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Estimating financial distress with a dynamic model: Evidence from family owned enterprises in a small open economy

Konstantinos Konstantaras*, Costas Siriopoulos[1]

University of Patras, Department of Business Administration, University Campus, 26504 Rio, Patras, Greece

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ABSTRACT

Employing earnings shortfall as a financial distress indicator, we formulate a dynamic nonlinear model, implementing Wooldridge's conditional maximum likelihood estimator and accounting for potentially endogenous covariates. Likewise, we not only achieve a significant improvement in consistency and classification accuracy over static approaches, but we also manage to understand better the evolution of the financial distress process. In our sample of Greek listed firms the higher the positive performance and the lower the leverage at the initial period the greater the chance that a company enters financial distress further down the road, possibly due to manager–owner overconfidence and debt-imposed discipline by company's creditors.

1. Introduction

Estimating the onset of corporate financial distress (FD) has assumed indisputably wide-ranging usefulness and applicability, stemming from its significant ramifications for company stakeholders in

Abbreviations: FD, financial distress; FDL, financial distress likelihood; FE, financial expenses; EBITDA, earnings before interest tax depreciation & amortization adjusted; EBIT, earnings before interest and taxes.

* Corresponding author. Tel.: +30 210 6201194; fax: +30 210 6201194.
E-mail addresses: dinokon@otenet.gr (K. Konstantaras), siriopoulos@eap.gr (C. Siriopoulos).
[1] Tel.: +30 2610 996394.

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cases of failure to meet debt obligations and payment default, on the one side, and to corporate restructuring, asset sales and debt workouts, on the other[2] (Hotchkiss et al., 2008). *Vis-à-vis* its importance, there has been extensive efforts to understand its economic drivers, performance and arising conflicts of interest, both in and out of court. Herein, we propose a new methodology to better understand FD on the one hand and to accurately predict its occurrence on the other, employing a dynamic nonlinear model which incorporates valuable information regarding past FD records.

The majority of research effort has been devoted so far in understanding and predicting bankruptcy and debt payment legal default, which paves the way for asset and debt restructurings, in or out-of-court, notwithstanding the potential for severe conflicts arising between managers, shareholders and creditors (see Hotchkiss et al., 2008 for a survey). Nevertheless, numerous researchers, including Wruck (1990), Asquith et al. (1994), Andrade and Kaplan (1998), Platt and Platt (2006), Jostarndt and Sautner (2008) and Pindado et al. (2008) have focused on obtaining a measure of FD likelihood (FDL), not necessarily entailing a formal bankruptcy filing or payments in arrears, but rather a situation of distress recognized by evidence of financial shortcomings from published accounts. Defining FDL this way includes as stress indicators, indispensably an earnings (either EBITDA – earnings before interest, tax, depreciation and amortization adjusted – or EBIT – earnings before interest and taxes) shortfall to cover financial expenses (FE), coupled in some cases with additional indicators, such as layoffs, reducing market valuation, negative EBIT or negative net income before special items. Its usefulness lies in the fact that it is independent of the eventual outcome, but consistent with an *ex-ante* approach (Pindado et al., 2008). Moreover, upon its diagnosis, FDL incorporates the potential for continuous reassessments prior to the occurrence of its ultimate resolution, facilitating the *ex-ante* corporate or stakeholder planning of possible remedies. The helpfulness of doing so may be seriously justified by the fact that firms in FD are considerably more probable to go bankrupt or be acquired.[3]

It is worth noting that there exist several distinctive features between the aforementioned definition of FDL and bankruptcy or payments default: the latter (bankruptcy and payments default) are (i) more closely related to corporate death than the former, and (ii) more closely resemble a one-off incident, modeled as an "absorbing barrier"[4]; in contrast, FDL may last for several years, especially in the case when it coexists with relative economic under-performance (Kahl, 2002). Moreover, the past record towards FD does matter, as there is an early warning of a potentially forthcoming distress-related bankruptcy or acquisition many years before its ultimate formal resolution (Ro et al., 1992). By defining likewise FDL, analysts are provided with an early distress warning tool, useful for an *ex-ante* FD estimation approach.

The majority of such estimation approaches have used static estimation techniques (e.g., the typical panel logit or probit) that fail to account for the full sample FD evolution dynamics; a solution proposal is the employment of hazard models that do use the full past record of FD and model the eventual bankruptcy (Campbell et al., 2008). Nevertheless, this very definition and staying nature of FD (an FE-EBIT shortfall may persist in several accounting years) sets estimation techniques *via* hazard models questionable for modeling the dynamics of the process. Up to corporate disappearance (the absorbing barrier) hazard models assume a different process than further on, where observations are treated as a new beginning of the process, not accounting for a dependence on previous FD history.

Given the importance of accounting for the FD dynamics, we employ a dynamic nonlinear panel model specification proposed by Wooldridge (2005) (conditional maximum likelihood estimator) which accounts for unobserved heterogeneity in a dynamic discrete choice framework, which may be easily formulated in widely available software. In the existing FDL literature, the strong dynamic dependence of FD on previous-year outcomes has been (partly) circumvented by limiting its definition to earnings shortfalls lasting two years (Platt and Platt, 2006; Pindado et al., 2008; Jostarndt and Sautner, 2008), in essence de-trending its one-period state-persistence. Nevertheless, a conceptual setback in employing such a biennial FDL indicator is the unavoidable treatment of the rest of the

[2] See Hotchkiss et al. (2008) for a comprehensive survey of the use of private and court-supervised mechanisms in resolving default by restructuring companies in financial distress.

[3] Asquith et al. (1994) examined listed FD junk bond issuers between 1976 and 1989, which exhibited a frequency of 55% in Chapter 11 filings.

[4] As assumed in hazard models for dynamic bankruptcy estimation, e.g., in Campbell et al. (2008).