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The Fair Valuation of Insurance Liabilities: The Information Set Perspective

by Mike Davlin

In his most recent in a series of insightful articles on the fair valuation of insurance liabilities (December 2005 *The Financial Reporter*), Luke Girard identified and introduced the very real concept of the regulator's call option, and ably discussed how its recognition by insurance accounting systems can better align stakeholders' interests and incentives. In so arguing, I believe Luke is right on the money. As often happens when ideas are in the air, I recently arrived at the very same destination as Luke but from an entirely different starting point: the new C3 Phase II capital regulations for variable annuities. I believe our two perspectives are complementary, and together might identify common ground between insurers and regulators where future discussions on fair valuation can less contentiously be advanced. In this short note, I hope to describe my own path to Luke's discovery, reformulate the issue from the currently fashionable perspective of credit risk theory, and then briefly suggest how that reformulation might allow future debate to center around technical rather than ideological issues.

While a constructive criticism of the new C3P2 regulation is far outside the scope of this note, I think it is fair to observe that, beyond the expense of compliance, its implications for financial management are not obvious. In order to get my own mind around the essence of C3P2, I tried to identify what sort of financial instrument the new regulation most resembled, and then considered whether or not it made economic sense for an annuity writer to initiate hedging activities in reaction to its having to issue this instrument. There remains no element of surprise in my revealing my own conclusions. From the perspective of management, C3P2 represents a barrier call option with a zero strike price. In respect to a company that writes only variable annuities, it gives regulators a knock-in call option for control of the insurer, or at least raises the call boundary of the existing regulatory option Luke described in his article. If and when the C3P2 framework is extended to other product lines, they will jointly determine a new



dynamic boundary on the regulator's call on corporate control for all types of insurers.

As Luke correctly noted, the regulator's option has real economic value that reduces the economic value of the firm to all stakeholders with claims junior to those of policyholders—most obviously, stockholders, but bondholders as well. That insight enables us to see that, even if C3P2 granted no liability credits for clearly defined hedging strategies, stockholders and bondholders now have an increased interest in seeing that the insurer's management reduces the value of the regulator option. This can be effected either through the liability side, by reducing guarantees or increasing fees, or on the asset side, through an investment strategy that includes capital market hedges and conventional indemnity reinsurance. In the presence of C3P2, hedging creates its own reward by partially reversing the newly increased economic value of the regulator's call option.

From the perspective of policyholders, C3P2 and other minimum asset requirements create a *protective covenant* that is missing from the capital instruments they have purchased from the insurer. Other more informed and better bargaining purchasers of capital instruments routinely insist such covenants be placed in their bond debentures. As do other

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debt covenants, statutory capital standards attempt to minimize agency costs by defining an intervention boundary, a point at which claimants can step in to protect their interests. I note in passing that any debt issued by an insurance company likely creates an unrecognized intervention barrier in addition to that of the regulator's option. Even the most staunch proponent of unfettered insurance markets—arguably, the present writer—can admit to both the presence of agency hazards and, while he might be inclined to quibble about its form and level, to some form of protective covenant for policyholders being both unobjectionable and necessary. In the absence of such a covenant, the economic value of an insurer's promises to its policyholders is reduced by possible future states of the world wherein the insurer's total assets are exhausted. Management's tenure lasts until bankruptcy, a stopping point before which all claims can be met in full, and after which no claim can be met. In the presence of a protective covenant, such as C3P2, management's tenure lasts until default, an earlier stopping point before which all claims can be met in full, and after which all claims can be only be partially met, but in a way that more equitably allocates a smaller and earlier shortfall to a larger group of claimants.

Whether the stopping time for management's control is defined by actual bankruptcy or by formulaized default, it can be modeled in a manner similar to the stochastic analysis required by C3P2. The excess of the fair value of policyholder claims in the presence of a regulator defined default barrier over the corresponding fair value under a bankruptcy barrier is exactly the fair value of the regulator's option; the fair value transferred to policyholders from other lower priority stakeholders. By incorporating bankruptcy and default scenarios, cash flows can be discounted at the risk-free rate, side stepping the nettlesome question of the appropriate transformation of own credit risk into higher than risk-free discount rates for valuing promised benefits in a different type of model. In this approach, the shortfalls from bankruptcy and default are directly simulated, enabling the calculation of probability term structures for

hitting each barrier. This sort of modeling is extremely detailed, and both consumes and produces an immense amount of information not normally visible to outside observers, such as rating agencies, regulators, and participants in capital markets.

The academic literature on credit risk reflects an ongoing debate over the relative superiority of two types of models: structural models and reduced form models. Structural models, which were first introduced by Merton, Black, and Scholes, appraise default risk by simulating a firm's total assets and liabilities. Reduced form models, introduced by Jarrow and Turnbull, attempt to directly model default time as a stochastic process calibrated to publicly available information on the firm, or similar firms. In a 2004 working paper, Jarrow and Protter discussed this debate over the relative merits of these two models. They made the cogent observation that neither model form is uniformly superior; whether one or the other is to be preferred in a given situation depends entirely on the information available to the modeler. Jarrow and Turnbull dub their analysis *the information set perspective*. As the modeler's information set approaches that of a firm's manager (or actuary!), a structural model is most appropriate. As the information set is reduced to that typically available to rating agencies and regulators, only reduced form models remain feasible. For the discussion at hand, the model I described would obviously be a structural model with high information requirements. The model Luke attributed to rating agencies would be a reduced form model, although these agencies have recently expressed interest in utilizing an insurer's internal structural models in their analyses. The current statutory framework has attributes of both; a myriad of contract details, invisible to the outside world, are reflected in simplified models whose parameters are calibrated to industry, rather than entity-specific, experience.

The information set perspective recasts a problem Luke discussed—an insurer attempting to boost its equity in response to a rating downgrade—in a somewhat different light. When a rating agency downgrades an insurer based upon a reduced form model and information set, the affected insurer has two options. It can adjust its internal structural model so it is judged to comport with the new rating—an act tantamount to an embarrassing

admission that a rating agency with its reduced information set somehow arrived at a better appraisal of the company's prospects than did its own management in full possession of an enormous informational advantage—or construct a logical defense of its internal model as it stands. Luke's concern was with a company electing the first option. From the information set perspective, insurance company management should be maintaining as realistic and relevant a structural model as possible, given the information at hand. It is important to note that, in a structural model such as I described, the term structures of bankruptcy and default probabilities are *calculated outputs*, not *assumed inputs*. The same holds true for their re-expression as higher yield rates that could be used for discounting promised benefits rather than benefits paid in a different structural model. The only *legitimate* way for management to bring their bankruptcy and default based structural model in synch with the rating agency's reduced form model would be to adjust its assumptions for asset and liability behavior in a manner that increases the resultant probabilities of bankruptcy and default. Doing so does *increase* the discount rates, which would, in some other model that does not allow for bankruptcy or default, equate promised benefits to the fair value of policyholder liabilities. But at the same time it would *decrease* equity in its internal structural model. This is exactly how it should be; such gamesmanship as Luke described would be both transparent and subject to deserved ridicule. Credible companies could not jump back and forth between reduced form and structural models as their outcomes suited them. I conclude that, under a thoroughly fair valuation system such as I described, the most likely outcome of an unexpected rating downgrade would be a vigorous defense by management of its internal structural model; a dialog that would eventually produce a consensus view.

And what of the common ground I promised? It seems to me that everyone should be able to agree that the *raison d'être* of insurance regulators, rating agencies, FASB and the IASB, is to protect contractual stakeholders; that unlike other stakeholders, policyholders currently lack protective covenants in their contracts; that when viewed as dynamically redefining the boundary of the regulator's option, C3P2 style minimum asset determinations can be a very efficient and effective way of creating just such



a covenant; that such boundaries increase incentives to engage in hedging activities; that such boundaries encapsulate superior information sets and consequently obviate the need to continue to spend valuable resources maintaining an informationally inferior, quasi-reduced form, statutory valuation model; that standards of absolute realism in a model should be replaced by an evaluation of a model's realism *relative* to alternative models and consistently applied to *all* models, including the current framework; that models and their associated assumptions should be judged on the degree to which they advance the interests of all stakeholders. I believe such a technical discussion would garner far more support for improved C3P2 style protective covenants, sturdily undergirded by increasingly detailed structural fair valuation models. **S**

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