这一部分想要探讨短期租赁房源分布对社会不平等性的影响。由于经济、人口和交通便利程度可能对短期租赁房源分布造成影响，而我们想探讨的并不是这一部分，所以想在自变量中将这一部分影响去除。

我们选择的描述经济、人口和交通便利程度的因素包括：贫困率、人口密度、地铁站密度和轨道线路密度，通过做主成分分析提取最具有代表性的部分。

我们选择的描述社会不平等性的因变量是80:20 ratio of earnings（80:20 收入比率）代表某个地区的收入分配的不均衡程度，具体是指最富裕的20%的人群的收入总和与最贫困的20%的人群的收入总和的比率。

我们分析的空间单位是行政区，先利用主成分分析得到的变量去拟合短期租赁房源密度，再由得到的残差，也就是我们认为有可能包括有关短期租赁房源分布带来的其他影响和效应的部分，去拟合我们定义的社会不平等指标。在这里，第一步是用最小二乘法做全局回归，第二部是使用地理加权回归。通过比较不同行政区地理加权回归拟合结果的R平方，探讨短期租赁的房源分布对社会不平等性的影响是否存在地理差异。

结果显示，有些行政区，特别是靠中西部的行政区，比如Hammersmith and Fulham，R平方值很高，甚至可以达到0.7，表明自变量可以解释因变量70%的变异，但在有些区域，比如Enfield,Waltham Forest，甚至出现R平方接近于0的情况，表明有些区域的社会不平等性受到短期租赁房源分布的影响较大，而有些区域则可能不受影响。

但是这一部分的内容仍然存在一定的问题和局限性：

1. 数据的空间单位过大可能会导致样本数量不足，影响拟合的稳定性和拟合结果的解释力
2. 数据中存在一部分缺失值，导致部分区域的R平方值缺失
3. 在控制经济、人口和交通便利程度等因素对短期租赁房源的影响是，假设了他们的影响是线性的，可能忽视了一些非线性因素的影响
4. 当控制了经济、人口和交通便利程度等因素的影响后，剩余的残差部分可能还有没有考虑到的外部效应，不完全是短期租赁房源分布本身带来的影响

This section aims to explore the impact of short-term rental distribution on social inequality. Since factors such as economic conditions, population characteristics, and transportation accessibility may influence the distribution of short-term rentals—and these factors are not the focus of our study—we aim to remove their effects from the independent variables.

The factors we selected to describe economic conditions, population, and transportation accessibility include: poverty rate, population density, density of subway stations, and density of rail lines. Principal Component Analysis (PCA) was used to extract the most representative components from these factors.

The dependent variable we selected to describe social inequality is the 80:20 ratio of earnings, which represents the level of income inequality in a given area. Specifically, this metric reflects the ratio of the total income of the wealthiest 20% of the population to the total income of the poorest 20%.

The spatial units of analysis are administrative boroughs. We first used the variables derived from PCA to model the density of short-term rentals, then used the residuals—representing the portion of variation potentially linked to other effects related to the distribution of short-term rentals—as predictors for the social inequality variable. In this process:

1. The first step involved performing a global regression using Ordinary Least Squares (OLS).
2. The second step utilized Geographically Weighted Regression (GWR).

By comparing the R² values of GWR results across different boroughs, we examined whether the impact of short-term rental distribution on social inequality varies geographically.

The results indicate that some boroughs, particularly in the central and western areas, such as Hammersmith and Fulham, exhibit high R² values, reaching up to 0.7. This suggests that the independent variables explain 70% of the variation in the dependent variable. However, in other areas, such as Enfield and Waltham Forest, the R² values are close to 0, indicating that social inequality in these regions is more significantly affected by short-term rental distribution in some areas than in others.

However, there are several issues and limitations in this analysis:

1. The large spatial unit of the data may result in insufficient sample sizes, affecting the stability and interpretability of the model's results.
2. Missing data in some regions led to the absence of R² values in certain areas.
3. When controlling for the influence of economic conditions, population, and transportation accessibility, we assumed their effects were linear, potentially overlooking nonlinear influences.
4. The residuals after controlling for economic, population, and transportation factors may still include unaccounted external effects, meaning they do not solely represent the impact of short-term rental distribution.