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The Case for Distributable Earnings

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The Case for Distributable Earnings[1]

Chris Foote and Steven Craighead

Abstract

In the past several years several separate approaches have been taken to assign value to insurance. "Value" has been defined functionally as the present value of either cash flows or distributable earnings. The primary difference between these is that cash flow valuation excludes the impact of reserves and required surplus, whereas distributable earnings are cash flows less the increase of the change in reserves and/or required surplus. Our assertion is that economic value is best defined by distributable earnings and that risk management processes must focus on distributable earnings or run the risk of misalignment. In this paper, we will discuss the differences between cash flows and distributable earnings, as well as the concept of a required balance that expands the usability of the Distributable Earnings framework.

[1] The design, use and conclusions of this paper and its related research reflect only the personal opinions of the authors. They do not reflect any opinions or positions of CNO Financial Group or Pacific Life Insurance.

1. Introduction

There is a quiet but persistent and troubling argument over the definition of the value of financial instruments, especially insurance contracts. The argument manifests itself in the financial models employed in risk management practices, particularly those for interest rate risk. The disagreement is not just some fine point of modeling; it goes to the core of the value addressed in risk management decisions, where the different approaches lead to materially different values, management decisions and ultimately risk outcomes. The persistence of this argument creates confusion in approaches to risk management as practitioners have choices from among various models, any of which may be deemed correct depending on one's perspective.[2]

The value or objective function of risk management processes is often labeled "economic value." This concept is intuitively understood to represent the core or most critical measure that forms the basis for comparative value or decision making. Disagreements center on how to define or measure economic value or, alternatively, economic reserves when measuring the liability value.

The measurements of economic value follow one of two basic approaches referred to in this paper as Market Value and Distributable Earnings. Market Value proponents define value based on "pure cash flows" and claim that this definition best represents "economics," or economic value. This approach is common, if not predominant, in the broader world of finance and increasingly in the world of accounting, where "market-consistent" approaches to valuation continue to be advanced. Financial textbooks and academic papers adopt the liability value as the short position of traded instruments such as bonds or options. These references are so common and plentiful that the approach is accepted as fact even though such references are advanced without proper foundation.

In contrast, the Distributable Earnings method is often relegated to a lower position and dismissed as irrelevant in the discussion of economic value. This method is often confined to actuarial practitioners and not understood well by those in the broader financial world. Even among actuarial practitioners, this method is often diminished because it is mistakenly thought to be synonymous with statutory accounting. The widespread belief is that statutory approaches cannot represent economics or economic value as such approaches are known to apply conservatism in valuation.

Typically ignored in the discussion of Distributable Earnings method is its role in the market transactions for insurance contracts. These markets are deep and well established, even though they lack the liquidity and transparency of the broader financial markets. This method underlies the pricing of both insurance contracts and transactions in the

[2] The use of the generic value of new business metric (VNB) within companies using market consistent embedded value leads those companies to conclude that the only insurance that should be added to a book of business is protection based (term). This is because VNB does not allow for the recognition of any future spread from the assets backing the liabilities. This is, of course, counterintuitive to the fact that spread-based insurance products have been successful within the industry for well over a century.

mergers and acquisitions (M&A) markets, including reinsurance transactions. In other words, by simple definition this is the market-consistent pricing method.

In this paper, we make the case for Distributable Earnings as the method that defines economic value for insurance contracts and similar financial instruments and as the appropriate and necessary objective function of risk management processes. We begin with a definition of economic value that presupposes neither distributable earnings nor market value. We then lay out the compelling rationale for the Market Value approach to valuing the insurance liability as the short position of a bond or other financial instrument. Next, we challenge this rationale by describing the distinguishing characteristics of insurance contracts that make the Market Value approach unsuitable for the insurance contract. We also identify the irresolvable paradox that demonstrates this lack of suitability. We then define and describe Distributable Earnings as the general pricing and valuation framework for financial projects characterized by a required balance or amount required to be held in support of the project. This framework is then reconciled to the market value paradigm—first in the context of defining economic value, then in an interpretive manner, and finally in a numerical example to demonstrate the conceptual reconciliation.

2. Background

The seminal paper "The Value of the Firm: The Option Adjusted Value of Distributable Earnings" (Becker, 1990) formally marked the transition of insurance pricing and valuation from the asset-share method to Distributable Earnings. The tontine-like asset-share model failed to recognize the reality of distributable earnings and an entity's freedom to deploy these earnings as they became available. The new Distributable Earnings model did not preclude accumulation but instead appropriately recognized such earnings as free surplus rather than as amounts tied up in the business that produced the surplus. Becker describes the insurance entity as a CMO (i.e., more generally a structured security in current terminology) and likens the distributable earnings to the CMO's principal and interest cash flows. He then argues that the value of the insurance entity must be based on these distributable earnings in the same way the CMO is valued on its distributions. He demonstrates the valuation by using option-adjusted pricing techniques from the world of finance. His example chooses the policyholder option to surrender and values this option under varying investment strategies in a sample set of interest rate scenarios.

Today, some 30 years later, the Distributable Earnings method is widely recognized as the method of pricing and valuing transactions involving insurance contracts and entities or blocks of business. However, this framework does not stand alone as representing value. Instead, it resides next to alternate methods ranging from accounting balance sheet presentations to those claiming to be grounded on financial economics.

The terms *economics* and *economic value of the insurance liability* and their interpretation are discussed in numerous references, notably Babbel and Merrill (1998) who establish several necessary criteria for a viable economic valuation model. Choices are made in the description of several of the criteria, but these critical choices are made without elaboration. For example, an economic value model should be *relevant* to the definition of economic value, but this definition is not clearly stated. Further, "accounting models" are dismissed out of hand as irrelevant, with no recognition given to the influence of accounting outcomes on real business decisions, whether consistent or contrary to economic value. Another important criterion is *calibration to prices*, meaning that an economic valuation model should calibrate to observable prices, but the only observable prices considered in the paper are from sources other than insurance markets. In other words, valuing the insurance contract relative to the fixed-income markets is axiomatic. Finally, *value additivity* (i.e., the whole equals the sum of the parts) is listed as another important criterion. These concepts are well stated in the paper but are advanced with little or no support or elaboration. Yet this fairly represents the underpinnings of the Market Value approach to valuing insurance liability.

That paper and many others apply the interest-rate models developed for the noninsurance financial markets to valuing the insurance contract. The models are evaluated by their ability to match observed prices, and the approaches may be considered "relative value" as they attempt to price one item relative to a known reference. The sophistication of these models and their widespread recognition in financial literature lends further credence to the appropriateness of their application to the insurance contract.

Reitano (1997) recognizes the two competing valuation approaches, labeling them "direct" and "indirect" market value calculations. He examines the insurance markets as they currently exist and how they might operate and value liabilities if they were highly liquid and transparent (i.e., if they were like the fixed-income markets). He also examines the put and call options granted to the insurance contract holder and relates these to the corresponding features in bonds and mortgage-backed securities and the valuation of the options within those contracts. His discussion yields no preference to either method, implicitly recognizing their coexistence while acknowledging that they yield different outcomes.

Girard (2000) also acknowledges these competing valuation methods, which he references as the option pricing method (OPM) and actuarial appraisal method (AAM). He reconciles the two methods with formulas and a numeric example using a guaranteed investment contract (GIC). He asserts that the two methods are equivalent and differences observed by practitioners in their modeling outcomes arise from the use of different assumptions. So attention must be given to the assumptions, specifically the choice of interest rate scenarios (risk-neutral methods are required) and how to define or measure the liability. The implication is that both models are correct and either may be employed as long as assumptions are set appropriately.

The world of accounting is moving increasingly toward Market Value practices. This movement implicitly recognizes that the "markets" represent a reality to be shown in income statements and balance sheets in preference to historic cost analyses. Considerable discussion arises in the approach to valuing assets or liabilities in the absence of observable transactions. The term "fair value" has been adopted to describe these values, where fair value equals market value (when known) or "market-consistent" valuations in the absence of price observations. Financial Accounting Standards (FAS) 133 was among the earliest pronouncements, and among its many requirements is the separate identification and valuation of derivatives embedded within other financial contracts. Within insurance, this pronouncement has considerable significance to fixed-index annuity contracts (FIAs), which have embedded call options. Market-consistent pricing is generally understood to be consistent with the options markets, implicitly assuming the value of the derivative is unaffected by its marriage to the host annuity contract.

Actuarial risk management practitioners must operate against this backdrop of financial theory, using competing models and the imperfect application of theory to insurance. These problems are illustrated by Reynolds and Wang (2007) who apply textbook interest risk immunizing techniques to a traditional life contract with continuing premiums. The failure of these techniques is seen in irrational and intractable durations and the failure of hedge strategies. These failures are in stark contrast to the certainty found in textbook examples using GICs and single-premium deferred annuities (SPDAs) as exemplary insurance contracts. The problems seen with the traditional life example are not rare; instead they illustrate the problems common to all forms of insurance with continuing premiums, meaning contracts other than GICs and SPDAs.

Reynolds and Wang's analyses also highlight the general uncertainty over the definition of value. The hedge strategies developed in the paper are tested and measured in both the Market Value and Distributable Earnings frameworks (the measurement of pre-tax income represents distributable earnings even though it is incomplete). The question arising from this work and left unanswered for practitioners is "what is the appropriate objective function of risk management—market value, distributable earnings or both?"

3. Economic Value

The concept of economic value is widely used throughout economics and finance. The arguments over value typically begin or end with this concept, and common terms when discussing the liability measurement also include "pure economics" and "economic reserves." Economic value is intuitively understood to represent the core or most important measurement forming the basis for comparative value or decision making. However economic value is measured, it becomes the goal or objective function of value creation or risk management and the value to be optimized or immunized.

Any objective argument over the measurement of a conceptual value must begin with a definition, one that brings clarity without presupposing a specific approach or formula. Surprisingly, this definition is absent from the considerable literature researched for this paper, even in those instances where the concept is referenced. We adopt the following definition:

Economic value. The economic value of a financial instrument is the value based on the return that is realized and recognizing all incidents of ownership (as a financial asset) or obligation (as a financial liability).

The terms in this definition are further explained as follows:

Return. The return delivered by a financial instrument is cash, not some form of utility such as the satisfaction derived from owning artwork.

Realized. The realized return is cash actually received.

All incidents of ownership or obligation. All aspects of the financial instrument must be recognized, especially in a financial liability that may carry numerous obligations beyond the contractual cash payments.

The theory and practice of financial modeling recognize both the time value of money and the primacy of market consistency in determining economic value. The following definitions address these concepts:

Time value of money. The value of cash to be received in the future is determined by applying a suitable discount rate. The specific discount rate depends on the circumstances of the instrument to value, as discussed in later sections.

Market prices. In this paper, economic value equals transaction value (i.e., cash). Further, economic value must be consistent with observed market prices. However, as will be discussed, consistency must be measured relative to an identical financial instrument transacted in the same market. Where either of these conditions does not apply, a requirement of "reasonable similarity" must be established and met. Any argument for consistency with hypothetical markets or hypothetical market conditions is rejected as specious.

These are the bases we use to analyze the two basic approaches to the economic value of an insurance contract or enterprise.

4. The Market Value Paradigm

The Market Value paradigm is common, perhaps even predominant, in the risk management programs of financial institutions. This model holds that an enterprise's market value equals the market value of its assets less the market value of its liabilities. Superficially at least, this paradigm defines economic value since it specifies market value for both asset and liabilities. This section examines the basis for this model and the rationale for the widespread acceptance of its application to insurance liabilities.

4.1 The Fixed-Income Model

The fixed-income model equates the market value of a security with the present value of its cash flows, where the discount rate is the unknown variable whose solution completes the equation. This is the model used to value bonds and other securities that pay interest at a contractually defined or fixed rate. Bond markets in particular use this model to solve for the discount rate implied by transactions. The discount rates observed in the transactions are analyzed and compiled to form pricing curves for the entire spectrum of fixed-income instruments available in the markets.

These market yield curves are valuable for two very significant reasons. First, they allow for pricing of instruments that lack current, observable transactions. This lack of market data may result from the security being privately placed or thinly traded or from general illiquidity in a segment of the market. Pricing is performed by taking the market discount curve derived for similar securities (with respect to credit, maturity, optionality and so on) and discounting the expected cash flows of the unpriced instrument. The process results in a price that is fair or reasonable relative to other known prices. Users rely confidently on this relative pricing mechanism because they understand its strong link to actual transactions in the marketplace.

Second, the yield curves contain information about the relative prices of specific securities and about the current markets relative to historic norms. For example, the discount rate could reveal that a given security is trading at a price comparable to other more highly rated securities. By itself this fact is not probative as it could mean either that the security is overpriced or that its credit is underrated. More generally, the discount curves reveal the market's current pricing of credit and, by inference, its expectation of future risks. Once again these facts prove nothing (i.e., this is not proof of future credit events), yet the significance of this information to the portfolio management decision process is not diminished.

The fixed-income model owes its strength to its practical utility and strong theoretical foundation. The depth and transparency of bond markets allow discount rate or yield curves to be developed and continuously available whenever markets are open. These curves represent market pricing for the entire spectrum of risks and maturities of bonds and other comparable fixed-income securities. The practical usefulness of the fixed-income model arises from this continuous calibration to real market transactions. These curves and the model represent true market-consistent pricing, a fact validated regularly by those who use it as a guide or expectation for pricing before entering the markets.

The practical usefulness of the model is buttressed by its integration with financial theory and advanced modeling applications. Financial theory posits credit risk as the reason for the price difference between two otherwise identical fixed-income securities. The model equates the price difference to an annual credit cost measured by the difference in the discount rates. This measurement can then be used to calibrate credit risk models to observed market pricing. Similar routines are possible for calibrating other features of these securities, such as call options. The basic model is also employed in the concept of stochastic pricing and the development of risk-neutral stochastic scenarios.

In sum, this model is firmly established in finance and universally recognized in the financial markets. Indeed, the integration with actual practice is so deep that it is nearly impossible to separate the model from the market. Seldom do users question whether a bond price is based on an observed transaction or the relative pricing resulting from the model, rarer still does anyone question the model itself.

4.2 The Insurance Contract as a Fixed-Income Security

The insurance contract, the argument goes, is the short position of a financial contract that can be viewed simply as a series of cash flows, not unlike a bond or other fixed-income security. This view is strengthened by the common practice in academic references of illustrating the application of finance theory to insurance contracts using SPDAs or GICs. The cash flows of these contracts conveniently mirror those of bonds (whether of the coupon-paying or zero-coupon variety), making this practice axiomatic. The credited rate of the SPDA or GIC is readily seen to be the counterpart of the coupon rate of the fixed-income security. Observation of the SPDA or GIC credited rates typically reveals a close relationship to discount rates in the fixed-income market, adding further credence to the view of the insurance contract as the short position of a bond.

Viewing the insurance contract as the short position of a series of cash flows leads to the application of the law of one price. Simply stated, this law asserts that two identical items must have the same price. This law is applied in practice when the price of one item is known and the second is unknown. It is applied to a financial instrument by viewing and valuing each of its cash flows independently. Thus it is not necessary to find two identical instruments to apply this law. Instead, it is only necessary to identify the series of cash flows, then to price each cash flow individually relative to a known reference.

This view is so common throughout finance and accounting that the term “market consistent,” as applied to the pricing of an insurance liability, is uniformly understood to mean pricing using the fixed-income model and (typically) discount rates from the bond markets (the fixed-income model is used for basic insurance cash flows, excluding embedded derivatives). Risk management processes in general and hedging processes in particular also adopt this model either implicitly or explicitly. For example, interest rate risk management implicitly adopts this model when the liability duration is calculated and used in the formulation of the investment strategy. Alternatively, the resulting market value is used explicitly when the strategy is based on the liability dollar-duration.

4.3 Market Value Paradigm—Definition of Return

The enterprise value in the Market Value paradigm is the sum of the asset values less liabilities. In this holistic view the insurance contract is a short position that can be settled (or the liability can be discharged) at a “market value” or an amount equal to the discounted present value of its cash flows. Further the assets can be sold at market value, and the net or difference between these values can immediately be realized as cash.

Conceptually this holistic view of economic value could be tested and proved true or false by analyzing transactions in the marketplace. However, such a test would be extremely difficult, perhaps impossible, owing to the lack of transparency in the market and the complexity of insurance cash flows. Certainly there is no argument that the asset values in this paradigm represent economic value as they are generally determined directly from market prices or valued in methods that are reliably market consistent. However, there can be no conclusion regarding the valuation of the liability other than that it is consistent with the pricing of a bond and the transaction occurred in the bond markets. Since neither of these conditions is true, alternative means are required to establish the validity of the Market Value formula.

This alternative means will focus in part on the definition of "return" in the Market Value paradigm, or the return that is received by holding and using the insurance contract for the production of income (as in the definition of "economic value"). The return in any given period in the Market Value paradigm equals the asset cash flows minus the liability cash flows, which is derived as follows.

Enterprise value is the market value of assets less liabilities:

$$\text{Enterprise value} = {}^{A}MV - {}^{L}MV$$

Further, the market value is defined as the present value of cash flows, so:

$${}^{A}MV = \sum v^{t}\, {}^{A}CF_{t}$$

$${}^{L}MV = \sum v^{t}\, {}^{L}CF_{t}$$

where v^t represents the suitable discount function appropriate for assets and liabilities, however derived. (This is to be interpreted in a general fashion. There is no implication in this formula that the asset and liability discount rates are equal nor that the rates are constant with respect to time.)

Thus, the enterprise value can be reformulated and generalized as the following:

$$\text{Enterprise value} = \sum v^{t} \left({}^{A}CF_{t} - {}^{L}CF_{t}\right) \qquad (1)$$

where ${}^{A}CF_t - {}^{L}CF_t$ represents the asset and liability cash flows in period t, and the v^t is the discount rate for any given period representing an amalgam of the asset and liability discount rates, whether determined in aggregate or individually for each contract.

This generalized formula shows that the Market Value paradigm defines the economic return in any given period as the asset cash flows less the liability cash flows. This definition of return leads many to describe this approach as valuing the pure cash flows where "pure" means without adjustment for the reserves or required capital, especially without statutory reserves.

5. Paradigm Shift

The arguments against the application of the Market Value paradigm to insurance contracts are many. No single argument stands alone, nor does any single argument completely refute this common viewpoint. Instead, the arguments collectively describe the error in this paradigm and point the way toward the alternative and appropriate approach to valuing insurance contracts and entities.

5.1 The Generalized Form of the Insurance Contract

Academic and textbook references commonly use a newly issued SPDA or GIC contract as exemplary guides in the development and application of finance theory to insurance. The GIC and SPDA contracts are special forms of insurance contracts with cash flow characteristics that conveniently mirror those of bonds. The pattern is a single premium or deposit (cash inflows) with subsequent benefits (cash outflows) that are a function of the initial premium accumulated with interest. In other words, the insurance contracts are represented by either coupon-paying or zero-coupon bonds. The simplicity of these contracts results in easy exposition of the math and financial theory. However, these examples are seriously flawed in two fundamental ways.

The first error is the automatic presumption that bonds and insurance contacts are to be valued in a similar manner simply because they have similar or even identical cash flows. This error is examined further in Section 5.2.

The second error is the generalization of the SPDA or GIC to represent all insurance contracts. The insurance contract in its general form is represented by one or more premiums or deposits and a wide variety of benefit patterns, including many that are not simple accumulations of premiums with interest. The choice of a special and simplified contract for illustration purposes avoids the complexity and problematic situations common to the generalized form. Most notably, these problems include numerical results that cannot be explained by the basic and well-known theory or convention that make the Market Value paradigm so compelling.

Consider the simple example of a one-year contract with a $100 premium paid at inception and an expected claim payment of $65 at the end of one year. The "discount rate" on this contract is –35%, a truly irrational or inexplicable rate relative to the theory developed for the fixed-income markets. Framing this casualty example from the Market Value perspective suggests some flaw or critical omission. Arguably, the omission might be the expense cost, which is now given as $30 at the end of year 1. With this information the discount rate is now –5%, still not rational within the framework of the fixed-income model.

The simple fact is that the fixed-income model, despite its strong theoretical and practical foundation, fails to explain this discount rate. This failure is significant since the discount rate is the critical component of the fixed-income model that differentiates the value of otherwise identical cash flows. Practitioners, especially those calculating liability durations for asset-liability management (ALM) purposes, regularly face computational issues with premium-paying product lines where the issues are inextricably tied to this discount rate problem.

Interestingly, practitioners often face such issues wearing blinders. The issues are thought to be special circumstances related to ongoing premium businesses and frequently are further limited to immature blocks of business where numerical problems are most glaring. The true and full picture is that premium-paying businesses represent the general form of insurance contracts, while single-premium products such as GICs and SPDA represent a special form. The inability of the fixed-income model to rationalize the price of this more general form should cast some doubt on its application to the special forms. Ultimately, it is a logical fallacy to assert that the model/theory is generally correct because it appears to work in a specific situation.

5.2 The Limits of Relative Pricing

Relative pricing is the practice or technique of pricing one item relative to another. It uses the known price of a reference object to value a second or target object. This practice is a core element in finance, especially in the pricing of bonds and other fixed-income securities using spreads relative to Treasuries.

To be valid, relative pricing routines must be applied to objects that are reasonably similar in both their characteristics and the markets in which they are transacted. The fixed-income markets inherently recognize the first requirement by developing spread indices for a large array of varying characteristics. The two primary and most critical differentiating characteristics are maturity (or average life) and credit quality. While these may explain most of the price difference between various fixed-income securities, further distinctions are made for the type of security, with classifications such as unsecured corporate debt, municipals and a wide array of instruments broadly defined as structured securities.

The pricing of fixed-income securities also recognizes differences in markets, typically as liquidity premiums. This premium is realized by a higher spread to Treasuries (compared to corporate bonds) as the inducement for investors to participate in less efficient markets.

This relative pricing practice is regularly extended to the valuation of insurance cash flows and is found in financial literature, risk management practices and increasingly in accounting practices. These areas regularly label the practice “market-consistent pricing” when the liability cash flows are valued relative to fixed-income securities.

The error in this practice is readily apparent on reflection. Insurance contracts are not similar to fixed-income securities in either their characteristics or the markets where they are transacted. The fact that each is a financial instrument with expected (although uncertain) cash flows is not sufficient to satisfy the reasonable similarity requirement. Instead, there is a host of differences, each with significance at least as great as those measured and categorized for fixed-income securities. For example, a significantly higher cost structure is associated with the creation (manufacturing) and issuance of an insurance contract, where the agent commission alone may be 10% to 15% of the transaction price. Equally significant is the requirement to hold assets (collateral) to back not just the contractual liability but also some level of additional surplus as enhanced security for the insured. Further differences emerge from features that have no counterpart in fixed-income securities, most notably from insurance contingencies such as mortality and morbidity.

In short, there is no foundation to support the practice of valuing the insurance contract as the present value of its cash flows discounted at a rate from the fixed-income markets. Labeling this value “market consistent” is a misappropriation of the term, as the calculation produces consistency with a vastly dissimilar object sold in a vastly dissimilar market. The issue to be considered, however, isn’t the labeling per se, but the resulting consequences when the chosen valuation method proves to be contrary to economic value.

5.3 The Insurance Markets

There are several markets for insurance contracts. These include institutional capital markets, individual consumer markets, large group insurance markets and the M&A markets that transact either entire organizations or blocks of in-force contracts. The insurance markets operate in ways that are vastly different than those of bond and financial capital markets. Among these differences are the regulatory framework, the pricing and manner that transactions settle and the level of transparency. This lack of transparency creates disagreement or confusion in the approach to determining the economic value of an insurance contract or enterprise. Despite the lack of transparency, there is no lack of understanding of the nature of these markets.

The regulatory requirements in the insurance markets are vastly different than those in the markets for bonds and other financial instruments. These regulations carry obligations, most significantly the need to hold reserves and capital. Interestingly, few deny that there is a cost to capital, yet these costs are ignored in economic value models based on pure cash flows.

It is also notable that insurance contracts settle in the secondary markets in an amount equal to the statutory reserves. In other words, entities discharge their liabilities by a payment of assets (cash or investments) with a market value equal to the statutory reserves. Thus, the statutory reserve should be deemed market value, as it represents the cost to settle the short position represented by the insurance contract.

Pricing in the insurance markets is uniformly performed in the Distributable Earnings framework. As will be described further, this framework prices financial contracts characterized by the requirement to hold reserves and other capital in support obligations. The framework recognizes these amounts as required capital and values the cost of capital intrinsically to the contract. This framework represents market-consistent pricing of insurance contracts across each of these markets.

5.4 The Market Value Paradox

Assume an entity issues a short coupon-paying $10,000 contract maturing in five years, then uses the proceeds to immediately purchase a five-year coupon-paying bond at par.

Has the entity created value? If not, why not? If so, how much, or alternatively, how is the value determined?

Answer 1: No, value is not created.

Rationale: This answer is consistent with general financial theory underlying market value pricing, especially the theory that efficient markets preclude the possibility of risk-free arbitrage. It is also consistent with the observed and very real net market value transaction price of $0.

Paradox 1: How does an insurance entity create value if its contract is viewed as the short position of a financial instrument such as a bond, when this view is the essence of the Market Value paradigm?

Answer 2: Yes, value is created. The value function is in the form of the present value of cash flows.

Rationale: Although not specified in the question, it is reasonable to assume a positive spread between the coupons on the long and short positions. This positive spread gives rise to non-zero value.

Paradox 2: How is the non-zero value deemed market consistent given the observed and very real market value net transaction price of $0?

This simple example and its paradoxical questions lead to a host of analyses that ultimately yield no consistency within the Market Value framework.[3] The clear and simple reason for the inconsistency is that the Market Value framework is the wrong approach to valuing an insurance contract or entity.

The insurance contract is a manufactured product that is designed and priced to create value on sale. Value is created on transactions in the insurance markets just as value is created or realized when other manufactured products are sold in their respective markets. Relative pricing and arbitrage represent the underlying premise of the theory underlying the pricing of fixed-income and capital market financial instruments such as options. These pricing models fail, as demonstrated by the preceding example, because they hold no place in their application to other financial instruments such as insurance contracts.

5.5 Distinguishing Characteristics: Inseverable Obligations

The holder or investor in a bond is free of any obligations with respect to that ownership. On the other hand, the “owner” of an insurance liability is the issuer of a security that contains a host of responsibilities that can’t be severed from the contract. These include the significant responsibilities to administer and service the contract and the statutory and contractual requirements to maintain reserves and capital to support the obligations.

Recognition of these inseverable obligations may be as easy as adjusting the cash flow stream for the expense of administering and servicing the contract. Beyond this relatively simple adjustment, the Market Value approach does not recognize (and is incapable of

[3] Discussion of the paradoxes is shortened for the sake of brevity.

recognizing) the reserve and capital requirements and the interaction of these requirements with the asset and liability cash flows.

These inseverable obligations are the critical distinguishing characteristics between insurance and other financial contracts. The obligations arise from the regulated nature of insurance contracts, which is wholly different than the contracts in other financial markets with their own distinct set of rules and regulations. The requirement to hold a reserve and capital transforms the very nature of the insurance contract into more than a simple series of cash flows. As a result of the transformation, the insurance contract cannot readily or simply be valued relative to bonds and financial instruments that transact in non-insurance markets.

5.6 The Paradigm: A Capital Project

On the surface, there is little difference between an investment of a specified amount in the purchase of a bond and an equal amount invested to purchase or issue and capitalize an insurance contract. Both represent cash flows invested with the expectation of a return, including a return of the investment. Both carry risk, even the possibility of complete loss. But this is where the similarities end.

The insurance contract is the finished product that results from a manufacturing process. As with most other manufacturing projects, this process must be regarded as a “capital project,” defined as an endeavor requiring significant investment of both financial and labor capital. The initial capital investment required to manufacture an insurance contract includes the effort to design and price the product as well as to develop the administration systems required for issuance and servicing. The financial capital comprises the expenses, reserves and statutory capital in excess of the premiums collected at the time of issuance. The manufacturing process itself is the transformation of the cash received in the form of premiums and financial capital into the cash that is paid as benefits. This transformation uses investments such as bonds as the critical raw materials used to produce the final, finished product of the promise and fulfillment of future payments.

The economic value of a capital project is the value it creates after considering all its cost components. The value created by General Motors in producing and selling a new car is not the final transaction price less the cost of the raw materials used in production. The value calculation must include the capital costs required to design the vehicle and build the manufacturing plants, all of which occur prior to assembling the very first vehicle. Unlike an automobile, however, the manufacturing and capital costs (especially the reserve and capital requirements) of an insurance contract do not cease at the point of sale but are ongoing through the life of the contract, ending only at its termination or maturity. The Market Value approach ignores these costs by assigning value solely to the asset cash flows (the raw material) and liability cash flows (the finished product).

5.7 The Hurdle Rate as the Discount Rate

Businesses evaluating capital projects use hurdle rates to discount and value future cash flows. The “hurdle rate” is defined as the minimum rate of return required for an investor to engage in a project. The value of the project is then defined as the present value of the capital flows discounted at the hurdle rate. This rate is unique to each firm even though there are common approaches to its development. It need not be constant within a company but instead may vary with each project to incorporate the relative cost of risk and perhaps the cost of capital or financing. The hurdle rate is likely to be higher than the cost of capital, given limits on either the availability of capital or the entity's ability to put the capital to work. This rate generally lacks transparency even though it may be disclosed by some firms such as publicly traded companies, possibly as their goal for return on equity.

Generally however, both financial theory and real-world practice understand hurdle rates to be higher than corresponding rates in the fixed-income markets for comparable risks. This excess required spread is due to the additional effort required of a capital project over transactions in the bond markets. Consider, for example, a financial project requiring investment of a specific amount that is designed to be risk free and having a return on investment—after considering all expenses of the project—that is equal to the risk-free rate. Few investors would choose to expend the effort to undertake the project if the same return were available for no effort beyond a call to a broker to purchase a Treasury security. This rationale leads to pricing and valuation of capital projects at discount rates well in excess of the yields available from the fixed-income markets.

While the fixed-income markets provide some reference for minimum hurdle rates, there is no such reference for the maximum. Investors in capital projects certainly set no limits on the return they would accept as if it were a gift for the taking. Instead, the hurdle represents the rate sought by investors as an inducement to engage in the project, considering their labor and financial capital. Increasing the hurdle rate while the other cost elements remain constant will force investors to raise prices (e.g., premiums) or lower their bid (e.g., in M&A markets). The hurdle rate's link to price is its limiting factor in competitive markets. In more than 30 years of pricing of life, health and annuity business for both direct sales and M&A markets, the first author of this paper has observed minimum hurdle rates ranging from 12% to 15%. This range has always represented spreads well more than fixed-income market rates, with the differences from about 400 basis points to as much as 1,000 basis points. Such differences in discount rates create huge disparities in discounted present values, reasonably implying significant differences in Distributable Earnings valuations compared to the Market Value approach.

6. The Distributable Earnings Framework

Distributable Earnings models are used extensively in actuarial work, especially in pricing, embedded value and appraisal analyses. These models are uniformly constructed using statutory reserves to develop the distributable earning. This section defines the Distributable Earnings framework as a generalized method, not strictly related to statutory reserving, to recognize the true purpose of the statutory reserve in actuarial analyses. The generalized definition also leads to recognition of other appropriate uses of the method (e.g., capital projects outside the actuarial or insurance worlds) and instances where the statutory reserve is not the appropriate basis to define the distributable earning.

This section also presents a new method to reconcile Market Value to Distributable Earnings, with a conceptual interpretation that emphasizes the fundamental differences between these methods. It also explains the reason value additivity is not a characteristic of the Distributable Earnings method. Finally, it describes the dual nature of distributable earnings as cash flows that both define value and require immunization (i.e., in duration management or cash flow matching programs).

6.1 Definition

Distributable Earnings is a general pricing and valuation framework for financial organizations or projects. Value in this framework is based on capital flows invested in or returned from the project or entity. These capital flows or distributable earnings equal the income from the project adjusted by the reserve or financial capital provision.

Distributable Earnings framework values projects that are required to hold amounts in reserve. Such reserve restrictions are common in finance and take a variety of forms. The most common for insurance enterprises comprises the reserves and capital held to ensure payment of the obligations. Similar restrictions are found in reinsurance agreements, wherein assets supporting the reserves must be placed in trust accounts as an additional level of security beyond the general promises of the reinsurer. Another common form found in borrowing agreements is collateral required to be held in specifically designated accounts. Regardless of the exact form, it is noteworthy that the reserve or collateral requirements are specified not just by statutory regulation but often by the contract itself. Whether by contract or regulation, these obligations are mandatory for the issuer to engage and/or remain in business.

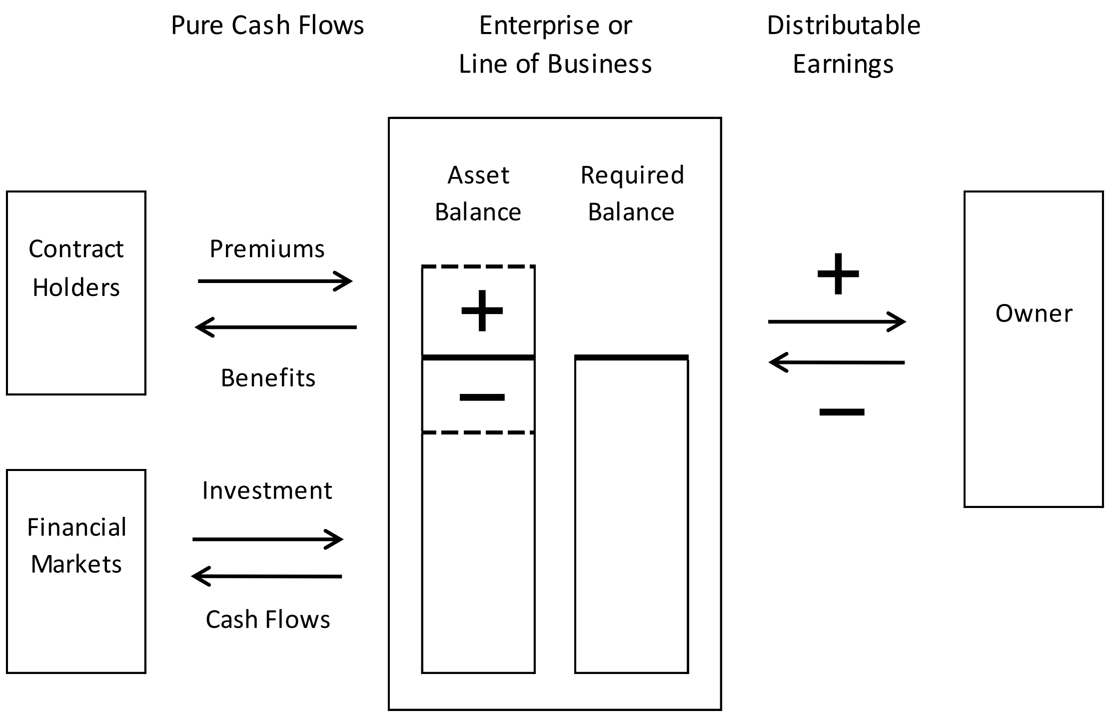
The common element in these financial agreements is the obligation to hold assets of a specified amount in support of the contracts. We refer to such amounts as the "required balance" to recognize their general and mandatory nature and the fact that these amounts include but are not limited to statutory requirements. The Distributable Earnings framework does not define the required balance but instead recognizes it as the limiting factor on the capital flows that may be distributed *to* the owner or required *from* the owner to fund or maintain the financial project or enterprise. In some situations, multiple sources may prescribe a required balance. The general framework recognizes the most restrictive set of requirements, which we term the "controlling constraint."

The controlling constraint defines not just the amount to be held but the basis on which the amount is valued. For example, a funding agreement may require that collateral be held as a specified percentage of the borrowed amount and that assets held as collateral be valued at market. Satisfying the controlling constraint ensures that all requirements are met, and in this regard the "distributable earning" can be described as the maximum amount that is freely distributable as a return to the owner.

The distributable earning in any period equals the value of the accumulated assets less the required balance. If positive, the excess is distributed to the owner or issuer of the contract, who then may freely use the distribution in any manner. If negative, the owner or issuer of the contract must contribute capital to correct the deficiency.

The distributable earnings mechanism is depicted in Figure 1. The enterprise or line of business is shown in the center of this figure and represented by its asset and required balances. Cash transactions with its customers (premiums and benefits) and financial markets (new investments and cash flows from existing assets, including sales) are depicted on the left. These cash transactions are the pure cash flows valued by the Market Value paradigm and are transformed into bonds and other assets that accumulate in the enterprise to form the asset balance.

Figure 1. Transformation of Pure Cash Flows into Distributable Earnings



Notes:
Pure cash flows = the benefits/premiums to or from the contract holders and the investment cash flows to or from the financial markets.
Distributable earnings = the capital flows to or from the owner.
Asset balance = the accumulated pure cash flows, valued according to the controlling constraints.
Required balance = the amount of assets that must be held, determined by contractual or regulatory constraints.
+ indicates accumulated assets in excess of the required balance (i.e., capital flows to the owner).
– indicates accumulated assets deficit to the required balance (i.e., capital call on the owner).

The required balance is the amount of assets that must be held and is defined by the controlling constraints—however or wherever these constraints may arise (contractually, by regulation or by operating practices). Assets that have accumulated in excess of this requirement, represented by the plus symbol, may be distributed and freely deployed by the owner of the enterprise. A required balance in excess of the asset balance, represented by the minus symbol, is a deficiency that must be cured by a capital contribution from the owner.

Whether positive or negative, the distributable earning may be viewed as the balancing item or amount that brings total assets to the required balance. The required balance is the gating mechanism that transforms the cash flows on the left side of the diagram to the distributable earnings on the right. The gating mechanism is the fundamental difference in the definition of "return to owner," separating the flows on the two sides of the diagram and separating the Market Value paradigm from the Distributable Earnings framework.

The framework discounts the distributable earnings at the hurdle rate specified by the entity. Most financial endeavors require some form of capital investment, typically at the inception of the project and characterized in this model as a negative distributable earning. Valuing the capital flows at the hurdle rate determines whether the project provides more value than this initial cost (i.e., if the present value of subsequent capital flows exceed the initial cost). Internal rate-of-return calculations on the series of capital flows determine the return on invested capital and can inform decisions on the best use of capital.

The framework is both divisible and scalable, meaning it can value a single contract, a block of contracts or an entire company. This leads to consistency in the capital decision process between micro- and macro-level planning. For example, a Distributable Earnings model used to price a specific product can also be used to value a given amount of production of the product. The micro pricing model in this situation is scaled to the level of production to facilitate capital budgeting or value-added measurements, all within a consistent modeling and valuation framework.

6.2 Reconciling Market Value to Distributable Earnings

The two basic components of economic value are the definition of return (i.e., cash to be realized) and the choice of discount rates. The rationales for the discount rates used in the competing models were discussed in Sections 4.1 and 5.7. Each choice is understood in finance and shown to be appropriate for its specific purpose.

The difference in the definition of return is seen in Figure 1 to arise from the gating mechanism, which is the required balance. This difference can also be derived by formula, using accounting terminology since the determination of earnings is by convention an accounting exercise. However, it must be interpreted in a generalized manner, meaning that the accounting must be done according to the controlling constraints. Specifically, statutory accounting is not implied by the following terminology.

At each measurement period, distributable earnings are defined as:

$$DE_t = \text{Income}_t - \Delta TS_t \quad (2)$$

Where Income_t is the after-tax income, and ΔTS_t is the change in target or required surplus.

Income is generally defined as cash received net of amount paid, plus or minus the change in accruals:

$$\text{Income}_t = {}^{A}CF_t - {}^{L}CF_t + \Delta^{A}BV_t - \Delta Res_t \qquad (3)$$

Where ${}^{A}CF_t$ and ${}^{L}CF_t$ represent the cash flows of the assets and liabilities, respectively; $\Delta^{A}BV_t$ represents the change in the value of the assets; and ΔRes_t represents the change in the reserve—both of the latter defined according to the controlling constraints. Consistent with these definitions, the required balance at time t is represented by the sum of Res_t and TS_t.

Substituting (3) into (2) and rearranging the terms gives the following:

$$DE_t = ({}^{A}CF_t - {}^{L}CF_t) + (\Delta^{A}BV_t - \Delta Res_t - \Delta TS_t) \qquad (4)$$

Referencing the definition of economic value, the Distributable Earnings framework defines the return in any period as the net of the asset and liability cash flows adjusted by the difference between the change in the value of the assets and required balance. The difference in the return in any period between Market Value and Distributable Earnings is then (4) – (1):

$$(\Delta^{A}BV_t - \Delta Res_t - \Delta TS_t) \qquad (5)$$

If negative, this difference reflects a holdback of cash flows and/or a capital call necessary to satisfy the contractually required asset balance. If positive, it reflects the release of the reserves or capital to be used to fund contractual cash flow needs and/or capital distributions.

Having examined the differences between the discount rates and definitions of return, the resulting differences in the numerical valuations can be examined conceptually with algebraic equivalences (see also the numerical illustration of these relationships in Section 7). The first interpretation can be formulated as follows:

$$\begin{aligned} &{}^{A}MV_0 - {}^{L}MV_0 \\ &- {}^{L}\text{Revalued}_{@Hurdle} \qquad (6) \\ &- \text{Cost of capital} \\ &= \text{PVDE (present value of distributable earnings)} \end{aligned}$$

Where ${}^{A}MV_0 - {}^{L}MV_0$ represents the asset and liability market values at time 0. ${}^{L}Revalued_{@Hurdle}$ represents a revaluation of the liability cash flows to the hurdle, or the difference in present value of the liability cash flows at the hurdle and market rates. Finally, Cost of capital is $-\sum v^t \Delta ReqBal_t + \sum v^t i\ ReqBal_{t-1}$, or the negative present value of increases in the required balance, plus the present value of investment income earned on assets backing the required balance (at the yield rate i), discounted at the hurdle rate.

Note that this cost of capital derivation is the same as the one commonly used in appraisal work, except that this reconciliation defines capital as the entire required balance rather than just target surplus.

In concept, this reconciliation shows that the distributable earnings value equals market value with an adjustment to revalue liability cash flows from the market rate to the hurdle, plus a cost of capital adjustment where "capital" is defined as the entire required balance. This reconciliation is intuitively appealing because the required balance is a capital requirement, and the world of finance uniformly recognizes that capital has a cost. Further, the revaluation of liability cash flows is no more than the discount rate difference as applied to the liability value. Finally, the asset value is seemingly unchanged.

The second interpretation can be formulated as follows:

$$\begin{aligned} &{}^{A}MV_0 - {}^{L}MV_0 \\ &- {}^{L}Revalued_{@Hurdle} \\ &+ {}^{A}Revalued_{@Hurdle} \\ &+ {}^{A\ TRANS}Revalued_{@Hurdle} \\ &= PVDE \end{aligned} \tag{7}$$

Where ${}^{A}Revalued_{@Hurdle}$ represents a revaluation of the existing asset cash flows (including sales) to the hurdle, or the difference in present value of the asset cash flows at the hurdle and market rates. ${}^{A\ TRANS}Revalued_{@Hurdle}$ represents a revaluation of all asset transactions (reinvestment activity) to the hurdle, or the difference in present values at hurdle and market rates of the cash flows of newly purchase assets, including both the cost at purchase and subsequent asset cash flows.

This equation is very similar to this first, but it yields an entirely new interpretation to the cost of capital, which now equals the revaluation to the hurdle rate of the existing assets and all future investment activity. Notably, this equivalence of the cost of capital to the revaluation of the assets is a fundamental conceptual relationship, not just an algebraic equivalence. In other words, the year-by-year components of the cost of capital do not sum to the components of the asset revaluation, so the relationship is not an algebraic tautology (demonstrated in Table 4 in Section 7). With some reflection, it is seen that the

PVDE can be expressed in a balance sheet relationship as equal to an asset value less a liability value. This suggests value additivity (as previously described), but value additivity is not a reasonably workable construct in the Distributable Earnings framework (especially if it requires both assets and liabilities to be revalued to the hurdle rate; see also Section 6.4).

In summary, the reconciliation shows that the differences in value between these models arise from each of the two core components of economic value. Given these differences, one should reasonably expect significant differences in valuation results. Understanding this expectation, practitioners and academics alike must consider whether two distinctly different models are equally valid and interchangeable, and if not, which of the two better represents economic value.

6.3 Fundamental Differences in the Approaches

Careful consideration of the components of the reconciliation reveals that the two approaches are not equivalent, contrary to the conclusion in Girard (2000). Two assumptions must be set equal in these approaches if they are to produce identical results, but these assumptions represent the fundamental difference between Market Value and Distributable Earnings, and they are never the same.

The first of these assumptions is the discount rate. While it is true that a market rate may be used to discount distributable earnings, the general framework recognizes the hurdle rate as the appropriate rate for valuing capital projects, and this rate is uniformly higher than market rates. Market Value proponents would never accept the hurdle rate as the appropriate discount rate; Distributable Earnings proponents would never accept the market rate.

The second assumption is that future investment activity (sales and reinvestments) must be identical. The Distributable Earnings framework defines the balance that must be maintained, and the future investment activity is determinable once given a set of on-balance sheet investments and investment strategy. The Market Value paradigm rejects the concept of a required balance, instead assigning value only to the existing asset and liability cash flows. This paradigm does not demand future investment activity, such as to cure an A-L cash flow mismatch. Further, future activity is intrinsically valued at zero in the Market Value paradigm.

In sum, the reconciliation of values demonstrates these two approaches to be immutably different, and no choice of assumptions appropriate to each method will cause the values to converge.

6.4 Distributable Earnings: Absence of a Defined Balance Sheet

Most valuation frameworks assert value-additivity by defining an asset value separately from the liability value, with the difference equaling the net value of the enterprise or project. In some instances such delineation may be deemed necessary, such as for accounting purposes when a balance sheet must be presented.

Distributable Earnings defines neither an asset value nor a liability value but instead defines only a single net value (i.e., the present value of distributable earnings). The framework relies on the controlling constraint to define both the required balance and the basis for valuing the assets that satisfy this requirement. It also relies on market consistency in valuation to the extent that market transactions are projected and modeled, but the framework does not otherwise define how to model this consistency.

The absence of defined asset and liability values within this framework proves inconvenient wherever the concept of value derives from the difference between the assets and liabilities. Recognition of distributable earnings as the basis for value in risk management processes, accounting systems and many other frameworks will most certainly require some attribution of the value, either to create the balance sheet or to fit a preconceived view that net value must equal assets less liabilities.

Unfortunately, such attributions are most likely to fail or be convoluted and incomprehensible at best. This expectation is most easily understood by turning to the example of an automobile for analogy. With the automobile and insurance contract alike, it is a simple and common proposition to define the value as the sum of the values of component parts. As is well known (and especially well understood immediately after completing repairs on a car), the sum value of the individual parts in an automobile vastly exceeds the value of the vehicle as a whole. This is true whether the vehicle is new or used, and whether the parts are new or used. Further, the equivalence in value is unlikely to be established regardless of whether the components are valued at market value or commodity value.

The error in valuing an automobile as the sum of its parts arises not in the arithmetic but in the construction that demands separate identification and valuation of its components. The true value of the automobile is to be determined only by taking it as a whole. The deconstruction to components implies not just that they have value separately and apart from the whole (which they might), but that the whole can function (or exist) without the one or several parts (which it can't). It also implies that the value of a single part equals the diminution in value of the whole after that part has been removed. For example, the value of the steel in the vehicle can readily be determined by transactions in the commodity markets. But removal of the steel from the automobile changes its nature and would destroy value by an amount far in excess of the value of the steel. Thus the remainder value (i.e., the value of the vehicle less the value of the steel) is meaningless. Despite the information content in the listing of the components and their values, it is extremely difficult to attribute the value of the whole to its parts.

This automobile analogy applies to the valuation of insurance or other financial contracts having a required balance. The assets required to be held in support of the obligations typically have value that is readily determinable in the markets. However, the assets cannot be completely removed without destroying the contracts or enterprise value in the same way that an automobile is destroyed by removing the steel. The Distributable Earnings framework recognizes the inseverable nature of the assets and liabilities and values the whole without intrinsically valuing the components. Attempts to deconstruct value in this framework by independently valuing the assets and/or liabilities will inevitably yield some residual value. As with the automobile, this residual may have some conceptual appeal, but it has no practical utility. Specifically, it is an error within the framework to assert that the "liability market value" equals the asset market value less the PVDE.

6.5 The Distributable Earnings Cash Flow

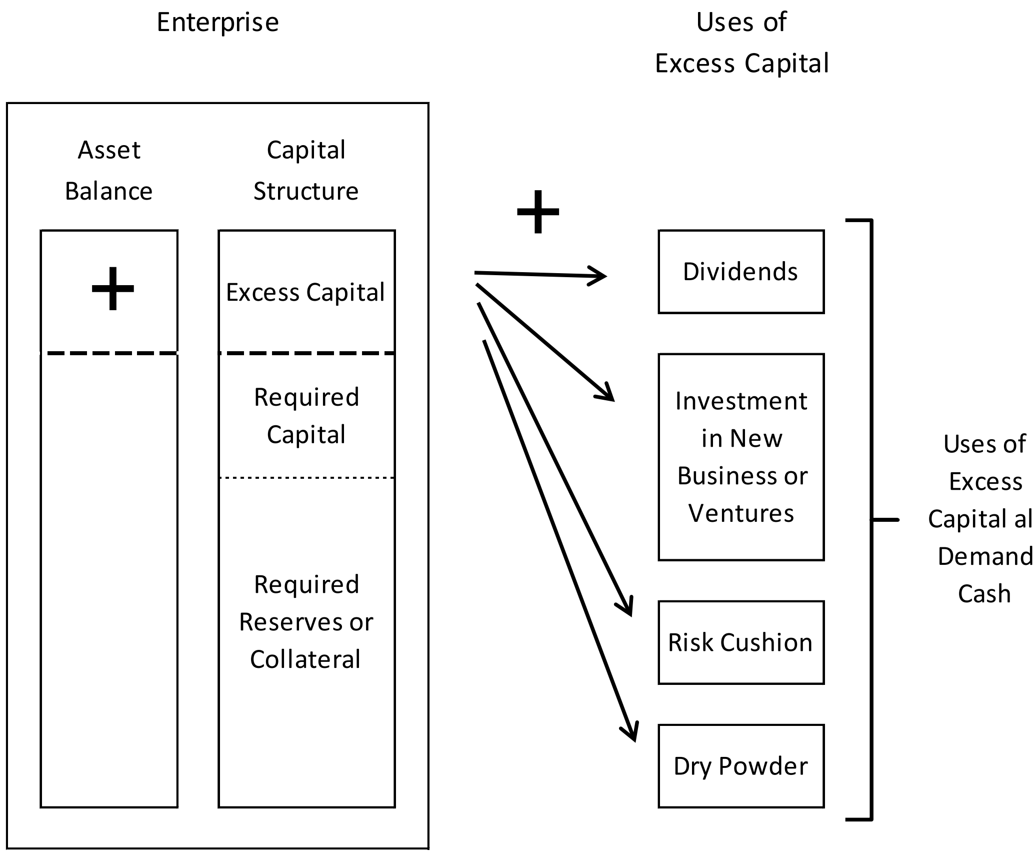
The description of the framework is not complete without defining the nature of the distributable earning, which is a cash flow that must be treated as any other cash flow in modeling for valuation and risk management purposes. This important concept may be familiar to professionals who are well versed in modeling distributable earnings, especially those who work with commercial actuarial asset-liability projection platforms. But this concept may be difficult to grasp, or it may seem that the distributable earning cash flow is not equivalent to an asset cash flow or premiums and policyholder benefits.

One difficulty is the visualization of the distributable earning as "paid to" or "received from" the owner of the enterprise, since rarely are these amounts actually paid out or received in full. Stock companies have clearly defined owners, and it is easy to see the capital flows to and from the shareholders. Mutual companies and fraternal organizations have clearly defined policyholders and members, but dividends rarely equal earnings. Some organizations may calculate the capital flows to and from lines of business or business units, but this is not a universal practice. The absence of these data points in an organization's financial statements makes it even harder to see the distributable earning as a cash flow.

The key to resolving these conceptual difficulties is in recognizing that distributable earnings comprise a framework or model of how to value an enterprise based on the capital flows required by or available to be released from the operation. This model is distinct, albeit not divorced from how the organization chooses to manage or display its capital flows.

The fact that capital is accumulated rather than paid out is not a violation of the model but an integral component. Most organizations have capital management processes that plan and manage the sources and uses of capital, and most operate with excess capital as depicted in Figure 2. The excess capital may accumulate from external sources such as from the capital markets (e.g., shareholders) or from internal sources. Internal sources in this framework release earnings as capital that is no longer required in support of the business (i.e., distributable earnings). The excess capital is then freely available for any use—whether external, such as dividends to shareholders or mutual company policyholders, or internal, such as funding for new business or ventures. Often the excess is held as "dry powder," meaning it is held for some unspecified future use. The framework values the assets backing the excess capital at market or consistent with their utility as cash.

Figure 2. Excess Capital from Distributable Earnings



The fact that the distributable earning is cash is established by how it must be valued and subsequently used. The value assigned to the distribution must equal both the return attributed to the project and the value assigned to its subsequent usage, meaning there must be an equal view of value. For example, one would not state that a project returned $100 if the owners or recipients actually received $90, $110 or any amount other than $100. Further, the $100 must be freely deployable for other uses without any encumbrance. Since cash is the only freely deployable medium, any other form of distribution or return from the project must be converted to cash. The conversion may carry a cost or other burden that must be assigned to the project; otherwise, the initial requirement—equal view of value—is violated.

In summary, the distributable earning must be modeled as a cash flow to ensure appropriate valuation of the return to the owner of the financial instrument. This modeling treatment does not depend on the specific operational practices of the company, whether it pays dividends or retains the earnings, or whether it actually performs the distributable earnings calculation. Risk management modeling must treat the distributable earning as a cash flow on par with all other cash flows, not just to assign appropriate value, but also to recognize the incidence of any cash flow mismatch risk. Thus the distributable earning has a dual nature as both the object of risk management (i.e., the value to be managed) and an element that gives rise to risk (e.g., a cash flow that gives rise to interest rate risk).

7. Illustration of the Distributable Earnings Framework

The primary arguments for Distributable Earnings do not rely on numerical outcomes. Illustrating the differences between two modeling approaches can do nothing to support one approach over the other unless there is a known and certain correct outcome. Thus the goal of this example is simply to demonstrate the basic Distributable Earnings formulas and the relationships between the income statement, balance sheet and cash flows. The example also includes the reconciliation to market value in order to illustrate the concepts presented in Section 6.2. The example uses a contract with continuing premiums to illustrate the problems in applying textbook finance to the general form of insurance. We make no attempt to examine or resolve these problems (as in Reynolds and Wang 2007) and these are left for further study.

Table 1 presents the primary income and balance sheet projection results from the pricing of a simplified projection of a casualty-like contract with each premium representing a one-year coverage term. Premiums renew annually with an 85% persistency, and the combined (undiscounted) loss/expense ratio is 95%. The projection is simplified by assuming a constant, level 6% market yield, thus producing a 6% yield on invested assets and zero gain/loss on sales of investments. The hurdle rate is assumed to be 12%. All cash flows occur annually, and the tax rate is set to 0% in this example. A complete listing of assumptions is presented in the table notes.

Table 1. Projection Results Using the Distributable Earnings Framework

	Liability Cash Flows				Balance Sheet					Income and Distributable Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Time	Premiums	Benefits	Expenses	Net	Assets	UEP Reserve	Claim Reserve	Required Surplus	Required Balance	Investment Income	Pre-tax Income	DE
0	10,000	—	3,000	(7,000)	12,500	10,000	—	2,500	12,500	—	(3,000)	(5,500)
1	8,500	1,300	2,550	(4,650)	15,669	8,500	4,719	2,450	15,669	750	2,181	2,231
2	7,225	2,405	2,168	(2,653)	17,251	7,225	7,619	2,408	17,251	940	1,968	2,010
3	6,141	3,344	1,842	(955)	17,440	6,141	8,928	2,371	17,440	1,035	1,764	1,800
4	5,220	4,143	1,566	489	16,399	5,220	8,839	2,341	16,399	1,046	1,568	1,599
5	4,437	4,821	1,331	1,715	14,264	4,437	7,513	2,315	14,264	984	1,377	1,404
6	3,771	4,098	1,131	1,458	12,125	3,771	6,386	1,967	12,125	856	1,190	1,538
7	3,206	3,483	962	1,239	10,306	3,206	5,428	1,672	10,306	727	1,012	1,307
8	2,725	2,961	817	1,053	8,760	2,725	4,614	1,421	8,760	618	860	1,111
9	2,316	2,517	695	895	7,446	2,316	3,922	1,208	7,446	526	731	944
10	—	2,139	—	2,139	3,868	—	3,333	535	3,868	447	1,212	1,885
11	—	1,562	—	1,562	2,295	—	1,904	391	2,295	232	99	243
12	—	1,072	—	1,072	1,177	—	909	268	1,177	138	62	184
13	—	655	—	655	453	—	290	164	453	71	34	138
14	—	301	—	301	75	—	—	75	75	27	16	104
15	—	—	—	—	—	—	—	—	—	5	5	80

Assumptions and relationships:
(1) Premiums = 85% annual persistency, terminating after 10 years.
(2) Benefits = 65% undiscounted benefit ratio, paid over 5 years.
(3) Expenses = 30% of premium.
(4) Net = –Premiums + Benefits + Expenses, or –(1) + (2) + (3)
(5) Assets = Required Balance (9).
(6) UEP Reserve = Unearned Premium Reserve (100% of premium at time of payment, $0 at end of 1-year term.
(7) Claim Reserve = discounted value of incurred claims, 4% discount rate.
(8) Required Surplus = 25% of premium + 25% of paid claims in prior year, or 25% * (1) + 25% $(2)_{t-1}$.
(9) Required Balance = UEP Reserve + Claim Reserve + Required Surplus, or (6) + (7) + (8).
(10) Investment Income = 6% yield on Assets, or 6% * $(5)_{t-1}$
(11) Pre-tax Income = Net Liability Cash Flows + Investment Income – ΔReserve, or (4) + (9) – Δ(6) – Δ(7).
(12) DE (distributable earnings) = Pre-tax Income * (1 – tax rate) – ΔRequired Surplus, or (10) * (1 – tax rate) – Δ(8).

Table 2 presents the investment activity arising from a strategy where available cash flows are invested in three-year par coupon bonds, where the three-year maturity represents the "average life" of the claims payout after each premium. Investment sales, if required, are from the bonds with the shortest remaining maturities.

Table 2. Cash Flows/Investment Activity with Specified Investment Strategy

	Liability Cash Flows						Investment Activity		Schedule of Bond Maturities		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Time	Asset Maturities	Investment Income	Total Asset CFs	Liab CFs (incl Tax)	DE Cash Flow	Net Cash Flow	Net Assets to Invest	Net Assets Sales	3 yr to Maturity	2 yr to Maturity	1 yr to Maturity
0				(7,000)	(5,500)	12,500	12,500	—	12,500	—	—
1	—	750	750	(4,650)	2,231	3,169	3,169	—	3,169	12,500	—
2	—	940	940	(2,653)	2,010	1,582	1,582	—	1,582	3,169	12,500
3	12,500	1,035	13,535	(955)	1,800	12,689	12,689	—	12,689	1,582	3,169
4	3,169	1,046	4,215	489	1,599	2,128	2,128	—	2,128	12,689	1,582
5	1,582	984	2,566	1,715	1,404	(553)	—	553	—	2,128	12,137
6	12,137	856	12,993	1,458	1,538	9,997	9,997	—	9,997	—	2,128
7	2,128	727	2,855	1,239	1,307	309	309	—	309	9,997	—
8	—	618	618	1,053	1,111	(1,546)	—	1,546	—	309	8,451
9	8,451	526	8,977	895	944	7,137	7,137	—	7,137	—	309
10	309	447	756	2,139	1,885	(3,269)	—	3,269	—	3,868	—
11	—	232	232	1,562	243	(1,573)	—	1,573	—	—	2,295
12	2,295	138	2,433	1,072	184	1,177	1,177	—	1,177	—	—
13	—	71	71	655	138	(723)	—	723	—	453	—
14	—	27	27	301	104	(378)	—	378	—	—	75
15	75	5	80	—	80	—	—	—	—	—	—

Assumptions and relationships:
(1) Asset Maturities = $(11)_{t-1}$.
(2) Investment Income= Table 1, item (10).
(3) Total Asset Cash Flows = (1) + (2).
(4) Liability Cash Flows (including tax) = Table 1, item (4).
(5) Distributable Earnings Cash Flow = Table 1, item (12).
(6) Net Cash Flow = (3) – (4) – (5).
(7) Net Assets to Invest = (6) if positive.
(8) Net Asset Sales = –(6) if (6) is negative.
(9) 3 Years to Maturity = (7).
(10) 2 Years to Maturity = $(9)_{t-1}$ less any sales needs not satisfied by available shorter term bonds.
(11) 1 Year to Maturity = $(10)_{t-1}$ less sales.

Tables 3 and 4 present and summarize various data from Tables 1 and 2 to illustrate the concepts discussed here. Table 3 summarizes the cash accumulated at the end of each period from the liability and asset cash flows prior to any investment activity and the distributable earnings cash flow [items (1) - (4)]. This amount is combined with the invested assets remaining at the end of the period to create the asset balance prior to the distributable earning cash flow [items (5) – (6)]. The asset balance is then compared to the required balance (7) to determine the distributable earning (8).

Table 3. Concept: Balancing Assets to the Required Balance

	Accumulated Cash plus Invested Assets prior to Distributable Earnings							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time	Liability CFs	Asset Maturities	Investment Income	Accumulated Cash	Invested Assets	Total Asset Balance	Required Balance	DE
0	(7,000)	—	—	7,000	—	7,000	12,500	(5,500)
1	(4,650)	—	750	5,400	12,500	17,900	15,669	2,231
2	(2,653)	—	940	3,593	15,669	19,261	17,251	2,010
3	(955)	12,500	1,035	14,490	4,751	19,241	17,440	1,800
4	489	3,169	1,046	3,727	14,272	17,998	16,399	1,599
5	1,715	1,582	984	851	14,817	15,668	14,264	1,404
6	1,458	12,137	856	11,535	2,128	13,662	12,125	1,538
7	1,239	2,128	727	1,616	9,997	11,613	10,306	1,307
8	1,053	—	618	(435)	10,306	9,871	8,760	1,111
9	895	8,451	526	8,081	309	8,390	7,446	944
10	2,139	309	447	(1,383)	7,137	5,754	3,868	1,885
11	1,562	—	232	(1,330)	3,868	2,538	2,295	243
12	1,072	2,295	138	1,361	—	1,361	1,177	184
13	655	—	71	(585)	1,177	592	453	138
14	301	—	27	(274)	453	179	75	104
15	—	75	5	80	—	80	—	80

Assumptions and relationships:
(1) Liability Cash Flows = Table 1, item (4).
(2) Asset Maturities = Table 2, item (1).
(3) Investment Income = Table 2, item (2).
(4) Accumulated Cash = (1) + (2) + (3).
(5) Invested Assets = Table 2, items (9) + (10), from time t – 1 (i.e., prior year end).
(6) Total Asset Balance = (4) + (5), or the balance prior to investment activity.
(7) Required Balance = Table 1, item (9).
(8) Distributable Earning = (6) – (7).

Table 4 presents the detail and present-value calculations to illustrate the two reconciliation approaches described in Section 6.2. The liability cash flows and the revaluation from the 6% market discount rate to the 12% hurdle rate is shown in column (1). The revaluation of the assets existing at time 0 is shown in column (2). The revaluation of future investment activity [excluding existing assets in column (2)] is summarized in column (7) from the supporting detail in columns (3) through (6). The cost of capital calculation and supporting detail is shown in columns (8) through (11).

Table 4. Reconciling Market Value to Distributable Earnings

	Liability	Initial Asset	Investment Transactions Subsequent to Time 0					Cost - of - Capital Calcuation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Time	Liab CFs	Total Cash Flow	Maturities	Sales	Investment of CFs	Investment Income	Total	Total Capital	Change in Total Capital	NII on Capital	Cost of Capital
0								12,500	(12,500)		(12,500)
1	(4,650)	750	—	—	(3,169)	—	(3,169)	15,669	(3,169)	750	(2,419)
2	(2,653)	750	—	—	(1,582)	190	(1,392)	17,251	(1,582)	940	(642)
3	(955)	13,250	—	—	(12,689)	285	(12,404)	17,440	(189)	1,035	846
4	489	—	3,169	—	(2,128)	1,046	2,087	16,399	1,041	1,046	2,087
5	1,715	—	1,582	553	—	984	3,119	14,264	2,135	984	3,119
6	1,458	—	12,137	—	(9,997)	856	2,996	12,125	2,140	856	2,996
7	1,239	—	2,128	-	(309)	727	2,546	10,306	1,819	727	2,546
8	1,053	—	—	1,546	—	618	2,164	8,760	1,546	618	2,164
9	895	—	8,451	—	(7,137)	526	1,840	7,446	1,314	526	1,840
10	2,139	—	309	3,269	—	447	4,025	3,868	3,578	447	4,025
11	1,562	—	—	1,573	—	232	1,805	2,295	1,573	232	1,805
12	1,072	—	2,295	—	(1,177)	138	1,256	1,177	1,118	138	1,256
13	655	—	—	723	—	71	794	453	723	71	794
14	301	—	—	378	—	27	405	75	378	27	405
15	—	—	75	—	—	5	80	—	75	5	80
PV at 6%	153	12,500					(0)				0
PV at 12%	(1,990)	10,699					(3,048)				(4,850)
Revaluation	(2,143)	(1,801)					(3,048)				(4,850)

Assumptions and relationships:
(1) Liability Cash Flows = Table 1, item (4).
(2) Cash flows from the initial 6% coupon bond of $12,500 par with 3-year maturity.
(3) Maturities from bonds purchased after time 0 and detailed in Table 2, item (7).
(4) Sales of bonds prior to maturity = Table 2, item (8).
(5) Cash reinvested in new bonds after time 0 = Table 2, item (7).
(6) Investment income on bonds purchased after time 0 = Table 1, item (10), less amounts included in item.
(7) Total = (3) + (4) + (5) + (6).
(8) Total Capital = Required Balance, Table 1, item (9).
(9) Change in Total Capital = $-(8)_t + (8)_{t-1}$.
(10) NII on Capital = 6% * $(8)_{t-1}$.
(11) Cost of Capital = (9) – (10).

The model results in Table 1 show that the entity issuing the contracts has a positive net after-expense cash flow of $7,000 at issuance of the contract. The entity must then contribute capital of $5,500 (a negative DE) in order to fully fund the required balance. In subsequent years, the contracts produce free cash flows (or positive DE) that are returned to the entity. The internal rate of return (IRR) of these capital flows, or return on investment (ROI), is 30.6%. As this ROI is in excess of the hurdle rate, positive economic value is generated by the transaction (PVDE) and totals $4,140. Equivalently, the value of the business at time 0 but immediately after the capital contribution is $9,640. This is summarized in Table 5.

Table 5. Pricing Summary

ROI	30.6%
PVDE	$4,140

PVDE measured at time 0, prior to initial capital contribution, includes initial DE of ($5,500).

At time 0 and immediately after the issuance and capital funding, the Market Value paradigm recognizes the value of the asset on the balance sheet totaling $12,500, less the $153 market value of the liability cash flows (valued at the 6% market rate), for a net value of $12,347. The net market value is 128% of the corresponding PVDE, illustrating the significant difference between the two approaches. The modified duration of the liability cash flows including expenses is 318 years, a truly irrational value considering that the cash flows do not extend beyond year 15. This is summarized in Table 6.

Table 6. Market Value vs. PVDE

Asset market value	$12,500
Liability market value	153
Net market value	$12,347
PVDE	$9,640
Net market value/PVDE	128%
Liability duration	318 years

Values measured at time 0, after initial premium and investment in the three-year bond and after the initial DE of ($5,500).

Table 2 shows investment/disinvestment actions required to satisfy the cash flows and the required balance. It is instructive to see that the distributable earning is a cash flow to be used or required as any other. The negative DE at time 0 is a cash flow to be invested along with the net positive liability cash flow. The positive DE in subsequent years may create the need for asset sales (as at time 5) or may otherwise be funded from the net of the asset and liability cash flows (as at time 1).

Table 3 gives a numeric presentation of the concept of the distributable earning as the amount of accumulated assets in excess of the required balance (as described in section 6.1 and illustrated in Figure 1). The distributable earning (8) equals the accumulated assets (6) less the required balance (7). This essential relationship may appear to be a simple accounting equivalence, but in fact, it is not. This relationship defines distributable earnings and so precedes or defines the accounting that summarizes the income statement and balance sheet.

Table 4 illustrates the two methods of reconciling market value to distributable earnings. The cost-of-capital reconciliation method shows the difference arising from the discount rates applied to the liability cash flows (1), plus the cost of capital (11). The revaluation of investments method shows that the revaluation of the cash flows of the on-balance sheet asset (2) plus the subsequent investment activity (7) equals the cost of capital. The results are summarized in Tables 7 and 8.

Table 7. Reconciliation Using the Cost-of-Capital Approach

	MV	**DE**	**Difference**
Asset value	$12,500	$12,500	$0
PV liability cash flows	153	(1,990)	(2,143)
Cost of capital	—	(4,850)	(4,850)
Value, net	$12,347	$9,640	($2,707)

Asset value = balance sheet value.
PV discount rate = 6% for MV and 12% for DE.
Cost of capital assumes 6% investment earnings on capital and a 12% discount rate.

Table 8. Reconciliation Using Revaluation of Investments

	PV at 6%	**PV at 12%**	**Revaluation**
Initial asset	$12,500	$10,699	($1,801)
Subsequent investment activity	(0)	(3,048)	(3,048)
Liability cash flows	153	(1,990)	(2,143)
Total	$12,347	$9,640	($2,707)
Asset revaluation (initial + subsequent)			(4,850)
Cost of Capital			(4,850)

In sum, these reconciliations illustrate the two critical differences between these approaches to valuation. The first is recognition of the requirement to maintain assets or capital in an amount specified by contract or regulation (i.e., the required balance). The second is the valuation of cash flows at the hurdle rate appropriate for capital projects rather than the rate taken from the bond markets.

8. Conclusion: The Case for Distributable Earnings

We have made the case for using the Distributable Earnings framework as the definition of economic value for insurance contracts. As the basis for economic value, it is the appropriate objective value to be used in risk management programs that seek to optimize or immunize risk to insurance entities.

We have discussed the compelling but seriously flawed rationale for the widespread application of the Market Value framework to the insurance contract. The rationale starts with the strong theory underlying the sophisticated techniques to valuing financial instruments, especially fixed-income securities. The flaw is the presumption of the insurance cash flows as equivalent to those of a bond, with this presumption enhanced by the nearly universal practice of illustrating the insurance contract using a bond-like GIC or SPDA. The application of this model ignores the very significant differences between fixed-income securities and insurance in both their characteristics and the markets in which they transact. We have explained the irony of this lack of differentiation compared to the wide array of distinctions made in valuing fixed-income securities, many of which are quite fine or exacting. We have also demonstrated the failure of this model in two simple ways. The first shows its inability to find a rational discount rate to value a simple insurance contract (that is, one other than a GIC or SPDA). The second demonstrates the failure with a paradox derived from the model and its premise of the insurance contract as the short position of a fixed-income security. The paradox shows that the model must either be inconsistent with market prices or precludes the possibility of value creation with the issuance of an insurance contract. Either way, it fails to be market consistent, despite its labeling.

The insurance contract is a capital project and must be valued as such. Similar to other capital projects, it is the end result of a series of processes, including design, manufacturing and distribution. Unlike most other products, the manufacturing process and corresponding capital requirements of the insurance contract do not cease at the point of sale but continue for an extended period of time.

We have described Distributable Earnings as the general pricing and valuation framework for valuing financial contracts characterized by the requirement to hold reserves and capital in support of obligations. This is the method used to price both insurance contracts and insurance entities (or blocks of contracts); hence, by simple definition it is the market-consistent method of pricing. This framework recognizes not just the fact of the reserve and capital requirements, but the incidence of these amounts relative to the cash flows from the supporting assets. It values the whole of the contract without a separate attribution of value to the assets and liabilities.

The use of hurdle rates is important to the valuation of capital projects. Hurdle rates, despite being specific to each entity, are uniformly higher than rates from bond and other fixed-income markets; hurdle rates represent the inducement to engage in the capital project represented by the insurance contract. Distributable Earnings valuations are often considerably different than “market-consistent” valuations, owing in significant part to the discount rate.

Finally, we have concluded that risk management processes should focus on economic value, which in the case of the insurance contract is represented by the Distributable Earnings framework. Risk management processes designed on the Market Value paradigm or using market-consistent approaches to valuing the liability are on uncertain ground relative to economic value. These processes should be evaluated relative to Distributable Earnings and/or redesigned appropriately. Most critically, these processes must not ignore statutory reserves and required capital, which are real requirements inseparable from the contracts, and these requirements carry both risk and cost.

References

Babbel, David F., and Craig Merrill. 1998. "Economic Valuation Models for Insurers." *North American Actuarial Journal* 2(3): 1–15.

Becker, David N. 1999. "The Value of the Firm: The Option Adjusted Value of Distributable Earnings." Society of Actuaries Financial Section Monograph, M-AS99-1: 83–134.

Girard, Luke N. 2000. "Market Value of Insurance Liabilities: Reconciling the Actuarial Appraisal and Option Pricing Methods." *North American Actuarial Journal* 4(1): 31–49.

Reitano, Robert R. 1997. "Two Paradigms for the Market Value of Liabilities." *North American Actuarial Journal* 1(4): 104–22.

Reynolds, Craig W, and David W. Wang. 2007. "Interest Rate Hedging on Traditional Life and Health." Society of Actuaries, https://www.soa.org/resources/research-reports/2007/research-interest-rate-hedging-life-hlth.

Wilson, Thomas C. 2015. *Value and Capital Management: A Handbook for the Finance and Risk Functions of Financial Institutions*. The Wiley Finance Series. Chichester, UK: John Wiley & Sons Ltd.

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