AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

 ©2012 Copyright Charles Sturt University

Area response in wheat production: The Australian wheat-sheep zone: Comment

Kevin A Parton

School of Management and Marketing, Charles Sturt University, PO Box 883, Orange NSW 2800, Australia

kparton@csu.edu.au

Abstract. This paper points out some difficulties in the econometric estimation of the original paper and suggests procedures for overcoming these.

Keywords: lagged dependent variables, trending, small-sample bias.

Introduction

Rarely does an editor of a journal have the opportunity and the obligation to write in response to an article published in their journal. That is probably because events almost never conspire to throw-up the circumstances that have occurred in the current instance.

Relative to his peers, Culas (2011) is worthy of publication. The paper succeeds in highlighting the issues surrounding area response in Australian wheat production. It achieves its results using standard econometric methods. So what is the issue that is being raised in this comment? It is that there are some question marks surrounding these standard methods. In a nutshell, the issue is that where there are lagged dependent variables the estimation of the other dependent variables can be affected. While the particular circumstances of the Culas (2011) paper may mean that there might be little bias in the estimation, it is considered worthwhile to make clear the fundamental estimation issues because others may try to employ his methods in circumstances where they are not applicable. Hence, an important objective in this comment is to reveal the circumstances under which the methods are applicable.

The partial adjustment model

Culas (2011) employs a partial adjustment model of the general form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_t + u_t \qquad (1)$$

He then applies ordinary least squares to the estimation. This is satisfactory as long as the error term (u_t) is well behaved, or white noise (Ramanathan, 2002) (in particular, the u_t are independently and identically distributed with zero mean and constant variance, σ^2), and the sample size is large enough (say greater than 30). This raises the first problem with Culas (2011), which is that the sample size seems to be 15 (i.e. annual data from 1991 to 2004), and we may expect some small-sample bias in the results, even without any of the autocorrelation issues discussed below.

The next situation to consider is where there is autocorrelated disturbances. Because u_t depends on u_{t-1}, Y_{t-1} (the lagged dependent variable) is correlated with u_t and applying OLS estimation will produce biased and inconsistent estimates. In addition, the usual tests for autocorrelation will be inapplicable. Ramanathan (2002, pp. 449-450) outlines an alternative estimation technique for overcoming these problems.

The relevant question for us is: are the disturbances in the Culas (2011) estimation likely to be autocorrelated? The paper itself does not provide enough direct evidence to make the judgement. Close examination of the results of the estimation reveals that, in the different versions of the model, the coefficient value of the lagged dependent variable range from 0.965 and 0.999 (Culas 2011, p. 47). That is, it is close to one, and this raises the possibility that the lagged dependent variable is squashing the effects of the other variables as observed by Achen (2001, p.14):

> *"In the presence of heavy trending in the exogenous variables and disturbances, lagged dependent variables will dominate the regression and destroy the effect of other variables whether they have any true causal power or not"* (original emphasis).

Hence, the issue about estimation problems devolves to whether the exogenous variables are heavily trending. The two variables to consider are the price ratio between wheat and wool, and the year. It would be expected that the price ratio is trending because of the secular increase in wheat prices and decline in wool prices over the study period. The year variable is by definition a trending variable. Hence, the Culas (2011) study seems to contain the circumstances outlined in the previous paragraph that Achen warns us to guard against.

Conclusion

The practical implications of this analysis are first, we should attempt to obtain a data set with more than 30 observations in order to reduce the problem of small-sample bias. Second, where there is a lagged dependent

 ©2012 Copyright Charles Sturt University

variable with heavy trending in the other exogenous variables, the model should be estimated using techniques applicable to the situation of lagged dependent variables and autocorrelation (Ramanathan 2002).

References

Achen CH 2001, 'Why lagged dependent variables can suppress the explanatory power of the dependent variables', paper presented at the American Political Science Association meeting, UCLA, July 2000.

Culas RJ 2011, 'Area response in wheat production: The Australian wheat-sheep zone'*, Australian Farm Business Management Journa*l, 8(1):43-49.

Ramanthan R 2002*, Introductory Econometrics with Applications,* 5th edition, South-Western, Mason, Ohio.