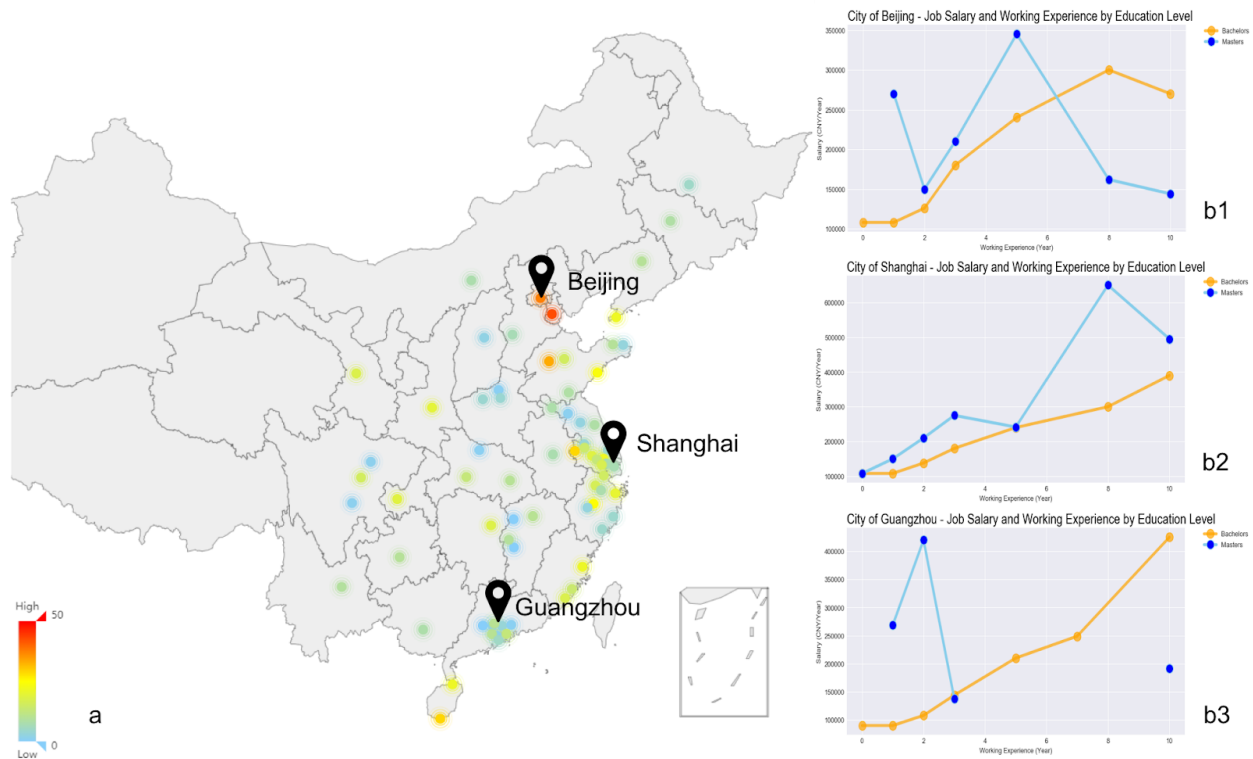


# Facts about High Degree Jobs in China

Where do high degree people work? How much do they earn? Between working experience and graduate degree, which one is more important to gain money?

Zhimeng Luo ([zhl123@pitt.edu](mailto:zhl123@pitt.edu))

Xiaoyi Tian ([xit33@pitt.edu](mailto:xit33@pitt.edu))



**Figure 1. a. High degree (bachelor or above) popularity in China cities (only cities that have larger than 100 total job opportunities are drawn). b. Median salary and working experience grouped by education level (Bachelor's and Master's) in the city of Beijing, Shanghai and Guangzhou.**

## Legend

Our initial questions involve: where do people who have high degrees (bachelor or above) tend to go and find a job? How much income do they earn? How different the salary is between bachelor's and Master's, as working experiences accumulated over time? We investigate 52,077 job postings from 51Job.com, one of the largest job-seeking platforms in China. We obtain each job's location, expected salary, and the degree requirement. In figure 1.a., each colored dot represents the city's percentage of job postings that requires a high degree

(bachelor or above). To avoid overwhelming, only cities that have larger than 100 total job postings are drawn. City of Tianjin has the greatest proportion of high degree requirements (42% of opening positions require a bachelor degree or above), followed by Beijing (35.6%), Shenzhen (12.8%) and Guangzhou (10.3%). We further investigated the relationship between salary and working experience in both masters and bachelors degrees in three largest China city, Beijing, Shanghai and Guangzhou. Beijing and Shanghai has similar income level for people who have a bachelor's degree and have less than 5-year working experience. Guangzhou offers the highest salary to bachelor's who have more than 10-year working experience than the other two cities. A master in Shanghai typically gains similar amount of salary as a bachelor who have one-year additional work experience in their initial career path. After gaining enough working experience (8 years or more), a master's income drastically surpass a bachelor's who has the same amount of working experience.

## Significance

This project provides empirical evidence of optimal location for high degree job-seekers. By analyzing more than fifty thousand job advertisements across cities and provinces in China on December, 2018. We demonstrate the education requirement structures across cities. We find that there is a higher proportion of high degree demanding in the east coast than the west inland. In addition, the labor markets in large cities (such as Beijing, Shanghai, and capitals of each province) are more favorable of high degree candidates than small cities. Within the largest cities in China (Beijing, Shanghai, Guangzhou) Beijing is the most ideal place for high degree people as it has the highest proportion of high degree demanding (35.6%), followed by Shenzhen (12.8%) and Guangzhou (10.3 %), Shanghai (7.1%) has the least opportunity for high-degree job seekers. This study informs higher-degree job-seekers should allocate job-hunting resources to the south-east coast, big cities, primarily the city of Beijing to find an ideal job in the more effective way.

This project also indicates the importance of education level and locations for gaining salary, as our result shows in general, a Master's gains higher amount of salary than a Bachelor's of they have the same years of working experience. The variation of gaining salary in different stages of career also varies by cities. Our contribution is to provide practical instruction to job-seekers who are concerned about the amount of salary they could gain, given their preference of working locations and their educational backgrounds.

## Findings

1. There are more job opportunities in the east coast of China than the west inland area for people who have bachelor or Master degrees. As figure 1.a. Shows, the density of dots on the right (east) side is higher than the left side (west). People who holds higher

education degree and seeking jobs could enhance their opportunities of being hired in the east coast.

2. Among those big cities, Tianjin has the highest proportion of higher-degree demanding, which is 42%, followed by Beijing 35.6%, Shenzhen (12.8%) and Guangzhou (10.3%). Shanghai (7.1%) has the least percentage of high-degree from overall job postings. For educated people who want to live in big cities but haven't decided which city yet, the popularity of high degrees in these cities could act as a dimension of job-hunting easiness or competitiveness in the city.
3. Beijing and Shanghai has similar income level for people who have a bachelor's degree and have less than 5-year working experience. Guangzhou offers the highest salary to bachelor's who have more than 10-year working experience than the other two cities. A master in Shanghai typically gains similar amount of salary as a bachelor who have one-year additional work experience in their initial career path. After gaining enough working experience (8 years or more), a master's income drastically surpass a bachelor's who has the same amount of working experience. People who are in different career stages could take more advantage of location, considering the median annual gains with a certain degree level in these cities.

## Data

51Job is one of the largest job-seeking platforms in China. Ten-thousands opening positions from every cities in China were posted everyday. The dataset was retrieved from Kaggle.com. link: <https://www.kaggle.com/carrychang/job-information-for-it/metadata>. The original data was crawled from 51job.com on December 30, 2018.

In total, there are 52,077 rows of job postings and 34 columns which contains a detailed description of each job advertisement, such as salary, education level and location. A detailed list of columns are: crawl\_datetime, url, company\_name, company\_size, company\_type, company\_area, job\_type, job\_name, edu, emplytype, welfare, salary, city, workingexp, resume\_count, company\_score, require\_content, work\_place, people\_need, post\_time.

## Method

In order to visualize the Chinese map, we use a python library called *Pyechart*, which is an easy-to-use, highly interactive and highly performant visualization library under Apache license. *Pyechart* has more than 400+ geomaps assets for geographic information processing, it is especially powerful for visualizing Chinese maps. A detailed description of *Pyechart* can be found here: <https://github.com/pyecharts/pyecharts/blob/master/README.en.md>.

Figure 1.a. plots the high degree (bachelor or above) popularity in various (almost all) China major cities. We only display cities that have larger than 100 total job opportunities to reduce the

noise. Color indicates the percentage of high degree demanding in all job postings in this city. We use red color as high popularity, blue color as low popularity. To emphasize three cities in figure 1.b., We manually labeled three largest cities (Beijing, Shanghai, Guangzhou) on the map after we export the static version of interactive figure from Python.

We visualize figure 1.b(s). by aggregating the *median salary* of all job postings grouped by *city* and *education requirements*. We use median because it better represents the majority of job postings, instead of mean, which could be drastically affected by a small number of outliers.

## Discussion

Though people have various reasons to earn a high degree, the main reason is to gain money. Have they earned more money after earning a higher degree than a bachelor? Does a master's degree really matter in order to gain more money? Or it is working experience more important? We found the in Shanghai, a bachelor can easily obtain the same level of salary as a Master's, as long as they have enough additional working experience (about 1 year). In addition, earning a master's degree needs a decent amount of investment on time and effort, but we don't see evidence that a fresh master's graduate earn a better salary than their peers in college who have already earned three years of working experience. People should reconsider the *opportunity cost* of studying for a higher degree if the only purpose is to obtain a higher income.

In addition, people who have high degree might actually learn a fact that they are too well-educated to find a job in small cities or certain areas in China. Small cities and cities in west inland area just don't have much demands on high degree people. People who holds a high degree (Master's or Ph.D.) might not be satisfied or fulfilled with the intelligence and knowledge demand of jobs in those areas. There is always a balance between personal development and living convenience. For some people who prefer living in a small city, they probably would reconsider the fit and value of earning a higher degree.