

Prof. Hong K. Lo  
Editor - Journal of Transport and Land Use, Asia/Pacific Section  
Hong Kong University of Science and Technology, Hong Kong

Dear Prof. Lo,

We are thankful once again for the very constructive comments received in reviewing our paper titled "Equity Impacts of Transportation Improvements on Core and Peripheral Cities", submitted for publication in the Journal of Transport and Land Use.

In light of the reviewers' comments and suggestions, we performed several modifications in the paper, which their main components are briefly outlined as follows:

- The name of the accessibility index was changed to "composite utility index" (CUI). The justification for using composite utility is explained in the text.
- We have made a clear distinction between short-term and long-term impacts of transport improvements. We emphasized that the long term impacts (e.g. effect on land values) are out of the reach of this paper.
- The use of interaction variables and distance was clarified.

Listed below, is a detailed summary of the modifications made in our revised manuscript in light of the reviewers comments. The original reviewer comment is included (in italic) for convenience, followed by our response.

Sincerely,

Eran Leck  
Shlomo Bekhor  
Daniel Gat

## **Reviewer B:**

*1) There is a poor conceptual linkage between Figure 1 and Figure 3.*

We did not intend to link between the figures. The purpose of presenting Figure 1 is to describe in general terms the role of commuting improvements in generating welfare economic benefits. Reduction of spatial wage disparities and appreciation in land values are just two examples for enhanced equity. In the revised manuscript we made a clear distinction between short-term and long term impacts (please see figure 1, and second paragraph in page 9). We emphasize that the focus of the paper is the short-term impacts.

*2) In Figure 3, analyzing transportation improvement as “intervention” in the MNL model fails to recognize the wider impact as shown in Figure 1.*

The term “intervention“ was rephrased and the corresponding text was also revised. Regarding the wider impact in Figure 1 – as previously mentioned this paper deals only with a part of the general problem, namely that transportation improvements have a significant effect on reducing wage disparities. The inclusion of the labor demand component (or in other words - how much businesses are willing to pay for labor services) is left for further research. Therefore, as pointed out in the previous remark, Figure 3 deals with a part of the whole problem.

*3) The accessibility index (Eqn. 4) is the key equity indicator used in the paper. However, its composition and structure have not been clearly justified and explained. It was just mentioned that “the values of the three coefficients (betas) were taken from NTA Transportation Planning Model (PGL, 2001). So, what are the values and what are the meanings behind?*

In the revised paper, we specified the values of the coefficients obtained from the NTA model. Please note that the name of the accessibility index was changed due to “composite utility index” (CUI) due to the request of Reviewer D. This term is also used by NTA. The explanation and justification for the use of the index was added in the text of the revised manuscript.

4) *The regional models were not used at all for the generation of the base case and the scenarios. Furthermore, the discussion is not related to the issue of “equity impacts of transportation improvements” at all. What are the reasons for generating and discussing the regional models (Section 4.3)?*

As indicated in the literature review, personal attributes are important explanatory variables in workplace selection. We presented the regional models to illustrate the application of the methodology for selected population groups in a region that is known for its disparities. The simulations were performed using the national model to avoid problems in the forecasting of aggregate variables.

5) *What is the meaning of “distance (km)"/dij in all the models? It does not enter into the conceptual framework and is not defined in the data section. Why is it used to interact with almost all variables, including age group (Tables 3-4), gender (Table 4), household size (a continuous variable?) (Tables 4 and 5) and work locations (Table 6)? Also, travel time is included in the accessibility index. So, why are the travel time and the distance included in the same model? There are other interaction variables which are problematic (e.g. year of schooling \*wage differentials in Table 4).*

The models presented in the paper were estimated after several intermediate runs, in which we tried to improve the explanatory power of the model. The reason for including interaction variables is to allow the model to be sensitive to personal characteristics. This method of interacting between personal characteristics and distance is common practice in destination choice models [e.g. Sivakumar and Bhat (2007) <http://pubsindex.trb.org/document/view/default.asp?lbid=802414>]

6) *On page 26, it was argued that “apartment price is a proxy for the economic robustness of the city, and does not function as a ‘pull or push factor’ for working in a particular city ...”. This argument is not well-justified.*

Land values do not play a direct role in the spatial job selection process of the individual. For job selection purposes, the individual does not care whether land values in a particular city are high or low (in residential choice models, this is clearly not the case).

Land values clearly play there an extremely important role in the selection process of individuals). Factors such as the travel time between origin and destinations, the wage offered at destination, population at destination (proxy for the scope of employment), as well as personal characteristics of the individual are much more important explanatory variables than land values, and the t-values in the models (as well as in studies reviewed in the literature review section) clearly show it. Land values do however function as proxies for the economic robustness of cities. This is because land values are often negatively correlated with variables such as distance from the core, and positively correlated with variables such as offered wage rate and city size. Land values may impact the selection process (in our particular model this impact is rather weak), but this effect is an indirect one.

*7) There are too many specific assumptions (many of which are not fully explained) in the simulation. The results are of limited interest to people outside the country.*

As pointed out previously, the main point of the simulation is to give a quantitative measure of the potential reduce in wage differential with respect to transportation improvements.

### **Reviewer C:**

#### **1. How were the 10,795 relevant observations derived from the 211,230 observations, was this a random sample?**

The data was extracted from the 20% sample of the census. In the regional models (10,795 observations), we did not perform further dissection or sub-sampling of the data. The small number of observations derives from the spatial nature of the model - (16 towns \* 64 work city alternatives). Please note that these towns are very small.

#### *2. Wach -> Wachs*

Corrected

3. " commuters who belong to the "non academic professionals" subset are more sensitive to accessibility level" Might this be because there is less advantage for the less-skilled to commute long distances, i.e. low wage/low skill jobs are more ubiquitous than high wage/high skill jobs

We agree. The comment was added in the revised version.

4. In the models, why do you multiply age group (etc.) by distance rather than by travel time?

As in the answer to reviewer 2, the idea was to allow the model to be sensitive to personal (socio-economic) characteristics. The distance\*personal characteristics combinations gave better log likelihood values than travel time\*personal characteristics combinations.

5. Figures 4 and 6 are pseudo-3D, they should be flat to enhance legibility.

Corrected

### **Reviewer D:**

*The paper is better now, but there remain a number of problems.*

1. *Terminology: the accessibility index on page 18 is defined at the level of individual OD pairs. This is not clear from the formula. Usually accessibility is defined at the level of just an origin (summation takes place across all destinations). It seems that what the author is measuring is some kind of average transport time. I suggest to drop the term accessibility index.*

We agree. The accessibility index term was dropped. We use the term composite utility instead (see in manuscript reference to Allen, 1984).

2. *The headings of Tables 3 and 4 are very unclear. It is not clear what is the dependent variable.*

The dependent variable is the choice of workplace city in all models. This was clarified in the text in the revised manuscript (see tables).

3. *In the rejoinders the author says that he includes a dummy for persons that live and work in the same city, but that is not clear in the tables.*

This variable was included in Table 6 (national commuting model). Please see last variable in Table 6. This particular variable was not included in the regional commuting models because of collinearity problems.

4. *When addressing equity effects owing to making trips to better paying destinations, the authors should also compute the effect on monetary transport costs (faster transport leading to longer commuting trips would cost more in terms of fuel, and similar for public transport).*

We did not have data for transport costs at the national level. The remark is correct in theory and it will be added for further research (please see the added paragraph in the conclusion section).

5. *As I understand the text now, the wage effects are computed at the origin regions. Wages as such remain unaffected, but from the perspective of the region of residence of workers, wages will change when workers decide to work at other locations. When this interpretation is correct, why does not the author consider the case that wages will go down in regions that become more accessible. For example when one can easily reach Tel Aviv from the whole country, this will probably reduce the wages paid in TelAviv.*

In theory you are correct, but one has to understand the unique nature of the Israeli labor market. If you will look at Table 1, you'll notice the extreme differences in the sizes of the Tel Aviv and the Beer Sheva labor markets. The addition of new workers (in absolute terms), originating from the periphery, in Tel Aviv is so small that it has virtually no effect on the Tel Aviv economy. Wages in Tel Aviv increase (very little) because Tel Aviv residents also change their work locations in favor of other core cities which offer higher wages. Your point is illustrated in Figure 6, which accentuates the convergence of

wages between the core and periphery. Notice how the relative wage significantly rises in peripheral cities and drops in Tel Aviv.

6. *Legenda is missing in figures 6 and 7.*

Corrected

7. *The paper remains rather silent on the important theme of changes in land prices due to changes in transport systems. This is a countervailing equity force.*

This is correct, but as previously mentioned we deal in this paper with the short term impacts. This important remark will be added for further research (please see the added paragraph in the conclusion section).