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Journal of Banking & Finance 26 (2002) 1181–1197

Journal of BANKING & FINANCE

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The relations among asset risk, product risk, and capital in the life insurance industry

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Received 2 March 1999; accepted 4 December 2000

Abstract

This paper explores the relation between capital and risk in the life insurance industry in the period after the adoption of life risk-based capital (RBC) regulation. To examine this issue, we use a simultaneous-equation partial-adjustment model. Three equations express the interrelations among capital and two measures of risk: product risk and asset risk. The asset-risk measure used in this paper reflects credit or solvency risk as in RBC. Product risk assessment for life insurance products is rationalized by transaction-cost economics – contractual uncertainty. A significant finding is that for life insurers the relation between capital and asset risk is positive. This agrees with prior studies for the property/casualty insurance industry and some banking studies. But the relation between capital and product risk is negative. This is consistent with the hypothesized impact of guarantee funds in other studies. The contrast between the positive relation of capital to asset risk and the negative relation of capital to product risk underscores the importance of distinguishing these two components of risk. © 2002 Elsevier Science B.V. All rights reserved.

JEL classification: C31; G32; G22; G28; K12

Keywords: Capital; Risk; Life and health insurance; Simultaneous equations; Transaction-cost economics

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PII: S0378-4266(01)00166-2

1. Introduction

This is the first study to look at the simultaneous interrelation among capital, asset risk and product risk in the life insurance industry using the framework of Shrieves and Dahl (1992) and Cummins and Sommer (1996). For the life insurance industry, academic research in this area has concentrated mostly on the influence of the life risk-based capital (RBC) regulatory tool. Pottier and Sommer (1997) compared the life RBC results with those of the insurance industry's rating organizations and Ryan and Schellhorn (2000) examined the impact of the life RBC law on life insurer's efficiency.

The interrelation between capital and risk for the banking industry received attention from Shrieves and Dahl (1992) and Jacques and Nigro (1997), among others. Berger et al. (1995) provide a survey of capital structure studies in the banking industry. In the insurance industry, Cummins and Sommer (1996) examined the interrelation between capital and risk, but only for the property/casualty insurance industry. In this study, we apply the methods used by Shrieves and Dahl (1992) and Cummins and Sommer (1996) to the life insurance industry in the post-RBC era.

The banking literature presents somewhat inconsistent empirical results on the interrelation between the capital-to-asset ratio and asset risk. Shrieves and Dahl (1992) found a positive relation between the capital-to-asset ratio and asset risk for the period of 1983–1986, but Jacques and Nigro (1997) found a negative relation between capital and asset risk for 1991. Berger (1995) found that the level of capital to asset ratio was negatively related to the level of portfolio risk in a study of the relation between capital and earnings in banking for the period of 1983–1989. The asset risk measure of these studies was based on the 1988 Basle Accord RBC guidelines. For the property/casualty industry, Cummins and Sommer (1996) found a positive relation for capital and risk levels in 1979–1990. They aggregated asset and product risk into a single portfolio risk measure using a model based on option pricing.

A positive relation between capital, on the one hand, and asset risk or product risk, on the other hand, is consistent with agency theory, transaction-cost economics theory (Williamson, 1988) and insurers' preference to avoid bankruptcy costs (Cummins and Sommer, 1996; Shrieves and Dahl, 1992). Transaction-cost economics (Williamson, 1988) assumes that when the products sold by the firm are riskier, debt financing is harder to obtain because of greater uncertainty that the firm will fulfill its contractual obligation to repay. Thus, firms that sell products with greater risk such as health insurance are expected to hold more capital. Additional theoretical explanation for the positive relation between risk and capital (Shrieves and Dahl, 1992) is that a firm will adopt lower leverage levels because of regulatory costs, unintended effects of minimum capital standards, and bankruptcy cost avoidance considerations.

A negative relation between capital and risk is consistent with the hypothesis that deposit insurance for banks and guarantee funds for insurers induce greater risk taking at lower capital levels (Cummins, 1998). Lee et al. (1997) express this idea as the

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