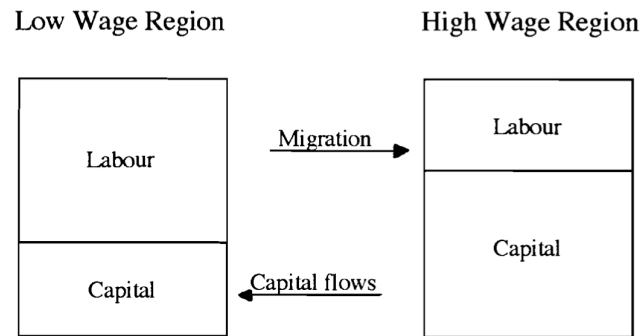


Figure 1. Neoclassical economic theory on migration leading to equilibrium.

Source: Oeberg 1995

Dual labor market theory sees pull factors in more developed regions as the primary cause of inter-region migration. It distinguishes between the primary market and the secondary market in developed regions. The two markets differentiate in that, primary market requires high-skill labor, while secondary market is labor intensive and provides only low-skill jobs. According to this theory, migration from less developed regions to more developed regions stems from a need of labor in the secondary market in more developed regions, because jobs in secondary market are undesirable to native labor and need to be filled by migrant workers. This need of migrant workers is amplified as the shortage has pushed up the wage as well (Piore 1980).

New economics of labor migration theorists incorporate household of origin into the explanation of migration. They model migration as a family's response to the risk of insufficient household income and market failures such as the absence of insurance and of capital market. By sending family members abroad (or to other regions) to earn higher wages, the other family members staying put will have supplementary income from their remittances (Jennissen 2007).

## 2.2 Empirical findings about migration

A host of literature in both China and the western countries have studied the causes of domestic migration. Since the findings are very different, this section

summarizes them separately. Literature on migration decision of people with different skill-levels is also discussed.

### **2.2.1 The western context**

Quality of life is one of the important factors examined by economists to account for migration. Quality of life is closely related to amenities including the variety of consumption choices and recreational facilities available, levels of income, costs of living, and other differences between cities. People move to cities that provide higher quality of life than their city of origin does, and higher quality of life is usually brought by high wages and rich amenities (Piore 1980). Bowles (1970) found that moves out of the US South in the late 1950s can be well predicted by expected income increases. Borjas, Bronars and Trejo (1992) find that differences in returns to skill is a major driver for migration across US states.

Major disagreement among scholars includes what amenities should be considered in the analysis, what relative weights should be given to them, and if some factors have more direct influence on location choices. It is argued that, contrary to conventional theories, amenities not only affect land prices, but also wages, and regional wage differences can largely be explained by local amenities (Roback 1982); while Albouy and Stuart (2014) suggest that people's migration choices are driven more by quality of life than by jobs.

Sjaastad (1962) conceptualizes a neoclassical migration model that sees migration as the outcome of resource allocation where individuals calculated the costs and benefits of migration, both monetary and non-monetary. This hedonic model is further developed by Rosen (1979) and Roback (1982) to understand how amenities determine wages and land prices across locations (Albouy and Stuart 2014). Greenwood (1975) suggests that distance, inter-region income differentials, and psychic costs of migration all play a role in an agent's decision of migration. Specifically, he contends that migration decreases with

increased distance, which serves as a proxy for the psychic costs of migration, but earnings gained from migration are usually substantial enough to offset the costs (Greenwood 1975).

In addition, personal characteristics such as age, education, employment status, and race are represented in expected earnings and preferences (Greenwood 1975). Chen and Rosenthal (2008) also find young and highly educated households are more likely to migrate to cities with better business environment, regardless of their marital status. “Power couples” – couples with college education – locate in large cities because such areas provide opportunities for dual careers (Kahn 1995). On the other hand, older couples of retirees, regardless of their education attainment, tend to move away from cities with business environment desirable to firms to places with abundant consumer amenities. This change of preferences over age reflects human life-cycle.

In the US and Europe, several scholars find climate and weather play a crucial role in recent migration, evidenced by the population gain in the Sun Belt. Using the 1970-2000 US Census, Chen and Rosenthal (2008) find that, American households’ favorite locations are in non-metropolitan areas and warm coastal cities such as Honolulu, Santa Cruz, and San Francisco, while old industrial cities in the rust belt are least liked. Similarly, Italian households are willing to pay a significant amount of money to live in places with less precipitation and moderate summer temperatures (Maddison and Bigano 2003). The increased scale of weather-related migration indicates an increased valuation of nice weather as a consumption amenity, and it is argued that this emphasis on desirable weather has to do with people’s growing income per capita (Rappaport 2009). Albouy (2008) reveals that natural amenities like moderate seasons, sunny days, and proximity to the sea, account for most quality of life differences. Contrary to previous findings, quality of life does not hinge on city size as long as these natural amenities are controlled (Albouy 2008).

### 2.2.2 The China context

While migration in capitalist countries is more driven by labor and housing markets, understanding migration in socialist and transitional China where central planning still plays an important role, requires looking with the lens of state institutions (Fan 2002).

As Fan (2002) pointed out, in the 1960s – 1970s of Mao’s era, the Third Front Program involved the transfer of investment and the migration of human resources from relatively more developed coastal provinces to poor inland areas in the Northwest and the Southwest. This flow of population is opposite to the direction from better-off to worse-off regions proposed by neoclassic theorists, and it could only be explained by the egalitarian ideology under the socialist era of Mao.

The household registration system, or the *hukou* system, was established in the late 1950s to restrict the migration from rural to urban areas. Rural hukou holders outside their hukou location faced tremendous difficulties in accessing their quota for food, public housing, medical care, and education for their children (Pines et al. 1998). Since the mid-1980s, the state relaxed the migration control as it began its economic reform to transition into a socialist market economy. Rural-urban migration (hereafter rural migration) became possible, but migrant workers were only permitted to do low-paid, manual jobs in cities, and had no access to equal public services as the urban residents did. This influx of rural-urban migrants provided ample cheap labor to the industrialization of the country (Fan 2004). But even today, they cannot easily obtain an urban hukou that entitles to them the same rights as urban residents.

With the gradual relaxation of migration control, the number of interprovincial migrants, defined as people who live in a province other than their province of birth, has increased from 10.76 million in 1985-1990 to 31.81 million in 1995-2000 (Fan 2005). This number grew to over 221 million in 2010 (“The Sixth Census: Migrant Population by

Province,” n.d.). According to China’s National Bureau of Statistics, the number of rural migrant workers<sup>3</sup> has also increased from 145 million in 2010 to 171 million in 2017 (“1978-2017 Migrant Population Statistics,” n.d.).

Starting from 2000, the new phenomenon of urban-urban migration (hereafter urban migration) began to receive attention. It is probably influenced by the college enrollment expansion in 1999 that has increased the number of college students by over 50%, as more students attend non-local universities. These urban migrants usually hold urban hukou, have college degrees, and migrate from small- and medium-sized cities to large cities in search of better job opportunities. One driving force of such migration is the inadequate provision of quality jobs in their origin cities relative to their education attainment (T. Fan 2018).

Though both rural and urban migrants suffer from disadvantages in local labor market (Cheng et al. 2013), they are different in several ways. First, rural migration began earlier than urban migration, but urban migration is increasing in scale in these few years. Second, a larger share of urban migrants are college degree holders than rural migrants (Liang and Ma 2004). Third, urban migrants are more likely to obtain local hukou and become “local”, while rural migrants are more likely to return home since they cannot obtain local hukou (Fan 2002).

### **2.2.3 Migration by people’s skill level**

In both China and the US, scholars have studied location choices of migrants with different levels of skills, which is evaluated by their education attainment. In the US, cities have been experiencing “the Great Divergence” since the 1980s (Fan 2004). Metropolitan areas with substantially high share of college degree holders in 1980s, continue to attract

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<sup>3</sup> Rural migrant workers are people who hold rural hukou but work in the city.

even more college graduates in 1980-2000, and this rise in skill is accompanied by a larger upswing in wage and housing price growth in high skill cities than in lower skill cities (Diamond 2016).

Using a 5% sample of the US census data from the 1980, 1990, and 2000, Diamond (2016) discovers how high and low skill workers tend to choose different cities and thereby leads to the Great Divergence. As the high skill cities continue to attract highly educated labor, local productivity is raised, thus raising workers' wages. With more discretionary income, workers' growing consumption enriches local amenities, and rich amenities in turn attract more workers that eventually drives up local rents. Low skill workers, less willing to take a lower real wage to live in a high amenity city, will choose to leave for more affordable cities. Diamond (2016) empirically finds that this process increase the well-being gap between the high and low skill workers that would be suggested by the increase in wage gap alone.

In China, the direction of migration is closely related to migrants of different skill types. Urban migration is predominantly constituted of education elites, while people participated in rural migration have less education attainment. (These two types of migration are determined by different factors.) In this thesis, for the sake of simplicity, urban migration is used interchangeably to refer to skilled worker migration, and rural migration refers to the same phenomenon as low skill worker migration.

Rural migration in China has been studied by many scholars since it has been a phenomenon for many years. Using 2014 China Migrants Dynamic Survey, Wang and Chen (2019) find that rural migrants favor cities close to their provinces of origin, with agglomeration of people from the same provinces and speak similar dialects, supporting the findings of Greenwood (1975). Their findings (2019) also show that intra-province migration is increasingly popular among rural migrants, particularly for provinces in Middle and Western China.

On the other hand, as Zhao (1999) points out, despite the significant volume of rural migration, the majority of rural population are reluctant to migrate or permanently stay in cities. His empirical study suggests that, the migration decision of rural households is a labor allocation decision that compares marginal returns to labor in agriculture and other employment types. He contends that, the major drivers of rural labor migration are the shortage of farmland, rural taxation, and the surplus of labor in rural area. Contrast with the traditional view that income differential is the principal reason for migration, Zhao concludes that increased income gained from migration is only seen transiently by the rural migrants, and does not effectively “pull” them into the urban area.

The relatively new topic of migration of skilled workers, has not been studied as much. Using a 1% population sample survey 2005, Liu and Shen (2014) finds that the migration of this population is driven primarily by job-related factors such as wage differentials, contrasting Zhao’s (1999) finding about rural migration where it plays a secondary role. Bachelor’s degree holders are found more sensitive to wage but less responsive to unemployment risk. Different from the change of preferences over life-cycle indicated by Chen and Rosenthal’s study in the US context (2008), Liu and Shen (2014) find no significant difference in the effect of amenities on age subgroups, while government granted benefits - such as advanced education opportunity - are more attractive to skilled migrants who already obtained local hukou. Table 1 gives an overview of variables found important in people’s migration decisions.

**Table 1. Variables in migration decisions**

Variables	Sources
Quality of Life	Albouy and Stuart 2014;
Amenities	Roback 1982; Chen and Rosenthal 2008
Income	Roback 1982; Liu and Shen 2014; Liu et al. 2018
Rents	Roback 1982
Jobs	Chen and Rosenthal 2008; Liu and Shen 2014
Distance	Greenwood 1975; Wang and Chen 2019

Business environment	Chen and Rosenthal 2008
Weather	Rappaport 2009; Chen and Rosenthal 2008; Albouy 2008 Maddison and Bigano 2003
Personal characteristics	Greenwood 1975; Diamond 2016

## Chapter 3 Methodology

In this thesis, I conducted a discrete choice experiment via a survey to collect stated preference information from college students, for which no revealed preference data is available. This chapter explains the design process of the survey using JMP software, detailing decisions on number of questions and attributes to be included, and sample size and respondent number to be recruited. A pre-test was conducted to test the initial survey design, and the survey was modified according to the feedback of pre-test respondents. The collected data was then analyzed also with JMP using multinomial logit models.

### 3.1 Discrete choice experiment

In this study, I employed one type of discrete choice experiment - stated preference method, to study college graduates' choice of cities. This method is widely applied in economics, public health, transportation planning, etc., to study and predict choice between two or more discrete alternatives, in contrast with continuous quantity of goods in standard consumption models.

Revealed preference data is a common source of information on the value attached to and preferences for goods or services (Lancsar and Louviere 2008). In a revealed preference study, people's preferences are inferred given their behaviors. For example, Ioannides and Zanella (2008) observe people's moves between neighborhoods and link these moving behaviors to the characteristics of neighborhoods and of individuals to infer their preferences or value attached to certain attributes. However, when revealed preference data is unavailable, stated preference method can be employed, by observing what people *say* they would do instead of what they are *observed* to do.

Discrete choice experiment has been widely used to study stated preference problems. It involves generating and analyzing choice data, which simulates preferences or values for which market does not exist or market data is unavailable even if it does exist

(Lansar and Louviere 2008). Typically, discrete choice experiment is implemented via a survey containing several *choice sets*, each presenting several hypothesized options that respondents should choose from. Each option, also referred to as a *profile*, is described by *attributes* that take on two or more *levels*. By varying levels across profiles, trade-offs between attributes and levels can be measured as people make choices. Choice data is collected as enough number of respondents make numerous such choices. The choice data is analyzed to estimate the contribution of attributes and levels to the overall utility.

### **3.2 Survey design**

To collect choice data, a survey was designed. The survey contains three parts: demographic questions, discrete choice questions, and an attribute ranking question. Demographic questions were included to study interaction between individual attributes and city preferences. In the last question of the survey, respondents were asked to *rank* the six attributes based on their importance in affecting their city choice. This is one of the conventional stated preference methods, where respondents are asked to directly order attributes based on their own perception. This kind of ranking can be hard when the comparisons are subtle, and they do not necessarily favor one thing over the other. Though this question was not used in the analysis for the thesis, it might be helpful in future research.

Survey design of discrete choice experiment involves decisions on attributes, levels, number of designs, number of questions in each design, and sample size, etc. The finalized survey has twelve designs, meaning there are twelve different versions of the survey consisting different choice sets. The twelve designs are assigned randomly to a total of 720 respondents, and each design receives answers from 60 respondents. Each design has six questions, or choice sets. Each of the six choice sets asks respondents to choose one from three city profiles, each described by six attributes. The survey includes a total of 216 profiles ( $216=12*6*3$ ), representing 216 scenarios one might face moving to a

hypothesized city. The reason for this specification is explained below.

The goal of discrete choice survey is to elicit enough information from respondents, but too many questions involving comparison of too many attributes will cause cognitive fatigue for respondents, thus impairing the quality of answers. Good survey design should find balance between the two aspects. In the pre-test of the survey, ten attributes and twelve questions were included. Based on feedbacks from survey respondents, only six attributes and six questions were preserved in the final version after the pre-test (with ten attributes) was conducted on 48 respondents. I removed several attributes because several respondents experienced cognitive burden when they were asked to compare profiles described by ten attributes. To prevent fatigue and gain more reliable answers, attributes indicated less important by the pre-test results are eliminated. Table 2 shows attributes and levels included in the finalized survey.

**Table 2. Attribute table of the survey**

Attribute	Level
City level	First-tier cities
	Second-tier cities
	Third-tier cities and others
Monthly income (yuan)	5,000-10,000
	10,000-15,000
	>15,000
Local hukou	Local hukou easy to obtain
	Local hukou hard to obtain
Monthly housing rent (yuan)	Less than 30% of monthly income
	30%-50% of monthly income
	Greater than 50% of monthly income
Housing price (yuan/m <sup>2</sup> )	<15,000
	15,000-30,000
	30,000-45,000
	45,000-60,000
Commute time (one-way)	<20 min
	20-40 min
	>40 min

Since there are fewer choice sets in each survey design and consequently fewer profiles, the survey will elicit less information from the respondents if number of survey designs remain the same. To compensate for the loss, I included twelve instead of eight survey designs in the finalized survey.

After determining number of attributes, choice sets, number of survey designs, the minimum sample size needed to evaluate can be roughly estimated. This paper uses the rule of thumb given by Johnson and Orme on Sawtooth Software's guide (2003) on choice-base discrete choices modeling. According to then, the number of respondents should satisfy this criterion:

$$\frac{nta}{c} \geq 500$$

where  $n$  is the number of respondents,  $t$  the number of choice sets in one survey design,  $a$  the number of alternatives per choice set, and  $c$  the largest number of levels of attributes.

For a survey where each respondent is supposed to choose between three given alternatives and repeat similar choices for six choice sets, and given that the largest number of levels contained by the attributes is four, the minimal number of respondents are 112 according to the formula above. The larger the sample size is, the more reliable the results will be. For the sake of survey efficiency, and given limited department funding, I assigned 60 respondents to each of the twelve versions of the survey, which yielded a sample size of 720 (60 respondents each version\*12 versions). This is adequate because empirically, one rarely requires more than 20 respondents per version to estimate reliable models (Lancsar and Louviere 2008).

The program used to generate survey profiles is the Choice Design platform of JMP, a data analysis software created by SAS. It produces product profiles – i.e. alternatives described by various combinations of attributes in pairs or in groups of three

or four – according to users’ specification, to compare prospective products. It allows specifications of number of choice sets, alternatives, and designs. Users are also able to specify number of attributes that can vary across alternatives in each choice set, so as to control cognitive burden of respondents.

Another feature of JMP’s Choice Design platform is, prior information about respondents’ preferences can be entered prior to survey generation to make more reasonable survey design. By knowing some of the respondents’ preferences in advance, I can spend more of the limited survey questions to elicit preferences for attributes we know less about. For example, if we know college graduates prefer first- and second-tier cities over others, we can spend more questions on finding out if they prioritize housing prices over monthly rent.

Using this feature, I set prior information to be: lower housing price and shorter commute time is always most preferred, while third-tier or lower-tier cities are always least preferred, as I believe that college graduates, holding other variables constant, would value more discretionary income over less income, less time spent on commuting over long time on commuting, while shortage of amenities living in a lower-tier city is widely disliked. Table 3 gives a sample choice-set presented to respondents in the survey.

Another measure adopted to prevent fatigue is restricting the number of attributes that could vary in a choice set to three, and the three varied attributes are highlighted so respondents can easily see which part they should be particularly careful about.

**Table 3. A sample choice set presented in the survey**

Attributes	City 1	City 2	City 3
City level	First-tier city	First-tier city	Second-tier city
Monthly income (yuan)	>15,000	<10,000	10,000-15,000
Housing price (yuan/m <sup>2</sup> )	15,000-30,000	15,000-30,000	15,000-30,000
Monthly rent (percent of monthly income)	30%-50%	>50%	30%-50%
Local Hukou	Easy to obtain	Easy to obtain	Easy to obtain
Commute time	20-40 min	20-40 min	20-40 min

The design was tested on its efficiency to see if it is optimal to elicit desirable information. There has not been a consensus on what constitutes an optimal design of discrete choice survey. But efficiency is one widely examined property, referring to the precision with which effects are estimated given this survey design. More efficient designs lead to more precise estimates for a given sample size. Specifically, D-efficiency is one of the widely used efficiency criterion, and more details can be found in Lancsar and Louviere (2008). The absolute value of D-efficiency is not particularly meaningful, but comparison of D-efficiency between numerous designs provides a hint of an optimal design.

One feature of JMP is, it enables users to set number of starts. For example, if number of starts is set to 100, then 100 designs will be generated randomly according to the seed specified. D-efficiency is calculated for each design and the one with best D-efficiency will be presented to user. Thus, setting a large number of starts will give a more efficient design. With JMP's algorithm, theoretically, five starts will provide 90% efficiency, and 10,000 starts will give 97% efficiency (Kessels 2016). Given the capacity of my laptop, the finalized survey used 200 starts, ensuring an efficiency level of higher than 90%.

### **3.3 Survey implementation**

This research employed the strategy of stratified sampling, which is appropriate when the measurement of interest is expected to vary between different subgroups, and there is a need to ensure representation from all subgroups. To gain a sample representative of the country, I allocated the 720 responses to each province according to the number of students enrolled in higher education institutions in each province (Ministry of Education 2019). The more students enrolled in a province, the more respondents are expected to come from this province. Distribution of college students enrolled in each province can be found in Table 10 in the appendices.

The twelve versions were sent to people from different provinces and each design received 60 responses. In the case that a province is allocated less than 60 respondents, students from the next province will fill up that vacancy. When there are more than 60 respondents from one province, then respondents other than the first 60 will be given the next design. For example, design 1 is sent to respondents in Beijing, where 72 responses are needed according to the sampling frame, then the first 60 respondents from Beijing received design 1, and the rest 12 received design 2.

The survey was disseminated using Tencent Survey's (wj.qq.com)<sup>4</sup> feature of *Response Group*, a platform with more than one million registered. Since some surveys provide cash incentives, large number of users volunteer to fill out surveys posted by others to earn money. I used the platform to recruit my respondents for free, but for each valid answer I offered a cash incentive of 2 yuan.

To register on the platform, users are required to provide basic information such as gender, age, education attainment and geographic location. This allows surveyors to filter possible respondents and reach eligible ones as they disseminate the survey. Exploiting this feature, I restricted my respondents to be people 1) with, or are pursuing either a bachelor's or master's degree, 2) aged between 20-29, 3) from a predetermined province, so the samples were stratified geographically. The filters are not 100% accurate to identify eligible respondents, because some socio-demographic information has changed since they registered. But overall, filters help to increase the accuracy of respondents recruited.

The survey was disseminated for several times to make up for invalid answers.

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<sup>4</sup> Tencent Survey is a crowdsourcing marketplace similar to Amazon's Mechanical Turk. It makes it easier for individuals and businesses to find eligible survey participants online. The use of the platform to recruit survey participants is free, but it also provides services such as designing survey, recruiting participants, cleansing survey data with a charge.

Once an answer is diagnosed as invalid because of short duration of answering, one more survey was sent to a new respondent that meets the restrictions. This process is repeated until the answer is valid.

### 3.4 Model

Random utility theory (McFadden 2001) is used to analyze choices in DCEs.

Using this theory, it is postulated that  $U_{ij}$ , the utility that respondent  $i$  attaches to city  $j$  can be decomposed into a systematic part  $V_{ij}$  and a random component  $\varepsilon_{ij}$ :

$$U_{ij} = V_{ij} + \varepsilon_{ij}, \quad j = 1, 2, 3 \quad (1)$$

where  $j$  ranges from 1 to 3, because three options of city are provided in the survey: first-, second-, and third-tier or lower-tier cities.

The random component is attributable to unobservable or omitted variables, specification error, and measurement error. For example, effects of city attributes that might affect people's choice of city - such as air quality and distance to hometown - but are omitted in the survey, will be absorbed by the random component.  $V_{ij}$ , the systematic part, is a function of  $X_{ij}$ , the observed attributes of alternative, interacted perhaps with personal attributes  $Z_i$ :

$$V_{ij} = V(X_{ij}, Z_i) \quad (2)$$

where  $X'_{ij}$  represents utility from factors such as city level, housing price, income, while  $Z_i$  is the effect of personal characteristics such as one's age, gender, etc.

It is assumed that one selects an alternative if and only if the utility of, for example, alternative 1, is higher than any other alternatives in this choice set. By observing if respondent chooses alternative 1, we are observing their utility. Assuming a joint probability distribution of  $\varepsilon_i$ , the probability of choosing the utility maximizing alternative - namely, option 1 - is given by:

$$\begin{aligned}
P(Y_i = 1) &= P(U_{i1} > U_{ij}) \\
&= P(V_{i1} + \varepsilon_{i1} > V_{ij} + \varepsilon_{ij}) \\
&= P(V_{i1} - V_{ij} > \varepsilon_{ij} - \varepsilon_{i1}), \quad \forall j \neq 1 \quad (3)
\end{aligned}$$

where  $Y_i$  is a random variable indicating the choice outcome. Estimable choice models can be specified from this conceptual model once assumptions are made about the distribution of random component.

I used multinomial logit model to analyze the choice data. The errors are assumed to have an independent and identical extreme value distribution. The alternatives are assumed to be independent of each other. The choice probability is given by:

$$P(Y_{ij} = 1) = \frac{\exp(\beta V_{ij})}{\sum_{j=1}^J \exp(\beta V_{ij})}, \quad j = 1, \dots, 3 \quad (4)$$

where  $V_{ij}$  is given by (2).

### 3.5 Data analysis software

The goal of this paper is to use collected choice data to estimate the  $\beta$  and  $\gamma$  vectors, thereby determining which factors are more important in people's decision of city choice and if they interact with personal characteristics.

Data are analyzed with JMP's Choice platform, which specialized in the analysis of choice experiments results. This platform allows analysis of both profile effects (or main effects) and subject effects, by including interaction terms of subject effects and profile effects in the regression. Profile effects are the attributes describing the alternative - in this case, the city alternative presented; subject effects are the attributes of the respondent.

Likelihood ratio tests are conducted on each main effect and interaction terms that include this attribute to see if their inclusion increases the goodness of fit of the model, as

compared to model without these terms.

Observing coefficients of interaction terms, I am able to tell if college graduates with certain demographic characteristics demonstrate similar preferences for cities.

JMP provides a Choice Model Report after analysis. Several items are of particular interest to this paper: 1) Effect Summary, which lists and visualizes effects estimated by the model, 2) Parameter Estimates, reporting estimates and standard errors of the coefficients of effects listed in Effect Summary, 3) Likelihood Ratio Tests, which presents results of Chi-Square tests for effects listed, and lastly, 4) utility profiler and probability profiler that allow comparison of two alternatives' utility and their probabilities of being selected.

## Chapter 4 Data

I conducted the survey using Tencent Survey, a Chinese survey platform similar to Amazon Mechanical Turk (<https://www.mturk.com/>). Among the 1393 individuals who opened the survey, 928 answered the survey, and 720 were valid responses. The response rate is 51.7%, calculated as the number of survey answers received divided by the number of potential respondents that have opened the survey link. The response rate is higher than that of email surveys (20%). This is satisfactory given the length and the complexity of tasks, and given that it is conducted via an online platform.

Several factors may have contributed to high response rate. First, a cash reward of 2 yuan was provided for each valid answer via the platform. This is a large amount as compared to other surveys on the platform. Second, complexity of tasks has been reduced by cutting survey length from 12 questions to 6 and reducing attributes of interest from 10 to 6 after the pre-test, reducing possibility of exiting survey before completing.

To ensure answer quality, I also filtered responses by limiting answer time to at least 120 seconds. Answer time less than that will make survey answer invalid, since the questions need at least 2 minutes to be considered thoroughly. In some rare cases, answer time of 118 or 119 seconds are accepted too, due to difficulties in recruiting eligible respondents after several times of dissemination. This should not impact answer quality, because theoretically, there should be no concrete difference between answers at both sides of the critical value of 120 seconds if the distance is close enough. On average, the survey takes more than 5 minutes to complete (see Table 4). Among the 720 respondents that gave valid answers, 48% are female and 52% are male (see Table 5).

**Table 4. Descriptive statistics of response time and respondents' age**

Variable	Obs	Mean	Std. Dev.	Min	Max
Time	720	308	414	118	6898
Age	720	23.9	2.8	16	30

**Table 5. Gender of respondents**

Gender	Freq.	Percent	National level
Female	344	47.78	48.9%
Male	376	52.22	51.1%
Total	720	100.00	

Ideally, the survey should be stratified based on geographic information. Though I have strived to achieve that, since I was only able to reach people registered in a certain province, and that province might be different from where people gain their degree, the actual sampling frame is inevitably different from the one intended – one that should be based on province where people get their degree. Luckily, since a large portion of people gain their degree in a local or in-province university, their registered province and degree province are the same. Thereby, the actual geographic distribution is close to the intended sampling frame. See home city level and province distribution of respondents in Tables 6 and 7.

**Table 6. Home city level of respondents**

Home City Level	Freq.	Percent	National level
First-tier cities	65	9.03	
Second-tier cities	186	25.83	60.6%
Third-tier cities	301	41.81	
Rural area	168	23.33	39.4%
Total	720	100.00	

According to Table 6, 67% respondents come from second- or third-tier cities, 23% come from rural area, while 9% call first-tier cities home, making a reasonable distribution of cities: the majority of the Chinese population live in second- or third-tier cities, due to large number of cities in these categories. However, the share of students from rural area is smaller than that in the national population – which is about 40% in 2017. This is expected since urban population has a higher rate of college attendance.

**Table 7. Province distribution of respondents**

SchoolProvince	Freq.	Percent	Percent in sampling frame
Shanghai	42	5.83	7
Yunnan	13	1.81	2
Inner Mongolia	2	0.28	1
Beijing	110	15.28	15
Jilin	16	2.22	3
Sichuan	28	3.89	5
Tianjin	30	4.17	3
Ningxia	1	0.14	0
Anhui	16	2.22	3
Shandong	25	3.47	4
Shanxi	10	1.39	1
Guangdong	35	4.86	5
Guangxi	9	1.25	1
Xinjiang	3	0.42	1
Jiangsu	57	7.92	8
Jiangxi	17	2.36	2
Hebei	20	2.78	2
Henan	12	1.67	2
Zhejiang	19	2.64	3
Hainan	3	0.42	0
Hubei	54	7.50	7
Hunan	31	4.31	4
Gansu	7	0.97	2
Fujian	11	1.53	2
Guizhou	7	0.97	1
Liaoning	34	4.72	5
Chongqing	19	2.64	3
Shaanxi	41	5.69	6
Qinghai	1	0.14	0
Hong Kong	10	1.39	NA
Heilongjiang	13	1.81	3
Overseas	24	3.33	NA
Total	720	100.00	100

Though most respondents attend college in China, a small portion gain their degree overseas, incorporating the foreign degree sample – a critical part of the college student body in China. Location information (Table 8) shows that 18 respondents are out of the country at the time they filled out this survey.

**Table 8. Current location of respondents**

Location	Freq.	Percent
China	702	97.50
New Zealand	2	0.28
Japan	3	0.42
Belgium	1	0.14
France	1	0.14
Australia	1	0.14
US	6	0.83
UK	1	0.14
Spain	1	0.14
South Korea	1	0.14
Malaysia	1	0.14
Total	720	100.00

Over 50% respondents are expecting graduation in 2020-2022, and 32% have graduated. The average age of respondents is 23.9, and 32% were born in 1994 – 1997. 60% hold a master’s degree, while 40% hold a bachelor’s degree. More than half of our sample study engineering or science, while 42% study humanities or social sciences (Table 9).

Survey respondents in this study consists of a higher portion of “elites” than the national average. As shown in Table 10, 50% come from the most selective universities (“985”) and very selective universities (“211”), 30% attend other first-tier universities, and 19% study in second-tier universities<sup>5</sup>. Third-tier universities are excluded since many provinces have ceased using this category. As a result of this respondent structure, the survey discloses more information on the elite student

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<sup>5</sup> Universities in China are categorized by the Ministry of Education into three tiers: first-, second-, and third-tier universities. These universities issue degrees, but there is another type of colleges that issue diplomats instead of bachelor’s degrees. First-tier universities are the most prestigious ones but admit least students. First-tier universities have the priority to start admission first in college admission. First-tier universities are further classified into “985”, “211”, and other first-tier universities. There are 39 “985” universities and they are the most selective universities in China. There are 112 “211” universities and they are the second most selective universities in China.

population that are more popular in labor market.

**Table 9. Major of respondents**

Major	Freq.	Percent
Engineering	214	29.72
Humanities	138	19.17
Science	203	28.19
Social Science	165	22.92
Total	720	100.00

**Table 10. Type college/universities of respondents**

School Type	Freq.	Percent
Most selective (985)	213	29.58
Very selective (211)	159	22.08
Other first-tier	213	29.58
Second-tier	135	18.75
Total	720	100.00

## Chapter 5 Results and Findings

In this chapter, I discuss the findings of my data analysis derived from modeling estimations with the survey data that I collected. I first present results of the city attributes found important by respondents and their impact on city choice, then I report findings on how person-specific attributes affect their city choice, and if there is certain correlation between individual attributes and preferences.

College graduates seem to prioritize short-term benefits over long-term benefits when choosing cities. Monthly rents and monthly income - factors that immediately impact their disposable income - are the most important factors that influence a city choice for college graduates. While factors with greater effects in the long run than in the short run – such as *Hukou* and, surprisingly, housing price, are found least important. I also found that preference differs significantly by gender, degree types.

### 5.1 Impact of city attributes on individual city choice

Three models are built, Model 1- the profile effects model to study impacts of city attributes alone, and Model 2 and 3 - the subject effects models to incorporate impacts of individual attributes as well. In the three models, the base alternative's attributes were set to be the middle levels, to enable easier comparisons between levels. The base alternative is a second-tier city, where the respondent has a monthly income of 10,000 – 15,000 yuan, rents an apartment that costs 30%-50% of their monthly income, the single-way commute to work takes 20 – 40 minutes every day, and the default housing price is 15,000-30,000 yuan per square meter. Including personal attributes significantly improves model's fit by reducing log likelihood

statistics<sup>6</sup> from Model 1's 8,155 to Model 2's 7,801 (Table 9). By eliminating interaction terms insignificant at the 0.05 level – which is used for the rest of the thesis - from Model 2, I obtained Model 3, with a log likelihood statistic of 7,841, indicating no significant difference in how well the two models fit the data. Therefore, Model 3 is used as the subject effects model.

I followed the JMP's user manual recommendation to name the three models. The profile effects model offers a reference for the subject effects model to see how city attributes interact with subject effects. This section elaborates on the influence of city attributes on city choice.

Model effects – indicating which factor plays a greater role in the choice – are presented in Table 12 in the Appendices section. All six city attributes (profile effects) of interest are significant in the three models. The six profile effects are highly significant in Model 1, but their log worth statistics<sup>7</sup> drop significantly once subject effects are included in Model 3, indicating that subject effects account for a large portion of the variation in city choices. Nevertheless, the six effects are still significant in Model 3. Comparison of level estimates (Table 11) reveals that Model 1 and 3 yield very similar results of these profile effects.

I examined scale of city attributes' impacts on respondents' utility by looking at their estimated coefficients. Table 9 shows parameter estimates of each attribute level. In both models, the single largest impact comes from monthly rent over 50% of

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<sup>6</sup> Smaller log likelihood indicates better fit of model.

<sup>7</sup> Log worth is the logarithmic transformation of p-value - defined as  $-\log_{10}(p - value)$  - to allow comparison of p-values that might be too close to be compared. P-value here comes from a chi-square test of each attribute to determine its contribution to the overall model.

monthly income, respectively reducing utility by 0.62 and 0.64 in Model 1 and 3, as compared to monthly rent of 30 - 50% of monthly income. Monthly rent <30%, on the other hand, improves utility by 0.60 and 0.56 for the two models.

Interestingly, college graduates hate third- and lower- cities more than they love first-tier cities. Respondents are very passive about living in a third- or lower-tier city as compared to a second-tier city (reducing their utility by 0.52 and 0.55 respectively), but utility gained from moving to a first-tier city from a second-tier one is not as prominent (0.27 and 0.3 in two models) – it is actually the second smallest profile effect among the 12 profile effects studied in Model 1.

Monthly income proves to have great symmetric impact in both models, i.e. subjects are very responsive to both high and low monthly income. In comparison, the effects of housing price and commute time are asymmetric. Respondents are more responsive to low housing price and long commute time, while higher housing price and shorter commute time do not raise their utility level as much.

These results indicate that short-term benefits, namely, disposable income, are the main determinants of city choice, since the three most significant factors – monthly rent, monthly income, and city levels – all instantly affect their lifestyles and quality of life as they relocate. On the other hand, housing price and local hukou play a less critical role, which makes it reasonable to infer that they matter less because they do not affect people's life as much, especially immediately after relocating.

Monthly rent is much more important than housing price, as shown in Table 12. I explored this aspect with JMP's feature of *probability profiler*, which shows one alternative's probability of being chosen as opposed to the specified baseline set. The odds of the two alternatives being chosen sum up to 1. Holding all attributes other than monthly rent and housing price at their middle level, set the baseline set at their middle levels (monthly rent of 30%-50% and housing price of 15,000 – 30,000), and

let monthly rent of the main alternative to be <30%, housing price 30,000 – 45,000.

The odds that one will choose the main alternative over baseline set is 0.503 (Figure 2), indicating that main alternative is more favorable. But if housing price is switched to a lower level (<15,000) and monthly rent to a higher level (>50%) for the main alternative, odds that main alternative is selected drops to 0.39 (Figure 3).



Figure 2. Probability profiler

(main alternative: housing price 30k – 45k; monthly rent <30%)

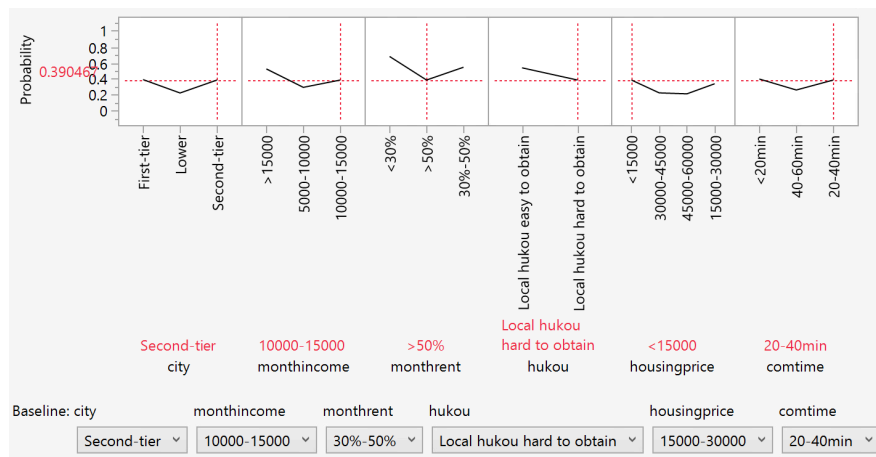


Figure 3. Probability profiler

(main alternative: housing price <15k; monthly rent >50%)

This indicates that college graduates are realistic and are driven by discretionary income in city choice. Since most college graduates need to rent an

apartment instead of buying one when first locating in a city, rent is a more relevant decision than housing price at this stage. High rent means an immediate reduction in discretionary income that makes other amenities less affordable. Levels of monthly rent are presented as portion of monthly income, which helps to reconcile differentiating rents levels across cities, also naturally makes respondents associate it with discretionary income.

On the other hand, high housing price becomes relevant only when they begin to consider homeownership, which is very unlikely for graduates with little savings. Similarly, hukou only matters for subjects determined to settle in this city permanently, but many college graduates only “seek their fortune” in these cities for several years, and may return to their hometowns afterwards. Given that, hukou is also less important immediately after relocation.

However, this does not mean that college graduates are short-sighted. As shown in Figure 4, once housing price becomes too high to be acceptable, even when monthly rent is really cheap, respondents are rational enough to switch to the reference set instead, indicating though they prioritize short-term benefits, they are NOT ignoring long-term consequences.



Figure 4. Third case of probability profiler  
(main alternative: housing price 45k – 60k; monthly rent <30%)

**Table 11. Parameter estimates of Model 1 and Model 3**

Variables	Model 1 – profile effects			Model 3 – reduced subject effects		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Monthly Rent[>50%]	-0.622	0.041	0.000***	-0.636	0.065	0.000***
Monthly Rent[<30%]	0.597	0.032	0.000***	0.555	0.052	0.000***
City Level [Lower]	-0.522	0.039	0.000***	-0.546	0.048	0.000***
Monthly Income[>15000]	0.511	0.031	0.000***	0.510	0.033	0.000***
Monthly Income[5000-10000]	-0.458	0.039	0.000***	-0.459	0.041	0.000***
Housing Price[<15000]	0.449	0.048	0.000***	0.450	0.060	0.000***
Commute Time[40-60min]	-0.397	0.037	0.000***	-0.360	0.045	0.000***
Housing Price[45000-60000]	-0.382	0.047	0.000***	-0.341	0.054	0.000***
Housing Price[30000-45000]	-0.314	0.045	0.000***	-0.276	0.052	0.000***
Hukou[Local hukou easy to obtain]	0.309	0.025	0.000***	0.343	0.038	0.000***
City Level [First-tier]	0.273	0.033	0.000***	0.306	0.040	0.000***
Commute Time[<20min]	0.225	0.033	0.000***	0.203	0.040	0.000***
Degree[master]* City Level [First-tier]				0.110	0.040	0.006***
Degree[master]* City Level [Lower]				-0.097	0.047	0.039**
Degree[master]*Commute Time[<20min]				-0.128	0.040	0.002***
Degree [master]*Commute Time[40-60min]				0.112	0.046	0.016**
Degree [master]*Housing Price[<15000]				0.147	0.051	0.004***
Degree [master]*Housing Price[30000-45000]				-0.095	0.047	0.044**
Degree [master]*Housing Price[45000-60000]				-0.100	0.050	0.046**

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Degree [master]*Hukou[Local hukou easy to obtain]	0.061	0.027	0.022**
Degree [master]*Monthly Income[>15000]	0.107	0.034	0.002***
Degree [master]*Monthly Income[5000-10000]	-0.141	0.041	0.001***
Degree [master]*Monthly Rent[<30%]	-0.045	0.041	0.274
Degree [master]*Monthly Rent[>50%]	-0.069	0.050	0.169
Gender[Female]* City Level [First-tier]	0.117	0.035	0.001***
Gender [Female]* City Level [Lower]	-0.198	0.041	0.000***
Gender [Female]*Commute Time[<20min]	0.057	0.035	0.106
Gender [Female]*Commute Time[40-60min]	-0.153	0.040	0.000***
Gender [Female]*Housing Price[<15000]	0.019	0.050	0.702
Gender [Female]*Housing Price[30000-45000]	-0.092	0.046	0.047**
Gender [Female]*Housing Price[45000-60000]	0.033	0.048	0.492
Gender [Female]*Monthly Income[>15000]	0.076	0.033	0.022**
Gender [Female]*Monthly Income[5000-10000]	-0.073	0.041	0.075*
Gender [Female]*Monthly Rent[<30%]	0.045	0.035	0.200
Gender [Female]*Monthly Rent[>50%]	-0.071	0.044	0.106
Graduated*Hukou[Local hukou easy to obtain]	-0.058	0.050	0.249
Graduated*Monthly Rent[<30%]	-0.026	0.065	0.690
Graduated*Monthly Rent[>50%]	0.135	0.081	0.096*
Home [First-tier cities]*City Level[First-tier]	0.236	0.085	0.006***
Home [First-tier cities]*City Level[Lower]	-0.003	0.106	0.979
Home [First-tier cities]*Commute Time[<20min]	-0.111	0.087	0.205
Home [First-tier cities]*Commute Time[40-60min]	0.216	0.096	0.025**

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Home [First-tier cities]*Housing Price[<15000]	-0.048	0.136	0.723
Home [First-tier cities]*Housing Price[30000-45000]	0.097	0.112	0.388
Home [First-tier cities]*Housing Price[45000-60000]	0.159	0.116	0.171
Home [First-tier cities]*Monthly Rent[<30%]	-0.218	0.087	0.013**
Home [First-tier cities]*Monthly Rent[>50%]	0.198	0.100	0.047**
Home [Rural area]* City Level[First-tier]	-0.056	0.064	0.380
Home [Rural area]* City Level[Lower]	0.078	0.073	0.285
Home [Rural area]*Commute Time[<20min]	-0.021	0.063	0.735
Home [Rural area]*Commute Time[40-60min]	0.070	0.070	0.321
Home [Rural area]*Housing Price[<15000]	0.074	0.089	0.407
Home [Rural area]*Housing Price[30000-45000]	-0.088	0.084	0.292
Home [Rural area]*Housing Price[45000-60000]	0.061	0.086	0.479
Home [Rural area]*Monthly Rent[<30%]	0.042	0.063	0.504
Home [Rural area]*Monthly Rent[>50%]	-0.059	0.077	0.441
Home [Second-tier cities]* City Level[First-tier]	-0.065	0.062	0.293
Home [Second-tier cities]* City Level[Lower]	-0.167	0.076	0.027**
Home [Second-tier cities]*Commute Time[<20min]	0.045	0.061	0.464
Home [Second-tier cities]*Commute Time[40-60min]	-0.127	0.070	0.071*
Home [Second-tier cities]*Housing Price[<15000]	-0.092	0.091	0.310
Home [Second-tier cities]*Housing Price[30000-45000]	0.056	0.081	0.494
Home [Second-tier cities]*Housing Price[45000-60000]	-0.111	0.086	0.197
Home [Second-tier cities]*Monthly Rent[<30%]	-0.020	0.061	0.740
Home [Second-tier cities]*Monthly Rent[>50%]	0.032	0.072	0.654

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Major [Humanities]*Commute Time[<20min]	-0.020	0.064	0.761
Major [Humanities]*Commute Time[40-60min]	0.013	0.073	0.863
Major [Humanities]*Monthly Income[>15000]	0.012	0.060	0.837
Major [Humanities]*Monthly Income[5000-10000]	0.078	0.075	0.298
Major [Humanities]*Monthly Rent[<30%]	0.031	0.065	0.633
Major [Humanities]*Monthly Rent[>50%]	0.066	0.080	0.411
Major [Science]*Commute Time[<20min]	-0.004	0.056	0.947
Major [Science]*Commute Time[40-60min]	0.002	0.064	0.979
Major [Science]*Monthly Income[>15000]	-0.195	0.053	0.000***
Major [Science]*Monthly Income[5000-10000]	0.073	0.064	0.250
Major [Science]*Monthly Rent[<30%]	-0.143	0.058	0.013**
Major [Science]*Monthly Rent[>50%]	0.069	0.069	0.312
Major [Social Science]*Commute Time[<20min]	-0.068	0.061	0.262
Major [Social Science]*Commute Time[40-60min]	0.199	0.066	0.003***
Major [Social Science]*Monthly Income[>15000]	0.027	0.058	0.636
Major [Social Science]*Monthly Income[5000-10000]	-0.001	0.074	0.992
Major [Social Science]*Monthly Rent[<30%]	0.115	0.061	0.060*
Major [Social Science]*Monthly Rent[>50%]	-0.079	0.078	0.308
School Type[211]* City Level[First-tier]	-0.001	0.061	0.981
School Type[211]* City Level[Lower]	-0.097	0.072	0.179
School Type[211]*Commute Time[<20min]	-0.053	0.063	0.401
School Type[211]*Commute Time[40-60min]	-0.090	0.072	0.213
School Type[211]*Monthly Rent[<30%]	0.118	0.060	0.052*

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School Type[211]*Monthly Rent[>50%]		-0.072	0.075	0.334
School Type[Normal first-tier]* City Level[First-tier]		-0.014	0.055	0.799
School Type[Normal first-tier]* City Level[Lower]		0.037	0.062	0.550
School Type[Normal first-tier]*Commute Time[<20min]		-0.045	0.055	0.413
School Type[Normal first-tier]*Commute Time[40-60min]		0.054	0.062	0.384
School Type[Normal first-tier]*Monthly Rent[<30%]		-0.008	0.054	0.887
School Type[Normal first-tier]*Monthly Rent[>50%]		-0.009	0.067	0.891
School Type[Second-tier]* City Level [First-tier]		-0.175	0.073	0.017**
School Type[Second-tier]* City Level [Lower]		0.211	0.079	0.008***
School Type[Second-tier]*Commute Time[<20min]		-0.070	0.069	0.311
School Type[Second-tier]*Commute Time[40-60min]		0.213	0.080	0.008***
School Type[Second-tier]*Monthly Rent[<30%]		-0.128	0.072	0.078*
School Type[Second-tier]*Monthly Rent[>50%]		-0.032	0.088	0.720
AICc	8178.85		8048.49	
BIC	8255.23		8687.08	
-2*LogLikelihood	8154.78		7841.62	

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My findings on rents and housing price's impacts on willingness to relocate differ from that of Dong (2016), which indicates that housing price plays a greater role than does monthly rents in migration decision. This discrepancy in findings may be attributed to differences in the two populations studied. As mentioned, my population is college graduates, and school type distribution suggests my sample skewed toward the elite end, while Dong's sample –collected in 2012 - has an average age of 33 years old, with 88% holding rural hukou and only 32% having received education beyond high school. The difference can be regarded as one between college graduates and average migrants; in other words, one between urban-urban migrants and rural-urban migrant.

It is conceivable that the population of interest in my study is less responsive to factors with greater long-term impacts than traditional rural-urban migrants for several reasons. First, home purchasing behavior in Chinese society is driven by the desire to alleviate negative impact of unpredictability - for example, depreciation of currency or being expelled by the landlord when renting. This anxiety from unpredictability is rooted in the life experience and the history of the country. However, born in the 1990s, this generation, has been brought up in the years when China's GDP was growing at a rate over 10% each year, and the political atmosphere is also more stable than before. Compared with previous generations, they experienced much less hardship from unpredictability of life and resources shortage of any kinds, thus might be less insecure about renting instead of buying home. Secondly, incremental knowledge and skills brought by higher education attainment may have made them less vulnerable to exogenous unpredictability such as unemployment. They are thus more open to the idea of renting, especially when they just begin to work.

I find that long commute time of 40 – 60 min reduces people's utility, while short commute time (<20 min) improves the utility only half as much. To evaluate the impact of

different levels on the overall utility, I looked into marginal probability<sup>8</sup> associated with each commute time level. As shown by my results, marginal probabilities of 20-40 minutes and <20 minutes are almost indistinguishable to the subject, but commute time of 40-60 minutes has much smaller marginal probability (Table 13). But overall, it is not the major consideration in city choice. This is expected, since most people take jobs based on their pay and career prospects, commute time is accepted as given. It might matter more for married people for whom family time is precious, especially for those with kids, but for college graduates fresh out of schools who are younger and more energetic, more time spent on the way to work might be easily compensated by other benefits such as higher wages.

Another interesting finding is that respondents are averse to living in smaller cities, while the idea of living in a first-tier city is not as attractive as expected, as compared to a second-tier city. Specifically, marginal probabilities of choosing first-tier and second-tier cities are respectively 0.41 and 0.40 in both models, with marginal probability of third-tier cities being 0.18 (Table 13 in the appendix). The distribution of marginal probabilities suggests that, first-tier and second-tier cities are becoming closer in terms of attractiveness to college graduates, while third-tier or lower-tier cities are pronouncedly less attractive.

This finding is supported by the fact that second-tier cities are growing rapidly in residential population and GDP growth rate (Zhe Wang 2020). China's population has increased by 4.9% in 2010 - 2020, but the population growth rates of first-tier and second-tier cities are very close - 19.9% and 17.4%, respectively. Top second-tier cities such as

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<sup>8</sup> Marginal probability is the odds of choosing one level over others under same attribute, holding other attributes constant at middle levels. It allows comparison of level effects under one attribute. Marginal probabilities of levels under one attribute should sum up to one, indicating *certainty* of being chosen.

Hangzhou, Nanjing, and Chengdu are performing almost as outstandingly as the four first-tier cities in terms of new economy index, which features intense technological and human capital investments.

In summary, city attributes' impact on city choice varies by attribute level, since each level is estimated as a variable in the model. The most influential attribute levels are monthly income, followed by third- or lower-tier city and monthly rent. College graduates are more responsive to short-term benefits such as monthly rents and monthly income because these variables impact their welfare immediately. Variables with greater effect in the long run are less important, but it does not mean that they completely ignore these effects. Low housing price and long commute time have larger impact on their utility than do high housing price and short commute in term of absolute scale of impact, though with different signs. First-tier and second-tier cities are almost equally attractive to these graduates.

## **5.2 Personal attributes' impact on city choice**

It is reasonable to assume the choice of where to live is affected by the respondent's own attributes. I explored these effects by interacting city attributes with six personal characteristics: gender, major, home city, school type, degree type, and whether the subject has graduated. The baseline setting of individual characteristics is: a male bachelor's in engineering candidate from a third-tier city studying at most selective universities ("985"), and this is the object of comparison when interpreting coefficients of interaction terms.

Among the 23 attribute interaction effects included in Model 3, 15 are significant (Table 12 in appendix). Parameters of interaction terms were estimated on levels, so I was able to observe patterns of preferences on levels. Five out of the 6 attributes are found significant, except the dummy for graduation. Preferences differ most between females and males, and between bachelor's and master's degrees holders. College graduates tend to

prefer cities of same city level as their home city. Majors and school ranking also play a role in city choice though their effects are less pronounced.

### 5.2.1 Gender

Model effects of Model 3 (Table 11) show that, women distinct from men in their attitude toward city level, long commute time, high housing price and high wages.

Parameter estimates in Table 9 suggest that, compared to males, female college graduates have significantly higher utility from monthly wages over 15,000 yuan, and from living in first-tier cities. They express significantly more negative attitude toward commute time over 40 minutes and housing price of 30,000 – 45,000 yuan per square meter, while no significant difference is found on commute time less than 20 minutes and other housing prices. However, females and males have similar preferences for hukou and rents at all levels.

The results suggest that female college graduates have a higher expectation for relocation choice: they are more attracted by the rich city life of first-tier cities and high wages, but display lesser tolerance for long commute time or expensive housing as relative to males, which limits room for trade-offs between desirable attribute levels.

Using JMP's utility profiler, which displays the utility of an alternative as perceived by a subject under customized specifications, it is found that females have more clear-cut preference for city levels (comparing the slope of lines in the city level graph in Figure 5 and 6), regardless of how other personal characteristics are specified. Despite their school type, home city level, major, degree type, female students find first-tier cities most attractive destination, followed by second-tier cities, while third- or lower-tier cities are least preferred. Figure 5 and 6 display the comparison of utility profiler under aforementioned baseline setting, but different specifications of personal attributes other than gender have been tried, and female demonstrate more clear-cut preferences in all these specifications.



Figure 5. Utility profiler of a female



Figure 6. Utility profiler of a male with same setting except for gender

One interesting exception is that when the female subject is from a second-tier city and holds a degree either of bachelor's or master's from a non-985 university. In this case, the female subject would find second-tier cities more desirable than first-tier cities. But if this person attends most selective universities ("985") holding other attributes same, she will still aspire to live in a first-tier city.

Comparatively, males are less concerned about city levels, regardless of their other personal attributes. Males have less infatuation for first-tier cities than females. Only males from first-tier cities obtain higher utility from living in first-tier cities, as compared to a male from a second-tier city. For males from non-first-tier cities, the lower their

university ranking, the more likely they will prefer second-tier over first-tier cities. This may be attributable to the more selective labor market in first-tier cities, where they have less competitive edge and are thereby less likely to afford higher quality of life. But there is at least one consensus across the gender line: third- or lower-level cities are strictly less preferable than first- and second-tier cities, irrespective of gender, school type, or any other individual characteristics.

### **5.2.2 Degree type**

Master's degree holders differ from bachelor's degree holders in many ways. Master's students are also more attracted by first-tier cities than bachelor's degree holders are. Accordingly, they are more patient with long commute time over 40 minutes and find short commute time less beneficial to their utility.

Although I found college graduates care more about short-term benefits from previous section, undergraduates and graduates behave differently in this aspect. In comparison with undergraduates, graduates care more about practical and long-term aspects of city choice: low housing prices and local hukou that can be easily obtained, all greatly appeal to them. They have higher expectations of wages, probably because of their education experience. It should be also noted that there is no significant difference in preference for high or low monthly rents between master's degree holders and bachelor's degree holders: both groups have strong preference for low housing rents and strong dislike for high rents. The major difference is that, besides short-term effects of rents, master's students also value long-term effects such as housing prices and hukou.

### **5.2.3 Home city level**

College graduates display unwillingness to locate in a city of lower level than their home city, and tend to choose a city at least of same level. For instance, college graduates from first-tier cities receive pronouncedly higher utility from locating in a first-tier city

than do students from third-tier cities. Similarly, those from second-tier cities are also less likely than their peers from third-tier cities to live in a third- or lower-tier city. Migration of college graduates seems to be climbing up a one-way ladder, and few are willing to go the opposite from a higher-level city to a lower-tier city.

First-tier city students, who might be more used to expensive rents, traffic congestions, and large city size from their experience living a first-tier city, display significantly less aversion toward long commute time and expensive rents, as compared to those from third-tier city.

#### **5.2.4 Major and school types**

Interaction terms with graduates' majors suggest that graduates majoring in humanities and engineering have no significantly different preferences in city choice. But students studying science are less attracted by high wages than do engineering students. The mechanism behind is unknown, but one possible guess is, employers prefer engineering students to science students.

No prominent differences have been found between most selective universities ("985"), very selective universities ("211"), normal first-tier and second-tier college graduates in their preferences. However, it is found that students from second-tier universities differ from 985 graduates – the baseline group - in that second-tier students' welfare is impaired significantly by choosing a first-tier city, while lower-tier cities have greater attraction for them than for their 985 counterparts. This corresponds to findings in 5.2.1 that males from non-first-tier cities' choice of city is greatly affected by their school type.

My results also indicate that second-tier university graduates are more willing to commute over 40 minutes than do graduates from most selective universities ("985"), which might suggest that they are more sturdy and ready to endure toils and tedium from

long commute in order to compensate for their disadvantage of education background as compared to 985 students.

## Chapter 6 Local Talent Recruiting Policies

Competition for talents has been going on among cities since the mid 2010s.

Municipalities around the country have made policies covering hukou, housing, employment, etc., to encourage eligible people to relocate. This chapter summarizes the common Chinese municipal talent recruit policies (Dong, 2019).

Policies addressing housing needs range from offering cash subsidies to directly provide affordable housing for eligible people. These subsidies are usually given in the way of housing stipend, paid for the first 1-5 years after relocation. The amount increases with applicants' education attainment. For example, in Xi'an, applicants are classified in four categories, based on their education attainment, fields of professionalism, and other requirements. Applicants classified as "D-level talents" can receive 1,000 yuan's housing stipend per month for 3 years, and 3,500 yuan for 5 years for "C-level talents".

For individuals with high-end talents, or holding certain certificates or degrees in desirable majors, most cities also provide lump sum housing stipends for home purchase needs, or loans at a discount interest rate, or increased savings limit for provident fund loans (公积金). Among the cities studied, lump sum stipends range from 20,000 to 3 million yuan in different cities for different levels of talents. For college graduates, these stipends are usually close to the lower end.

Local hukou has been made easier to obtain, as local governments streamline application process and relaxing the originally rigid policies to include more people. Score-based hukou system (for obtaining local hukou) is widely employed in cities to decide who can obtain local hukous. It calculates eligibility for getting hukou based on many items, including number of years paying social security in this city, education attainment, majors, skills, etc.

Eligibility varies across cities, commonly depending on the types of talents in need

in the cities. Some encourage the stay of talents with degrees or certificates in certain fields, some favor college graduates with overseas degrees, most cities also raise the maximum age for eligible people. For married talents, most municipalities allow their spouse and kids to obtain local hukou as well. For college graduates without an address to register their hukou to, i.e. have no purchased home in this city, most cities allow them to register to their workplace as collective hukou. Cities in great need of talents just lower the bar to an extent that anyone with tertiary education will be able to stay.

Some cities also take measures to encourage start-ups and employment. Typical measures geared towards college graduates are providing internship opportunities, holding free workshops for students interested in start their own companies, making loans easier to obtain by startups run by college students or graduates. Some cities provide incubators and free offices for student entrepreneurs. To encourage college graduates to come work in their cities, Nanjing offers 1,000 yuan to college graduates who come from out of the province to take interviews in Nanjing. Similarly, Chengdu offers free hostel for these college graduates.

Based on the 15 cities' talents recruiting policies, though most cities work to increase discretionary income, few measures have been taken to directly address income, an important factor in city choice. Wuhan and Suzhou are the only two cities with these measures. Wuhan set minimum yearly wages to be 40k, 50k, 60k, and 80k yuan for college diploma, bachelor's degree, master's degree, and PhD degree holders respectively. But the limit is relatively low and might not be able to attract students that are more competitive in the job market. Suzhou, the other city with policies on income, provide wage subsidies of 60,000 – 120,000 yuan for talents in certain key industries, based on their scores in local hukou settling system.

Policies applied most extensively to attract talents are hukou policies, followed by assistance in housing rents and homeownership, and employment. Though measures on

rents and home buying is also a form of increasing income, very few cities have direct measures on income. It is understandable to leverage hukou as selling point, because municipal governments have much control over hukou policies and it incurs little costs as compared to other policy tools.

In contrast, housing stipends and income policies rely on municipal budgets, and can strain the balance sheet if the municipality is already struggling. However, according to my results, if municipalities really want to attract college graduates, they should put more efforts in addressing income and housing issues. It is also found that no governments worry about commute, which is supported by my findings that commute time is less important than other concerns.

## Chapter 7 Discussion and Conclusions

In this thesis, I employed a discrete choice experiment to survey over 900 college graduates in China to study what factors matter more to them as they choose a city to relocate after graduation. I also investigated how their preferences are associated with their personal attributes. I then looked into common municipal talents recruiting policies adopted by many Chinese cities, and compared their policy tools to my findings to evaluate these policies based on the concerns of college graduates.

This thesis showed that, city level, costs of housing (either renting or buying), monthly income, commute time, hukou are all important factors that college students consider when choosing where to locate. The most important factors are renting costs and monthly income.

I found that college graduates who are female, from first-tier cities, holding master's degree from better universities, are most attracted by first-tier cities. On the other hand, male college graduates from third-tier cities or rural area, holding bachelor's degrees from universities with lower ranking, are most likely to choose a third- or lower-tier city. There exists more room for trade-offs between attribute levels for male than for female.

College graduates seem to prioritize short-term benefits over long-term concerns in their choice of where to locate. Particularly, factors with immediate impact on their discretionary income and quality of life are first considered as they make decisions. Specifically, monthly rent is the most important factor in college graduates' choice of city, as it largely determines their disposable income every month. High monthly rent has the greatest negative impact on college graduates' welfare, while low monthly rent has the greatest positive impact. Similarly, wages also have symmetric influences on welfare, i.e. utility increases with high wage and the decrease from low wages is of similar scale.

Though college graduates find both first-tier and second-tier cities attractive, third-

tier and lower-tier cities are unpopular, indicating college graduates value lifestyles and rich job opportunities associated with living in first- or second- tier cities. First-tier cities are found less popular than expected, and this corresponds to the phenomenon of “exodus from first-tier cities” in recent years. This implies that second-tier cities are very hopeful to attract talents from first-tier cities to their cities, provided right incentives. Meanwhile, it also means third- and lower-tier cities face greater difficulties in attracting college graduates, unless they can provide more attractive incentives.

College graduates are greatly better-off with low housing price, but even if housing price is high, they are willing to accept it as long they are content with other attributes. Hukou is less important among the factors studied, as getting local hukou means the decision of permanently settling down there. College graduates typically have not made up their mind to settle down in a city when they are still at college or have just graduated.

The policy implication of this thesis is, more municipal government efforts should be made to directly improve income so as to attract college graduates and enhance affordable renting. Extensively used hukou policies may appeal to more mature groups of talents, but might not be the right tool to attract college graduates.

This study extends previous research on migration decisions in two ways. First, it zoomed into the college student migrants who are very differently from rural-urban migrants. This research also innovatively introduced the discrete choice experiment into migration studies, which allow researchers like me, with relatively small cost, to gauge college students preferences in city choice with no available data.

My method is limited, however, since the choice sets only consist of small number of attributes. Other variables of interest, such as environmental quality and education resources for kids, were not included so as to avoid fatigue of respondents. Though I have tried my best to select variables most likely to be relevant, it is unknown whether the

results would be different if more attributes are included. This thesis stems from lack of data in urban migration and college graduates' city choice, I also call for data collection efforts to include the urban migration topic into census and other large-scale surveys by Chinese cities in the future.

## Appendices

### A 1. Survey findings

**Table 12. Model effects summary**

Terms	Model 1: profile effects		Model 2: subject effects		Model 3: reduced subject effects	
	Log Worth	P-Value	Log Worth	P-Value	Log Worth	P-Value
Monthly Rent	90.087	0***	31.397	0***	32.885	0***
Monthly Income	67.497	0***	22.623	0***	59.927	0***
City Level	43.616	0***	18.807	0***	33.602	0***
Hukou	34.363	0***	16.229	0***	20.136	0***
Housing Price	36.892	0***	9.438	0***	20.068	0***
Commute Time	26.702	0***	8.024	0***	15.706	0***
Gender*City Level			5.002	0.00001***	5.272	0.00001***
Home*City			3.294	0.00051***	3.2	0.00063***
Gender*Commute Time			3.008	0.00098***	3.276	0.00053***
Degree*Commute Time			2.375	0.00422***	2.443	0.00361***
Degree*Monthly Income			1.886	0.013**	1.339	0.04581***
Major*Commute Time			1.771	0.01693**	1.861	0.01376***
Major*Monthly Income			1.719	0.01909**	2.709	0.00195***
Home*Monthly Rent			1.653	0.02221**	1.746	0.01793***
School Type*Commute Time			1.651	0.02232**	2.079	0.00833***
Degree*Monthly Rent			1.493	0.03216**	1.561	0.02745***
Degree*Housing Price			1.491	0.0323**	2.171	0.00675***
Gender*Monthly Income			1.379	0.04176**	1.339	0.04581***
Home*Commute Time			1.319	0.04792**	1.16	0.06916
Degree*Hukou			1.3	0.05011	1.667	0.0215***

Degree*City Level	1.273	0.0533	1.723	0.01891***
School Type*City	1.153	0.07033	1.783	0.01647***
Major*Monthly Rent	1.116	0.07658	0.87	0.13478
School Type*Monthly Rent	1.002	0.09963	0.906	0.1242
Gender*Monthly Rent	0.651	0.22361	0.622	0.23879
Gender*Housing Price	0.606	0.24789	0.637	0.23041
Home*Housing Price	0.597	0.25313	0.685	0.20635
Major*Housing Price	0.59	0.25677		
Graduated*Monthly Rent	0.587	0.25905	0.717	0.1919
Graduated*hukou	0.534	0.29254	0.610	0.24561
Major*hukou	0.438	0.36489		
Graduated*Housing Price	0.365	0.43177		
School Type*hukou	0.343	0.45389		
Graduated*Monthly Income	0.313	0.48661		
Major*City Level	0.307	0.49316		
School Type*Monthly Income	0.256	0.55446		
Home*Monthly Income	0.235	0.5823		
Graduated*City Level	0.127	0.74662		
Gender*hukou	0.1	0.79381		
Home*hukou	0.041	0.91049		
School Type*Housing Price	0.028	0.93751		
Graduated*Commute Time	0.014	0.96863		
School Type*Housing Price	0.028	0.93751		

**Table 13. Marginal probability and marginal utility for Model 1 and 3**

Attribute level	Model 1 – profile effects		Model 3 – reduced subject effects	
	Marginal Probability	Marginal Utility	Marginal Probability	Marginal Utility
Monthly Rent (<30%)	0.538	0.597	0.536	0.594
Monthly Rent (>50%)	0.159	-0.622	0.158	-0.630
Monthly Rent (30%-50%)	0.303	0.024	0.307	0.036
City Level (First-tier)	0.412	0.273	0.414	0.286
City Level (Lower)	0.186	-0.522	0.178	-0.559
City Level (Second-tier)	0.402	0.249	0.409	0.274
Monthly Income (>15000)	0.513	0.511	0.383	0.496
Monthly Income (5000-10000)	0.195	-0.458	0.170	-0.315
Monthly Income (10000-15000)	0.292	-0.052	0.155	-0.408
Housing Price (<15000)	0.368	0.449	0.383	0.496
Housing Price (15000-30000)	0.301	0.248	0.292	0.227
Housing Price (30000-45000)	0.172	-0.314	0.170	-0.315
Housing Price (45000-60000)	0.160	-0.382	0.155	-0.408
Hukou (Local hukou easy to obtain)	0.650	0.309	0.657	0.325
Hukou (Local hukou hard to obtain)	0.350	-0.309	0.343	-0.325
Commute Time (<20min)	0.402	0.225	0.401	0.226
Commute Time (40-60min)	0.216	-0.397	0.209	-0.425
Commute Time (20-40min)	0.382	0.172	0.390	0.199

## **A 2. Sample Survey – Design 11**

This survey studies the city choice of college graduates. Your answers will help us better understand this decision and inform policy decisions. No identifiable information will be recorded in this survey and your answers will be used for academic purpose only. Thank you for your participation!

### **Part I**

1. What's your biological sex?

Female

Male

2. What's your birth year? \_\_\_\_\_

3. What's the highest level of education attainment that you've obtained? Specify the degree that you are about to receive if you're still in college.

Bachelor's

Master's or above

4. What type of college did/will you receive your highest level of education?

985

211

Non-985 and non-211 first-tier colleges

Second-tier colleges

5. What major are you studying for you highest level of education?

Humanities

Social sciences

- Engineering
  - Sciences
6. Your year of graduation? \_\_\_\_\_
7. Which city is your college of highest education level located? \_\_\_\_\_
8. Where do you come from?
- First-tier cities (Beijing/ Shanghai/ Shenzhen/Guangzhou)
  - Second-tier cities
  - Third-tier or lower-tier cities
  - Rural area

## **Part II**

This part includes seven questions. Each of the first six question asks you to choose one city to locate from three city options. Please compare the three options and choose the one most desirable for you.

1. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	Second-tier city	Second-tier city	Second-tier city
Monthly income	10,000-15,000 yuan	>15,000 yuan	5,000-10,000 yuan
Monthly rent (as percent of income)	>50%	>50%	>50%
Hukou	Local hukou easy to obtain	Local hukou hard to obtain	Local hukou easy to obtain
Housing price	15,000-30,000 yuan/m <sup>2</sup>	15,000-30,000 yuan/m <sup>2</sup>	15,000-30,000 yuan/m <sup>2</sup>
Commute time	<20 min	20-40 min	40-60 min

2. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	Second-tier city	Second-tier city	Second-tier city
Monthly income	5,000-10,000 yuan	>15,000 yuan	10,000-15,000 yuan
Monthly rent (as percent of income)	30-50%	<30%	>50%
Hukou	Local hukou easy to obtain	Local hukou hard to obtain	Local hukou easy to obtain
Housing price	45,000-60,000 yuan/m <sup>2</sup>	45,000-60,000 yuan/m <sup>2</sup>	45,000-60,000 yuan/m <sup>2</sup>
Commute time	<20 min	<20 min	<20 min

3. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	Second-tier city	Second-tier city	Second-tier city
Monthly income	10,000-15,000 yuan	10,000-15,000 yuan	10,000-15,000 yuan
Monthly rent (as percent of income)	>50%	<30%	30-50%
Hukou	Local hukou easy to obtain	Local hukou hard to obtain	Local hukou easy to obtain
Housing price	<15,000 yuan/m <sup>2</sup>	15,000-30,000 yuan/m <sup>2</sup>	30,000-45,000 yuan/m <sup>2</sup>
Commute time	<20 min	<20 min	<20 min

4. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	First-tier city	Second-tier city	Third-tier and lower-tier city
Monthly income	5,000-10,000 yuan	5,000-10,000 yuan	5,000-10,000 yuan
Monthly rent (as percent of income)	30-50%	30-50%	30-50%
Hukou	Local hukou hard to obtain	Local hukou easy to obtain	Local hukou hard to obtain
Housing price	30,000-45,000 yuan/m <sup>2</sup>	30,000-45,000 yuan/m <sup>2</sup>	30,000-45,000 yuan/m <sup>2</sup>
Commute time	20-40 min	<20 min	40-60 min

5. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	Second-tier city	Third-tier and lower-tier city	First-tier city
Monthly income	>15,000 yuan	>15,000 yuan	>15,000 yuan
Monthly rent (as percent of income)	>50%	30-50%	<30%
Hukou	Local hukou hard to obtain	Local hukou hard to obtain	Local hukou hard to obtain
Housing price	<15,000 yuan/m <sup>2</sup>	15,000-30,000 yuan/m <sup>2</sup>	45,000-60,000 yuan/m <sup>2</sup>
Commute time	40-60 min	40-60 min	40-60 min

6. Which of the three cities would you like to live in after graduation?

Assume that the three options differ **only** in the specified factors. First-tier cities refer to Beijing, Shanghai, Guangzhou and Shenzhen, second-tier cities are the province capitals and other regionally important cities, and the rest are third or lower-tier cities. Only three of the six factors vary in each question, and varied options are highlighted.

	A	B	C
City level	Third-tier and lower-tier city	Third-tier and lower-tier city	Third-tier and lower-tier city
Monthly income	5,000-10,000 yuan	5,000-10,000 yuan	5,000-10,000 yuan
Monthly rent (as percent of income)	30-50%	>50%	<30%
Hukou	Local hukou hard to obtain	Local hukou easy to obtain	Local hukou hard to obtain
Housing price	45,000-60,000 yuan/m <sup>2</sup>	15,000-30,000 yuan/m <sup>2</sup>	30,000-45,000 yuan/m <sup>2</sup>
Commute time	20-40 min	20-40 min	20-40 min

7. Please rank following factors by their importance to your city choice. 1 means most important, 6 means least important:

City level; monthly rents; housing price; commute time; monthly income; hukou

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