OMITTED LATENT BIASING FACTORS: ANALYTICAL FOUNDATIONS

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SUMMARY

This research introduces the concept of omitted latent biasing factors, defined as unobserved, unmeasured, and empirically unknown source(s) of influence based on the omission of a uni-dimensional latent construct across measured items and/or endogenous constructs in a hypothesized model. While the extant literature on common method bias centers on *potential* latent biasing effects on individual measurement items (and has primarily been limited to specification tests for same source biasing effects in survey research), this research proposes broadening the potential applications of omitted latent measurement biasing tests to other design concerns (see Campbell and Stanley 1959). Most importantly, this research lays the analytical foundations and proposes the need for specification tests for the *potential* presence of uni-dimensional latent biasing factors across endogenous constructs in simultaneous equation systems. Building on econometric and structural equation modeling foundations, the research proposes and conceptualizes the biasing effects that omitted latent biasing factors can have on both measurement and structural parameter estimates.

Omitted latent biasing factors (OLBF) are defined as unobserved, unmeasured, and empirically unknown source(s) of influence based on omitted latent biasing variance across measured items and/or endogenous constructs in a hypothesized model. The OLBF specification testing approach developed in this research establishes the conceptual and analytical underpinning for a structural equation modeling (SEM) technique that simultaneously detects, controls for, and supplements an understanding of both omitted latent biasing measurement factors (e.g. same source or other measurement model effects such as cohort effects) and omitted latent biasing structural factors (e.g. omitted substantive variables in the structural specification). Latent measurement and structural factors have implications that extend across a variety of simultaneous equation model specifications—which include, in the case of omitted latent biasing structural factors, specifications which either implicitly or explicitly assume perfect measurement (e.g. classical systems of simultaneous equations). Thus, the implications apply to research settings that involve estimating simultaneous equation systems in which all relevant measurement and substantive variables cannot be comprehensively identified, enumerated, and/or measured, *and* the need for unbiased parameter estimates is paramount.

In statistical analysis, bias refers to a specific property of an estimate obtained from modeling a data generation (e.g. game theoretic) or sampling process (e.g. experimental, quasi-experimental, and survey designs). Unbiased, consistent, and efficient properties establish the foundation for valid parameter estimates. Bias is the deviation of the expected value of an estimate from the true population value. As a result, bias plays a critical role in interpreting both the direction and magnitude of parameter estimates, and therefore identifying and controlling bias is essential to developing, testing, and advancing marketing science.

While bias is of concern to virtually all statistical models, the interest here focuses primarily upon two paradigms of model specification that are widely used in marketing: structural equation

models and classical systems of simultaneous equations. There is a rich tradition of structural equation modeling (SEM) in the marketing literature (cf. Baumgartner and Homburg 1996) and it is well suited for estimating a simultaneous system of equations (Steenkamp and Baumgartner 2000). SEM constitutes a growing literature across a wide range of disciplines, including marketing science (cf. Jedidi et al. 1997, Ansari et al. 2000, Hutchinson et al. 2000). In addition to their widespread use of SEM, marketing scientists continue to employ traditional systems of simultaneous equations in the marketing science literature (cf. Lam et al. 2001). SEM specifications integrate simultaneous equation modeling foundations (cf. Judge et al. 1985, pp. 563-653) with psychometric theory to provide a means for explicitly modeling the effects of measurement error. Thus, classical systems of simultaneous equations differ from mediated SEM structural model specifications primarily in the former's assumption of perfect construct measurement (Bollen 1989). Consequently, while this research advocates an SEM approach for detecting, estimating, and controlling for biases that can result from the exclusion of relevant variables in model specification, since many of the statistical techniques employed by marketing researchers today are special cases of structural equation modeling (Jöreskog 1973, Wiley 1973, Bollen 1989), it not only has implications for primary research (e.g. survey research, experimental and quasi-experimental), but also for model specifications which employ secondary data analyses.

While most of the concern in marketing research has centered on same source bias in survey research (cf. Mackenzie et al. 1993, Netemeyer et al. 1997, MacKenzie et al. 1999, Menon et al. 1999, MacKenzie et al. 2001, Wang and Netemeyer 2002, Hunter and Perreault 2007), the existence of both structural and measurement omitted variables too often remains unacknowledged in marketing and other research in the social sciences. Essentially, social scientists and other applied researchers need a better understanding of unwanted sources of variance in data sets that effect parameter estimation.

The purpose of this research is to propose a new, comprehensive method for addressing the issue of omitted variables *simultaneously* in the measurement and structural components of a model. To provide a conceptualization that encompasses both substantive and methodological omitted variables, this research introduces the term "omitted latent biasing factor" to refer to unknown common sources of variance. While the conceptualization, terminology, and approach proposed here represent new contributions to the marketing literature, this research builds on concepts and principles from psychometrics, econometrics, and structural equation modeling.

This research contributes to the marketing and social sciences literature in several ways. It introduces the concept of omitted latent biasing factors. By doing so, the aim is to raise consciousness regarding the broad *potential* for omitted latent biasing factor effects in both primary and secondary research. The research also establishes a methodological foundation for a comprehensive new approach for explicitly modeling omitted latent biasing factors using SEM techniques, one that allows the *simultaneous* detection, and control while supplementing a researcher's understanding of factors that might cause an OLBF effect within their empirical model specifications.

References available on request.

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