Transportation Research Part A 138 (2020) 564–566

Contents lists available at ScienceDirect

Transportation Research Part A

journal homepage: www.elsevier.com/locate/tra

# Does Uber affect bicycle-sharing usage? Evidence from a natural experiment in Budapest: A rejoinder☆

Barna Bakó[a], Zombor Berezvai[b,*], Péter Isztin[a], Enikő Zita Vigh[c]

[a] Department of Economics, Corvinus University of Budapest, Fővám tér 8, 1093 Budapest, Hungary
[b] Institute of Marketing, Corvinus University of Budapest, Fővám tér 8, 1093 Budapest, Hungary
[c] Natural Resources Research Group, Research Institute of Agricultural Economics, Zsil utca 3-5, 1093 Budapest, Hungary

## 1. Introduction

We are grateful for the comments by Péter Bucsky on our article on Uber's effects on bicycle sharing usage (Bakó et al., 2020). Unfortunately, we believe that the concerns raised, and criticisms made by Bucsky (2020) are either based on misunderstandings of our results or are irrelevant to the analysis. In the following we address each objection made by the assessor and further clarify our results.

## 2. Missing relationship between Uber and BSS

Bucsky (2020) argues that it is "highly questionable" whether riders combine Uber and BSS within a trip. This argument might be valid, yet this was not the subject of our analysis. Our paper was not intended to analyse the relationship between Uber and BSS within one single trip. We applied a wider, more systemic perspective. As we pointed out in the original paper, "the nature of complementarity between ride-sharing and bike-sharing services is best characterized as a type of temporal complementarity" (Bakó et al., 2020, p. 291). This means that many riders use both BSS and Uber, but at different times and during different trips. To illustrate again our logic with an example different from what we had given in the article consider someone who may use BSS to visit a friend after work, but she goes home using Uber, either because it is late in the night or because she consumed some alcohol or due to any other reasons. Another reason why city dwellers might use BSS especially during the afternoon commuting time instead of driving or using ride-sharing services can also be explained by traffic congestions. As McKenzie (2020) showed, BSS can be faster than Uber in commuting peaks.

This temporal complementarity between Uber and BSS is also strongly supported by the data. The temporal distribution of BSS and Uber usage differs significantly as was reported by Rao (2018), who analysed JUMP (Uber's BSS service) and Uber usage in San Francisco. Regarding BSS usage, the San Francisco data show substantial similarities with data from Budapest (see Fig. 3 in Bakó et al., 2020), however it is fair to note that the temporal distribution of Uber usage is not available for Budapest. Yet, given the similarities in Uber's usage pattern across major cities (see e.g., Hall et al., 2018 or Mohamed et al., 2020), we can safely assume a similar usage pattern in Budapest as in San Francisco.

Moreover, we believe that the assessor misunderstands our argument regarding the overlap between the user bases of Uber and

☆ This research was supported in the Széchenyi 2020 program framework (EFOP-3.6.1–16-2016–00013) under the European Union project titled: "Institutional developments for intelligent specialization at the Székesfehérvár Campus of Corvinus University of Budapest". The authors thank the Centre for Budapest Transport for access to the data and Péter Dalos for his helpful comments and suggestions. B. Bakó gratefully acknowledges financial support from the Hungarian National Research, Development and Innovation Office (NKFI-119930 and NKFI-132343).

* Corresponding author.
*E-mail addresses:* barna.bako@uni-corvinus.hu (B. Bakó), zombor.berezvai@uni-corvinus.hu (Z. Berezvai), peter.isztin@uni-corvinus.hu (P. Isztin), vigh.eniko.zita@aki.gov.hu (E.Z. Vigh).

https://doi.org/10.1016/j.tra.2020.06.011

Available online 14 July 2020

BSS. In fact, we do not claim that these user bases have to be connected, rather we simply suggest that they might be connected, an interpretation which is consistent with the findings. Apart from our findings this conjecture is also supported by Rao (2018) who shows that including JUMP into Uber's mobile app increased BSS trip frequency by 15% in San Francisco. This is a clear indication that many Uber users are BSS riders as well.

Bucsky (2020) also questions the plausibility of our results, since as he puts it only a fraction of Uber users combines BSS and Uber. Yet, we do not understand why a fraction, as small as it may be, cannot cause statistically significant and substantial effects.

## 3. The timeline of the analysis

The commentary considers the time period analysed in the original article a "fundamental problem" since apart from the exit of Uber other "one-time effects," such as the arrival of tourists or changes in weather conditions might have biased the analysis. In our opinion, however, these effects are not one-time effects but rather seasonal effects that are present in both years of the analysis. For this very reason we used the difference-in-difference method to deal with the effects of tourism and other seasonal changes, while for the effect of weather conditions – that the assessor is specifically concerned about – we used explicit control variables.

We consciously used only 6 months of data in our analysis since BSS usage is highly seasonal (see Fig. 2 in Bakó et al., 2020). While during summertime, trip frequency is more or less flat, analysing yearly data would bias the results due to the very significant seasonality in BSS ridership.

Furthermore, there is a clear trade-off when defining the length of the period analysed. If it is too short, real effects might not be observable. If it is too long, there is a high probability that other changes might occur, and the results pick up their effects, too. The 3-month interval (with Uber's exit happening roughly in the middle) was a balanced choice in this trade-off.

Moreover, as Bucsky (2020) points out in Table 1 of his commentary, several new alternative mobility services entered the Budapest market in the second half of 2016 and later. For this very reason we had chosen a time frame that was free from these changes, so that their effects would not bias our results.

Another reason we used a shorter time horizon in our analysis is the general declining trend present in BSS usage in Budapest, a subject we address in the next section.

## 4. Ridership trends

The assessor correctly points out that the usage of the Budapest BSS has been declining. However, as one can see in Fig. 2 in Bakó et al. (2020) (and in Fig. 2 in Bucsky (2020)), 2015 and 2016 were quite similar in terms of usage. The sharp decline started afterwards.

The shift in the usage pattern related to the exit of Uber can also be seen in the data (see Table 1). While in the first part of the summer of 2016, trip generation was very similar to that in the same period of the previous year, after the exit of Uber we can observe a sizeable decline. Weekly data show the same pattern. At the beginning of the summer, 5 out of the 8 weeks showed an increase from 2015 to 2016. After Uber's exit, each week features a decline. These differences might be driven by weather conditions, but this was a clear reason why we applied regression methods and controlled for changes in weather using PET and precipitation dummies.

Additionally, we used the difference in the number of trips between 2015 and 2016 for our analysis. As in both years Uber was available during the first half of the summer, we were able to control for the differences across the years. What our results suggest is that there was a one-time decline in BSS usage after Uber's exit from the market.

Finally, the declining trend of the Budapest BSS is present for both regular and ad hoc users. However, we find a significant increase in trip generation after Uber's exit for ad hoc users. This is another finding of our research that clearly contradicts Bucsky's argument.

## 5. Alternative mobility providers

We are aware that the mobility market of Budapest is changing. However, it is very important to note that in the analysed period (from June 2015 to August 2016), neither the taxi regulation, nor the mandatory prices had changed. This was a rather calm period in this regard which makes it especially convenient from an analytical point of view.

Even though another taxi-like service provider did enter the market at the end of the analysed time period it is important to highlight the differences between Uber and other taxi and car-sharing service providers in general, which in our opinion questions the validity of this specific concern. First, Taxify (later renamed as Bolt) is more like a normal taxi provider, operating with the regulated taxi prices. Uber's service was on average half as expensive as those of the regulated taxi services. Thus, from the consumers' point of view, the exit of Uber resulted in an almost double-fold increase in the average price of taxi-like services. We believe that this can

**Table 1**
Average number of daily trips on weekdays by regular users (passholders).

| Time period | 2015 | 2016 | Difference | Change |
|---|---|---|---|---|
| June 1–July 24 | 2652 | 2693 | 41 | 1.5% |
| July 25–August 31 | 2659 | 2354 | −305 | −11.5% |

cause a significant change in mobility patterns.

As far as car-sharing goes, it is a completely different concept than the one Uber is built upon. Users need to have a license, they need to find an available car in close proximity, and they have to be in a physical and mental state to be able to drive. Regarding electric scooters, they are mainly used for short trips (see Jiao and Bai, 2020), therefore these cannot be seriously considered as an alternative to Uber.

## 6. Exit of Uber's impact on ridesharing

We do agree with Bucsky (2020) that after all it was Uber's decision to leave the Budapest market. However, we do not share his opinion on whether the company would have been easily able and willing to adopt to the legal requirements for taxi services. In our view Uber's competitive advantage lays in its radically different business model. Also, Uber's exit was not driven by the lack of demand, but by legal changes. Therefore, the exit of the company can be considered a natural experiment.

Regarding the comment on illegal taxi services, we are certain that they were and are present in the market. However, they are a rather costly and imperfect substitute for legal ride-sharing services. Uber's two main advantages (low price and very customer-friendly ordering and evaluation process) to this day were not matched by any other company or individual service provider. Hence, Uber's exit from the Budapest market caused a reduction in mobility options in Budapest and our research focused on how this reduction influenced BSS usage. We believe that the assessor did not provide any empirical evidence, nor plausible logical arguments that should lead anyone to reconsider the results.

## References

Bakó, B., Berezvai, Z., Isztin, P., Vigh, E.Z., 2020. Does Uber affect bicycle-sharing usage? Evidence from a natural experiment in Budapest. Transp. Res. Part A 133, 290–302.

Bucsky, P., 2020. Does Uber affect bicycle-sharing usage? Evidence from a natural experiment in Budapest. A Comment. Transp. Res. Part A.

Hall, J.D., Palsson, C., Price, J., 2018. Is Uber a substitute or complement for public transit? J. Urban Econ. 108 (C), 36–50.

Jiao, J., Bai, S., 2020. Understanding the Shared E-scooter Travels in Austin, TX. ISPRS Int. J. Geo-Inform. 9 (2), 135.

McKenzie, G., 2020. Urban mobility in the sharing economy: A spatiotemporal com- parison of shared mobility services. Computers Environ. Urban Syst. 79, 101418.

Mohamed, M.J., Rye, T., Fonzone, A., 2020. The utilisation and user characteristics of Uber services in London. Transp. Plan. Technol. 43, 424–441.

Rao, S., 2018. Understanding multimodality: An analysis of early JUMP users. https://medium.com/uber-under-the-hood/understanding-multimodality-an-analysis-of-early-jump-users-4a35d647b7e6.