Trade without â€œproportionalityâ€•: A novel approach to trace import uses

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Import share is a key parameter in analysis of international trade. However, previous research mainly relies on the â€œproportionalityâ€• assumption (and its variants) to obtain share parameters, which may lead to biased estimates. In contrast, this paper introduces a novel approach that combines machine learning techniques with big data to accurately trace import uses within narrowly defined industries. We present a novel methodology to estimate the import matrix without â€œproportionalityâ€• assumption. To this end, based on Chinese customs product trade data, enterprise business registration data and rich micro-survey data, this study develops machine learning algorithms to precisely trace import uses. This approach is then applied to compile Chinaâ€™s non-competitive input-output tables with 37 sectors during the period of 2000-2016. Essentially, our novel estimation approach overcomes the limitations of the â€œproportionalityâ€• assumption by utilizing rich micro datasets to identify the source sector and the use sector of each product. The procedure is as follows. Using customs trade data at product level, we first match it according to the concordance table between HS 8-digit code and the input-output sector to identify the source sector of the product. Then, we match it with the enterprise business registration database to identify the sector of the enterprise, which represents the use sector of the product. In this way, our estimation method directly traces the end-uses of imports rather than imposing â€œproportionalityâ€• assumption. Also, we compare the newly estimated import matrix with counterparts relying on the â€œproportionalityâ€• assumption. The comparison result shows that, overall, the differences in most import share estimates between the two methods are not significant. However, there are also some sectors with large differences in share estimates, exceeding 50 percentage points. We conclude by generalizing this methodology, which can be applied and adapted to other economies when tracing import uses, and serving as key inputs for analysis of international trade.