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Estimating firm-level and country-level effects in cross-sectional analyses: An application of hierarchical modeling in corporate disclosure studies

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Abstract

Researchers in the field of international accounting are often confronted with observations of firms clustered into higher-level units such as countries. Using data from a corporate disclosure study including 797 firm observations from 34 countries, we demonstrate that the inferences obtained from the most commonly used Ordinary Least Square (OLS) test, which pools the firm and country data either under the disaggregation or aggregation approach, are problematic and misleading. To overcome the methodological limitation, we subsequently employ hierarchical modeling to simultaneously estimate both firm-level (within-country) and country-level (cross-country) disclosure determinants. We find that the clustering effects are significant in almost all firm-level variables. Once such effects are adjusted, only three firm-specific variables are significantly associated with corporate disclosure. Evidence provided by this study has important implications for most international accounting studies conducted in cross-level contexts.

Keywords: Disaggregation; Aggregation; Disclosure; Hierarchical modeling

1. Introduction

The increased and growing interest in international accounting has led to the use of various variables, both firm and country specific, to explain the differences in disclosure practices

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between companies around the world. Unfortunately, the voluminous findings documented by cross-country studies are highly inconsistent and even contradictory (e.g., Bushee, 2004). There are several reasons for this inconsistency. First, theoretical assumptions regarding the relation between corporate disclosure and firm-specific and country-specific characteristics may differ across studies. Second, sample settings and disclosure measures may also diverge. Aside from these reasons, several authors have noted that such cross-country disclosure studies are often confronted with the significant challenge of having to specify firm-level (micro) and country-level (macro) influences in one model (e.g., Bushee, 2004; Miller, 2004).

To describe the current practice in dealing with this methodological issue, we reviewed 23 disclosure studies published in accounting and international accounting journals in the past few decades. The common purpose of these studies was to identify the factors that determine corporate disclosure. Among these 23 studies, 15 were carried out in cross-country settings. To investigate firm-level and country-level influence on disclosure, 12 of those 15 studies integrated both firm-level and country-level predicted determinants into one cross-sectional analysis using Ordinary Least Squares (OLS) regression.[1] Due to the limitation of the traditional single-level OLS techniques, researchers used two approaches to treat observations. The first is to disaggregate the country-level variables down to the firm level and then perform the firm-level test (e.g., Archambault & Archambault, 2003; Khanna, Palepu, & Srinivasan, 2004), which identifies the individual company as the unit of analysis. The second method is to aggregate the firm-level variables up to the country level and perform country-level tests. Though these two approaches seem straightforward, most researchers do not adequately consider the implications of the assumptions that they make when they move variables conceptualized at the *macrolevel* (country-level) to the *microlevel* (firm level) and vice versa.

An important and often untested assumption made by researchers using the disaggregation method is that all firm observations are independent — that is, firms from the same home country share no common characteristics and perceptions. However, this assumption is inconsistent with the theory on international accounting development. Choi, Frost, and Meek (2002) summarize how a country's fundamental characteristics, such as its macroeconomic, socio-historical, cultural, and legal environment, impact corporate financial reporting in both accounting measures and disclosure perspectives. Given that companies in the same country share similar national environments and institutions, the predicted firm-level disclosure determinants are likely to be correlated with country-level variables. Thus the claim that the disaggregation approach tends to violate the basic assumptions of OLS analysis regarding the independence of observations and uncorrelated error terms and, consequently, generates false significant estimates.

The alternative aggregation approach also presents some methodological issues. One issue is related to the small sample size of individual countries (e.g., Miller, 2004). Country-level tests often include less than 40 country observations with each encompassing the underlying local firms observational data, and thereby essentially reduces statistical power. Another issue is related to the aggregation modeling technique. The within-country variations between individual firms cannot be evaluated under the aggregation approach since such variations associated with firm-specific characteristics are reduced to a country

[1] The remaining three studies apply country dummies to represent country-specific effects.