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The Impact of Food Away from Home on Adult Food Quality: Comment

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In the Todd (2014) study, the following two equations are used

(1) $DQ_i = \gamma^A_{0708}(YR0708) + \gamma^A_{0910}(YR0910) + \beta_1(Meals_i) + \beta_2(Snacks_i) + \delta\mathbf{X_i} + \Delta\varepsilon_i$

(2) $DQ_i = \gamma^B_{0708}(YR0708) + \gamma^B_{0910}(YR0910) + \beta_1(Meals_i) + \beta_2(Snacks_i) + \lambda_1(MealsFAFH_i) + \lambda_2(SnackFAFH_i) + \delta\mathbf{X_i} + \Delta\varepsilon_i$.

Note that (1) is nested in (2); therefore, one can use these two equations to test for specification error; i.e., whether the cross-product terms are relevant explanatory variables. Hence, the differences in coefficients γs between the two equations cannot and should not be used to explain diet quality changes over time; because one can have only one of the specifications shown by (1) or (2). When variables that should be included in the model but were not, the resulting estimates are biased; on the other hand, when irrelevant variables are included in the regression, resulting estimates are inefficient (Greene 1990, pp. 253-62). The R-squares presented in Table 5 seem to support that equation (2) is the correct choice; because the R-squares for (2) are larger than the ones for (1). However, the adjusted R-squares should be used to determine if (2) is indeed the right choice. With this in mind, the statement

> "In equation (2), γ^B_{0708} estimates the change between 2005-06 and 2007-08 when the number of FAFH meals and snacks are also included as controls, and γ^B_{0910} estimates the change between 2005-06 and 2009-10. If γ^A_{0708} is larger than γ^B_{0708} (and γ^A_{0910} is larger than γ^B_{0910}), it indicates that the decline in FAFH consumption explains some of the improvement in diet quality over the years compared. If γ^B_{0708} or γ^B_{0910} are not statistically different from zero, then the change in FAFH consumption explains all of the improvement in diet quality."

seems problematic; because one should not compare the estimates between (1) and (2). Because when (2) is chosen, the estimates in (1) are biased; and when (1) is chosen, the estimates in (2) are inefficient. In addition, when (2) is chosen, the estimates of λ should be used to estimated the impacts of FAFH on diet quality and the γs in either (1) or (2) have nothing to do with FAFH; because

$\partial DQ_i/\partial MealsFAFH_i = \lambda_1$, and
$\partial DQ_i/\partial SnackFAFH_i = \lambda_2$.

If $MealsFAFH_i = Meals_i * FAFH_i$ and $SnackFAFHi = Snack_i * FAFH_i$; then

$\partial DQ_i/\partial FAFH_i = \lambda_1 Meals_i + \lambda_2 Snack_i$.

Reference

Green, W.H., 1990. *Econometric Analysis*. Macmillan Publishing Company, New York

Todd, JE 2014. "Changes in Eating Patterns and Diet Quality among Working Age Adults, 2005-2010," *Economic Research Report 161*, ERS/USDA.