

EMPIRICAL AGREEMENT BETWEEN FORMATIVE AND REFLECTIVE MEASUREMENT MODELS: A MONTE-CARLO ANALYSIS

Nick Lee, Aston University, United Kingdom
George R. Franke, University of Alabama, United States
Woojung Chang, University of Alabama, United States

ABSTRACT

Diamantopoulos and Winklhofer's (2001) paper on formative index construction in the *Journal of Marketing Research* changed the perspective of many marketing researchers on construct measurement. Since 2001, a significant stream of literature has developed which explores the extent to which existing reflective measures should be specified as formative. This work raises the possibility of significant negative consequences arising from the so-called 'incorrect' specification of measures as reflective when they should be modeled as formative. For example, Jarvis, MacKenzie, and Podsakoff (2003, p. 212) suggest that if a formative measure is specified as reflective, "the structural parameter estimates within that model [may] exhibit very substantial biases that would result in erroneous inferences." This paper examines the evidence for such claims, first by considering the nature of validity, then by conducting a simulation analysis of the effects of reflective treatment of formative indicators. The results demonstrate that despite their conceptual differences, and the results reported in prior empirical literature, formative and reflective specifications may reveal very similar substantive relationships between constructs when the comparisons are made appropriately.

The perspective that a given construct is inherently either formative or reflective, and should be modeled as such, is predominant in the formative literature (e.g., Diamantopoulos and Sigauw 2006; Jarvis, MacKenzie and Podsakoff 2003). This view does not match the realist ontology of measurement which dominates organizational and marketing research (e.g., Borsboom 2005). The realist ontology defines constructs to exist apart from their measures, and thus the meaning of the construct should not be defined by the measurement model. This philosophy is inconsistent with the approach taken by the formative literature in general. However, the realist ontology does accommodate the perspective that constructs may be measured either formatively or reflectively. With either approach, validity assessment will consider both logical analysis of the measurement model, and empirical testing of nomological relationships. As summed up by Kaplan (1964, p. 198), "The validity of a measurement consists in what it is able to accomplish, or more accurately, in what we are able to do with it... The basic question is always whether the measures have been so arrived at that they can serve effectively as means to the given end."

To examine the effects of formative versus reflective specifications on estimated nomological relationships, we modify an earlier simulation study (MacKenzie, Podsakoff, and Jarvis 2005). They consider a population model in which an exogenous formative construct influences an endogenous formative construct, and each construct has reflective as well as formative indicators. They compare this model with three others: exogenous formative and endogenous reflective; exogenous reflective and endogenous formative; and both reflective. We start with a similar population model, but unlike MacKenzie et al., we set the scale of each latent construct using one of its reflective indicators. This approach creates more consistent construct variances across model specifications. We also modify the reflective specification to avoid an inappropriate combination of distinct items into a unidimensional reflective construct. Specifically, we divide the original endogenous construct, which combines formative and reflective indicators, into two reflective constructs. We conduct a Monte-Carlo analysis using 500 samples for the four models, each with 250 observations, to compare the estimated effect of the exogenous construct on the endogenous construct. To two decimal places, all four models yield an average estimated effect of .30, the same as the true population value. Though power and some fit statistics vary across models, all models show excellent fit on average.

The results indicate that formative and reflective specifications need not yield different estimates of the relationships between constructs, contrary to previous investigations. This is not to say that the distinctions between formative and reflective measurement are unimportant. These approaches involve fundamentally different measurement conceptualizations, and developing measures from formative and reflective perspectives may lead to different sets of indicators (e.g., Diamantopoulos and Sigauw, 2006). However, when researchers face a given item set, it is possible that reflective and formative models of that set will give substantively similar results. These findings may encourage a complementary perspective on reflective and formative approaches to analyzing measures, in place of the antithetical perspective observed in the recent literature.

References Available on Request.