Discussion

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Ambler and Cardia's paper is an interesting one on an important topic: whether or not inflation has any effect on economic growth, and the related question of whether the methods used to draw inferences about this potential effect are adequate. Specifically, the authors analyse the implications of an endogenous growth model for the results that one can expect in cross-section and time-series regressions involving growth rates and inflation.

It was not difficult to forecast that van Norden would give a very thorough discussion of the endogenous growth model itself, and so I address the authors' interpretation of empirical results in the light of this work. My remarks centre therefore on Section 4, in which the authors list and describe the implications for regression models.

I wish to make two general points. First, the interpretational difficulties that the authors raise are all examples of generic potential problems in the use of regression models; these models are, after all, well understood at this point, and it would be surprising if these difficulties were not members of well-known classes. Second, because such problems are extremely common in macroeconomic data, the simple fact of their existence is of less interest than any quantitative information we might have about the *extent* of the difficulty that arises. In other words, models of macroeconomic data typically will not fit the classical regression assumptions exactly, and the relevant question in most cases becomes the quality of the approximation that we obtain—that is, not, "Is this model the true data generation process?" but, "Will the answer to my question be approximately correct if I use a model of this type?"

Cross-Section Regressions

To begin, I consider Subsection 4.1 and the eight points listed by Ambler and Cardia. As I summarize in Table 1, for each of these eight points I draw a link to a standard econometric "problem" or condition, if the link has not already been made. The regressions to which Ambler and Cardia refer are roughly of the form

$$g_i = \alpha_0 + \alpha_1 \pi_i + \alpha_2 G_i + \gamma' z_i + e_i,$$

where g_i represents the growth rate of gross domestic product (GDP); π_i, the inflation rate; G_i, the level of GDP; and z_i, a vector of other variables, for each country *i*. Barro (1996) uses several regressions with specifications along these lines, with G_i representing a beginning-of-period observation, and the other observations being 10-year averages of growth, inflation, and so on.

With respect to points 1 and 7(c) in Table 1, it is worthwhile to remember the distinctions made by Engle, Hendry, and Richard (1983), among various concepts of exogeneity, allowing us to distinguish between the conditions necessary for estimation of parameters (weak exogeneity) and the use of parameter estimates for policy analysis (super-exogeneity). In points 7(b) and 8, the authors remind us, in effect, to beware of Galton's Fallacy, which as Friedman (1992) noted shows no sign of disappearing

Table 1

Ambler-Cardia point[a]		Generic condition
1.	Regressions are not reduced forms	Failure of weak exogeneity
2.	$\hat{\alpha}_1$ depends on cross-sectional variation in other variables	Omitted variables bias
3.	$dg/d\pi$ depends on μ and on other variables	Omitted variables bias
4.	Related to 2, 3	
5.	Particular tax rates are omitted variables	Omitted variables bias
6.	Related to 3, 5	
7.	(a) regression is not a structural form	Specification error
	(b) coefficient on beginning-of-period per capita income does not imply convergence	Regression Fallacy (Galton's Fallacy)
	(c) $\hat{\alpha}_1$ cannot be taken to be policy-generated	Failure of super-exogeneity
8.	Transitional dynamics can also explain coefficient on beginning-of-period per capita income	Regression Fallacy (Galton's Fallacy)

a. Cross-section regressions.

from economic argument. In their summary, they again draw attention to what I have translated as a failure of weak exogeneity, which implies a failure of super-exogeneity, so that coefficients cannot be taken as derivatives exploitable by policymakers.

Failure of super-exogeneity is commonplace if not universal. Omitted variables bias will also afflict most empirical macroeconomic models. The relevant question is whether the bias is likely to be big enough to matter for given coefficients, or important in the context of a given problem, a question that Ambler and Cardia do to some extent address by simulation of their model. The value added in this Ambler-Cardia modelling approach lies, I think, in the ability to provide some numerical answers to questions of this type.

More generally, the qualitative points raised here seem for the most part to have been familiar to Barro (1996) and his commentators, particularly with respect to endogeneity; it is in obtaining quantitative information that this model offers potential progress. While there is only limited quantitative information of this type in the version of the model that Ambler and Cardia present in this paper, this seems clearly to be a direction in which the authors are working to extract more from their model.

Time-Series Regressions

Finally, I make a few points about time-series evidence. Here the implications of the Ambler-Cardia work take the form, not of criticisms of a particular regression model, but of general indications of the time-series properties that one can expect. I agree with most of what the authors say, in particular with their interpretation of the failure to reject the unit root in inflation as likely to be a power problem. As Bruno and Easterly (1996) note, episodes of very high inflation tend to have short life spans, following which there is a return (however temporarily) to a lower-inflation environment.

I wonder, however, how many of these implications require this model, or any endogenous growth model. It seems to me that many of these points would be widely accepted quite apart from these models, and could also be obtained within other classes of macroeconomic model.

References

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