Liveability Scores and Social Mobility - An Analysis Directed At City Policies

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1. Background and Introduction: Immigration has always been an emphasis for the Canadian economy and cultural mosaic. We defined liveability according to and weighted by the 5 categories in the Economist's Global Liveability Index 2021 (0-100 scale); Stability (25%), Healthcare (20%), Culture & Environment (25%), Education (10%), and Infrastructure (20%). Our project aims to explore for the City of Toronto 1) which income and education levels affect liveability scores within neighbourhoods of Toronto and 2) how social mobility across Toronto can be improved to attract immigrants into Toronto. We also assumed, on average, people gravitate towards neighbourhoods most suited to their needs, constrained by their financial means; an assumption along the lines of the microeconomic rationality expectations assumption.

2. Methods: First, neighbourhood categorical liveability scores were constructed based on five categories for a composite Toronto neighbourhood liveability scores. We included metrics that directly measured the category, e.g., petty/violent crime rates, or were measures of government policy, e.g., COVID-19 testing centres for medical resource allocation. Then, a k-means model (k=2) was fit to address possible hierarchical structure in liveability scores (two possible segments of scores), and a two sample t-test (p-value$<2.2\cdot10^{-16}$, α=0.05), provided strong evidence of different cluster means. Given a large set of covariates taken from the 2016 census neighbourhood profiles, VIF scores were computed and found evidence of strong multicollinearity (VIF>10). To better measure the true effects of covariates, we constructed linear/linear-mixed models examining income and education, two factors important to immigrants/social mobility, for city and cluster levels. In the mixed model, we added cluster as a random intercept to account for inter-cluster dependence.

3. Results: Within the higher liveability score cluster, the model indicates that while controlling for education level, the $90k and over income level is significant (refer to slide 11). On the other hand, the model for lower liveability scores cluster indicates that all income levels except under $25k are statistically significant (refer to slide 12). Interestingly, in the full Toronto neighbourhoods model, we see the same effect direction and significant income levels as the lower liveability scores clusters (refer to slide 13).

4. Discussion: Between both higher and lower liveability clusters, only some income level covariates were statistically significant at α=0.05. Particularly, the "$90k and over" income bracket was significant in the positive direction in both clusters and at the city level, suggesting high earners gravitate towards higher liveability neighbourhoods under our assumption. Contrarily, in the lower liveability scores cluster, the "$50-89.9k" bracket coefficient was significant in the negative direction and find "$25-49.9k" bracket coefficient has a positive association; such behaviour is perhaps indicative of the "$50-89.9k" bracket being a "mobility ceiling" since increasing residents in the "$50-89.9k" bracket is associated with decreasing liveability scores, possibly suggestive of a difference in the neighbourhoods (recall that a liveability score is specific to some neighbourhood) where residents in "$50-89.9k" vs. "$90k and over" brackets live. Indeed, we do see some evidence of this when examining individual neighbourhoods, e.g., Mimico vs Waterfront Communities. Analysis of education's effects would be improved by conditioning education level against age or work status.

5. Conclusion: Overall, we found that for the linear regression models relating income and education levels, the highest income bracket has a statistically significant effect on neighbourhood liveability scores. Our next steps would be to advise the City of Toronto to look into possible gentrification of the city and policy remedies. For example, constructing a logistic model to examine the odds of moving to a higher liveability neighbourhood w.r.t. income level and controlling for confounders, which would provide more clarity for a "mobility ceiling". However, for future research, more up-to-date datasets and more relevant sub categorical datasets will be used to reproduce a present-day insight on the liveability of Toronto[1].

[1]All datasets were the most recent and openly available ones from OpenDataToronto.