JOHANNES KEPLER UNIVERSITY LINZ | JKU
economics
Volkswirtschaftslehre

Prof. Dr. Rudolf Winter-Ebmer

P +43 732 2468-8236 / 8216
F +43 732 2468-8217

rudolf.winterebmer@jku.at
www.econ.jku.at/winter

Linz, March 20, 2014

Report on the Dissertation by Tymon Sloczynski – Warsaw School of Economics

The Dissertation consists of three independent papers, together with an introduction on treatment effects framework and decomposition analysis. The main part of the dissertation brings together the literature on treatment effects and the literature on (Blinder-Oaxaca) decomposition analysis. In general, the dissertation is a professional and competent scientific piece of work; the author is very competent in his analysis. He is arguing clearly and has a solid and profound knowledge of the relevant literature.

The main topic concerns the applicability of the linear regression model and its relations to common decomposition methods in labor economics and econometrics. Starting from an observation that treatment effects are typically heterogeneous with large differences between population groups, the dissertation argues that the linear regression model may be a bad representation of any effect in a specific group. Moreover, it continues with a re-interpretation of the usual Blinder-Oaxaca decomposition in relation to the well-known "index problem" in choosing an appropriate comparison group.

Chapter 3 discusses problems of a linear regression model in cases when binary variables have heterogeneous effects for subpopulations. The main result of this chapter is that the coefficient on a binary treatment variable in linear least squares regression is a consistent estimation of a weighted average of the treatment effect on the treated and the

treatment effect on the non-treated. The weights are – against intuition – the population proportion of the non-treated for the first term and the population proportion of the treated for the second term. This result causes troubles for samples where the proportion of treated and non-treated individuals is very uneven: in such a case, the linear regression coefficient is neither a good approximation of the ATT nor the ANT. This result relies on some very restrictive assumptions: there should be only one single control variable whose variance is equal in both subpopulations. In the literature, similar results are known for opposite cases: in the case of a fully saturated model (Angrist). The use of fully saturated models seems to be a good starting point, if one considers treatment effect models, where unconfoundedness is a basic identification requirement and a fully saturated model is closely associated with matching models which are typically used as an identification device. In this respect, the conditions of the current Lemma are strong. Sloczynski uses Monte Carlo evidence for a test of the direct predictions of the model, but also more realistic simulations using well-known data from NSW (National Supported Work) data, where more control variables are used and finds the main results confirmed. Such a simulation is highly needed, considering the restrictive assumptions of the main Lemma. While very interesting and proving the main point, I found the discussion and the presentation of the NSW too short; the main issues in the simulations could have been better prepared. In particular, some additional tables showing relative deviations from expected results, etc. could have helped in a proper assessment of the results.

Chapter 4 is, in a sense, a dual version of chapter 3. Here, the Oaxaca-Blinder decomposition method is discussed; in particular the well-known index-number problem. Typically, results from the Oaxaca-Blinder decomposition suffer from a problem, that it is not clear, which comparison group – where the wage structure is supposed to be non-discriminatory – is chosen. Sloczynski is offering a reinterpretation of the results in chapter 3: by defining an average gender effect conditional on X_i, the author can define the gap between the expected log wages of a male and an (observationally equivalent) female with $X_i = x$. Then this average gender effect can be evaluated for men only (PAGM) of for women only (PAGW). This interpretation is very much related to the matching literature, where treatment effects are, in principle, defined for everybody in the population. Summing up over the subpopulation of the treated or the non-treated (or any other meaningful subpopulation)

will give us separate treatment effects. Here, the analysis is similar. Finally, the author uses the result from chapter 2 to construct a new version of the non-discriminatory wage structure (or a neutral) one, which follows the weighting scheme as shown before. This re-interpretation has the advantage that no recurrence to a "non-discriminatory" wage structure following from some form of a discrimination model is necessary. Moreover, it squares well with an often observed fact, that BO-I (when the male wage structure is used as basis) is often higher than Bo-II. The author explains this by a reference to the glass ceiling: that gender wage differences increase with rising wage levels. He continues with a re-interpretation – along these lines – of other decomposition measures in the literature. As the author mentions in the text, the issue of gender wage differentials – while very often used in the literature – suffers from a principal problem: the unconfoundedness assumption is not possible or credible in this field. While the author does not invoke this unconfoundedness assumption for his result – nor does he discuss his results in a causal way – the actual empirical applications suffer from it: his ideas of an average gender wage gap or the PAGM or PAGW is very reminiscent on the matching literature: there, the unconfoundedness assumption is an essential component of the identification of treatment effects – for the whole population as well as for subpopulations like the treated or untreated (men and women in our case). In a nice empirical application, the author uses his concepts to describe gender wage gaps in the UK using data from the quarterly labour force surveys.

The final chapter is a nice empirical exercise combining the material shown above. As the Oaxaca-Blinder unexplained component can be seen as an estimator of the population average treatment effect on the treated, Sloczynski provides an extensive and careful finite-sample evaluation of this estimator with a variety of well-known other estimators using data from the NSW (which were used in the seminal study by Dehejia and Wahba, 1999). Next to the Oaxaca-Blinder estimator, he uses reweighting estimators, others based on propensity scores as well as nearest neighbor matching estimators. The results are prepared for various variants of these estimators, concerning stratification on the estimated propensity score. Moreover, all analyses are done for four variants in terms of sampling, where particular care is given to issues of data overlap in the treated vs. non-treated group. He assesses these estimators with respect to root mean square error and mean biases. Given this very careful evaluation, the Oaxaca-Blinder unexplained component comes out very favorably among the

competitors, in particular in cases, when the empirical overlap between treated and non-treated is large. This good performance of the O-B estimator is a very interesting result, given the simplicity of the estimator. While the author acknowledges the fact, that this empirical application/test is only one result concerning the robustness of this estimator, other tests with other datasets or applications should follow. It will be particularly interesting to study other circumstances where, e.g. the proportions of treated and untreated are more uneven as in the case of gender gaps.

Summing up, the dissertation provides a coherent study of important economic and econometric issues. The author shows a very good knowledge of the literature, is typically very concise and convincing in his argumentation. Given the topic of the dissertation, the relations between treatment effects models and the Oaxaca-Blinder decomposition method, he is using several methodologies: i) theoretical analysis showing the equivalence of decomposition and treatment methods, ii) simulation study replicating the theoretical results and iii) actual data from the UK and the USA to show under realistic conditions, how these estimators perform. The author is using appropriate and convincing methods for the dissertation. Moreover, he is elaborating his topic from different angles, describing the consequences for linear regression analysis, for decomposition methods and for appropriate treatment effect models. In that sense, the three main chapters of the thesis work nicely together.

As a referee I was pleased with the content and execution of the thesis. It used clear methods and replicable results. In my opinion, the thesis fulfills the requirement for a PhD dissertation and I recommend Tymon Sloczynski for public defense.

With best regards