
Response to Breusch's Critique

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PRÉCIS

Dans sa critique de l'article de Davis E.A. Giles et Lindsay M. Tedds, *Taxes and the Canadian Underground Economy* (2002), Trevor Breusch soulève deux points majeurs au sujet du processus particulier d'estimation utilisé dans cet ouvrage qui a pour résultat de rendre les conclusions sur l'importance et la forme de l'économie souterraine sans effet. Dans leur réponse à la critique de Breusch, les auteurs font remarquer que ces résultats ne signifient pas que la méthode statistique générale utilisée dans l'ouvrage est discréditée ni que l'ouvrage lui-même n'a aucune valeur : la majeure partie de celui-ci n'est pas visée par la critique.

ABSTRACT

In his critique of David E.A. Giles and Lindsay M. Tedds, *Taxes and the Canadian Underground Economy* (2002), Trevor Breusch raises two key points regarding the particular estimation process followed in that book, which render ineffectual the specific results regarding the reported size and form of the underground economy. In their response to Breusch's critique, the authors stress that those results imply neither that the general statistical methodology adopted in the book has been discredited nor that the book itself is worthless: the major part of the book remains untouched by the critique.

KEYWORDS: UNDERGROUND ECONOMY ■ TAX EVASION ■ ECONOMETRICS ■ MATHEMATICAL MODELS

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INTRODUCTION

Giles and Tedds¹ provided the first extensive empirical study of the size of the Canadian underground economy and its development over time. The intent of their book was to shed some light on a very active, although somewhat neglected, sector of the Canadian economy—the “underground” or “hidden” sector. We acknowledge that this was by no means a simple or uncontroversial task: it is impossible to say without a shadow of a doubt who, or what result, is “correct” when it comes to statements about the size of the Canadian, or any other, underground economy. There is, unfortunately, no simple “right answer,” but this does not undermine the usefulness of studying this phenomenon, or of the book. The basic goals of the study were twofold: (1) to obtain an estimate of the Canadian underground economy and (2) to inform, not eliminate, the debate in this field. We feel strongly that informed debate and discussion frequently has positive effects; and in terms of this topic, it has led to better research and the application of new methodologies. We welcome the comments and criticisms offered by Breusch; we are pleased that he has taken an interest in this field of research, and we appreciate having the opportunity to make some comments by way of a response.

The particular statistical methodology adopted in our book is a two-step process. The first step is to estimate a MIMIC model of the underground economy. In basic terms, a MIMIC model incorporates several observable “indicator” variables that reflect and several observable “causal” variables that are believed to be determinants of the size and form of the underground economy. One of the benefits of working with the MIMIC model is that it produces a time series of the underground economy. Unfortunately, it can generate only an index for such a time series. That is, it can tell us about changes in the ratio from year to year, but not about the actual values of the ratio in individual years. To convert the index series into a time series of values, we require a reliable estimate of the underground economy ratio at one or more points in the sample period under consideration. The second step is to obtain such an estimate. The methodology followed in the book utilizes a conventional demand-for-cash model that is extended to allow for two output sectors—one measured and one underground.

Breusch makes two key points² regarding the particular estimation process followed in the book and based on the methodology outlined above. First, the specific form of the demand-for-cash model that we used is unidentified, and it appears that he is correct on this point. To keep matters in perspective, however, it must be

1 David E.A. Giles and Lindsay M. Tedds, *Taxes and the Canadian Underground Economy*, Canadian Tax Paper no. 106 (Toronto: Canadian Tax Foundation, 2002).

2 Breusch is also correct in his comments about our interpretation of the “weights” associated with the different causal variables, and we thank him for these observations. It is very common to standardize the variables before they are used in the estimation of a MIMIC model (see, for example, Bruno S. Frey and Hannelore Weck-Hannemann, “The Hidden Economy as an ‘Unobserved’ Variable” (1984) vol. 26, nos. 1-2 *European Economic Review* 33-53), but we have not done this in any of our work.

emphasized that the purpose of this model is to provide a benchmark value to assist us in converting the underground economy index into a series of values. Breusch also makes a comment that relates specifically to the underground economy index. In particular, he notes that one of the causal variables used in the MIMIC model, the self-employment income variable, “alone determines most of the time profile of the index.”³ We have reviewed the data and concur with this comment. As a result, we believe that this point does render the specific results regarding the size and form of the underground economy reported in the book ineffectual.

We would like to stress that these results imply neither that the general statistical methodology adopted in the book has been discredited nor that the book itself is worthless. The issues identified above are ones related to estimation and simply mean that (1) the particular form of the demand-for-cash model needs to be rethought and (2) one of the causal variables we used in the specific estimation process is suspect. Overall, we believe that the general methodology, which is distinct from the specific choice of variables or functional form, still provides a fruitful way of estimating the principal features of a very broadly defined underground economy. Further, while the specific results outlined in the book are clearly questionable, the lion’s share of the book remains untouched by the critique.

Breusch also raises additional issues that either we were previously aware of, and have pointed out in subsequent work and in private communication to Breusch, or require clarification. We present these points below.

ISSUES PREVIOUSLY KNOWN OR THAT REQUIRE CLARIFICATION

Stability

Tedds⁴ reports that the demand-for-cash model used in Giles and Tedds was subsequently found to be quite sensitive to small data changes, which prompted her to re-examine the specification of the currency demand model. She proposes an alternative way to incorporate the underground economy into a demand-for-money equation that attempts to correct the problem. The revised method treats underground output as an observed component and then estimates the resulting state space model by maximum likelihood using the Kalman⁵ filter.

3 Trevor Breusch, “The Canadian Underground Economy: An Examination of Giles and Tedds,” in this issue of the *Canadian Tax Journal*, at the text accompanying note 34.

4 Lindsay M. Tedds, “The Underground Economy in Canada,” in Christopher Bajada and Friedrich Schneider, eds., *Size, Causes and Consequences of the Underground Economy* (Aldershot, UK: Ashgate, forthcoming).

5 R.E. Kalman, “A New Approach to Linear Filtering and Prediction Problems” (1960) vol. 82, series D *Journal of Basic Engineering* 33-45.

Benchmarking

Tedds⁶ and Giles and Tedds calibrated the resulting index series from the MIMIC model by finding the mean year of the sample, dividing each observation in the index series by the value that the index series took in that mean year, and then multiplying those values by the average value of the underground economy obtained using the currency demand model. Breusch notes that if one wants to preserve the content of the original index, the values of the time series must retain the same proportional relationships present in the index values. Tedds⁷ details an alternative calibration process that she believes preserves the proportional relationships found in the original index series.

Unit Roots and the MIMIC Model

There seems to be some confusion regarding the precise steps followed in the estimation of the MIMIC model and the transformation of the causal variables. It is generally accepted that when modelling with time-series data, these data must first be tested for the presence of unit roots; if these are detected (and in the absence of cointegration), they are rendered stationary in order to avoid the consequences of estimating spurious regressions. That is, the model's coefficients are obtained using the stationary series, but the model's predicted values are calculated using the original data. This is the process followed by Giles and Tedds for estimating the MIMIC model and is outlined in detail on pages 123–33 of the book.

CONCLUSION

We are delighted that Trevor Breusch has taken an interest in our work, and we are grateful to him for taking the trouble to replicate our results. His comments have revealed some weakness in our earlier study, and this will be most helpful to future researchers.

We also acknowledge that macroeconomic measures of the underground economy, such as those provided in Giles and Tedds, have been criticized for not being consistent with modern economic models of consumer behaviour, employing flawed econometric techniques, producing unreliable estimates, and providing limited guidance to policy makers. In particular, the macro-methods developed to date do not provide any information regarding the characteristics of those who participate in the underground economy. In order to obtain this type of information, a method that utilizes microeconomic data is required. There have been a number of recent methodological contributions on this front, and we encourage interested readers to consult those works. Ultimately, such microanalysis may prove to be more fruitful than much of the macro-level analysis that has been carried out to date.

6 Lindsay M. Tedds, "Measuring the Size of the Hidden Economy in Canada" (MA extended essay, University of Victoria, Department of Economics, 1998).

7 *Supra* note 4.