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Chapter Title: Response to Jan de Haan's comment on "Hedonic Imputation versus Time Dummy Hedonic Indexes

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Response W. Erwin Diewert, Saeed Heravi, and Mick Silver

We are very grateful for the comments made by Jan de Haan on our chapter. In particular, his equations (1) through (4) make clear the various alternatives that could be used by statistical agencies in constructing elementary price indexes using hedonic regressions to quality adjust new and disappearing items or models for a narrowly specified commodity. The commentary by Haan provides statistical agencies with a very useful overview of the issues associated with quality adjustment of prices in a replacement sampling context. Moreover, the notation used in our chapter will not be familiar to most practitioners and so Jan has done us all a favor in translating our rather formal matrix algebra results into an easier to interpret framework.

In order to help the reader make the connection between our notation and the notation used by Haan, we will specialize our unweighted models discussed in sections 4.2 and 4.3 of our chapter to the case where the number of new items that enter the sample in period 1 is equal to the number of items that have disappeared from the sample in period 0 so that the total number of items in the sample in period 0, $N(0)$, is equal to the total number of items or models in period 1, $N(1)$, and we will follow Haan and set n equal to this common number of models. With this replacement sampling simplification of our model, the exponential of $\mathrm{LP}_{\mathrm{HI}}$ defined by our equation (34), where $\mathrm{LP}_{\mathrm{HI}}$ is our hedonic imputation estimate of the change in log prices going from period 0 to 1, is indeed equal to Haan's hedonic imputation index, $\hat{P}_{HI}$, defined by his equation (4)—and as Haan notes, the exponential of our $\mathrm{LP}_{\mathrm{HI}}$ is also equal to Haan's full imputation index, $\hat{P}_{FI}$, defined by his equation (3). Furthermore, using our expressions (32) and (33) and the simplification that $N(0)$ equals $N(1)$, it is easy to show that the exponential of $\mathrm{LP}_{\mathrm{HI}}$ defined by our equation (34) is also equal to Haan's double imputation price index, $\hat{P}_{DI}$, defined by his equation (2). Note that Haan's double imputation price index uses the actual prices for the matched models and hence, using the aforementioned equalities, so does our hedonic imputation index, $\mathrm{LP}_{\mathrm{HI}}$. Thus, the main point to debate in this context is whether to use Haan's single imputation index $\hat{P}_{SI}$, defined by his equation (1), or the double imputation index that was defined (in logarithms) in our chapter by equation (34) and which is equal to Haan's expressions (2) and (3). For a discussion of the merits of the two methods, the reader is referred to Haan's commentary.

Haan also briefly discusses our weighted hedonic imputation indexes in his commentary and he provides a much more extensive discussion of the issues associated with weighting in hedonic regressions in Haan (2007). We recommend this paper to interested readers. The specific point that Haan makes in his commentary about our weighted hedonic imputation index (whose logarithm $\mathrm{LP}_{\mathrm{WHI}}$ is defined by equation [65] in our chapter) is that this index does not satisfy the strong identity test; that is, if the models are exactly the same in the two periods under consideration and the prices for each model remain unchanged, then the strong identity test asks that the index be equal to unity, no matter what the quantities are. Haan is correct in his assertion; the exponential of our LP_{WHI} defined by equation (65) does not satisfy the strong identity test, whereas his preferred Törnqvist imputation index defined by his equation (13) does satisfy this test. Haan ends his commentary by noting that the issue of weighting in hedonic regressions seems to be unresolved; that is, is our form of weighting to be preferred over his or not? This issue requires more research but at this point in time, we do find Haan's suggested weighting scheme rather attractive!

Reference

de Haan, J. 2007. Hedonic price indexes: A comparison of imputation, time dummy and other approaches. Room document at the Tenth Ottawa Group Meeting. 9–12 October, Ottawa. Available at: http://www.ottawagroup2007.ca/r004/pdf/ogo04_033_e.pdf.