

## **SECURITIZATION OF LIFE INSURANCE ASSETS AND LIABILITIES**

Alex Cowley  
J. David Cummins

### **INTRODUCTION**

Securitization is one of the most important innovations of modern finance. The securitization process involves the isolation of a pool of assets or rights to a set of cash flows and the repackaging of the asset or cash flows into securities that are traded in capital markets. The trading of cash flow streams enables the parties to the contract to manage and diversify risk, to take advantage of arbitrage opportunities, or to invest in new classes of risk that enhance market efficiency. The cash flow streams to be traded often involve contingent payments as well as more predictable components which may be subject to credit and other types of counterparty risk. Securitization provides a mechanism whereby contingent and predictable cash flow streams arising out of a transaction can be unbundled and traded as separate financial instruments that appeal to different classes of investors. In addition to facilitating risk management, securitization transactions also add to the liquidity of financial markets, replacing previously untraded on-balance-sheet assets and liabilities with tradeable financial instruments.

---

Alex Cowley, FIA, is Senior Vice President within the Insurance Solutions Group of Lehman Brothers and is a Director of Lehman Re & Lehman Risk Advisors. J. David Cummins is the Harry J. Loman Professor at the Wharton School of the University of Pennsylvania. The author can be contacted by e-mail: [cummins@wharton.upenn.edu](mailto:cummins@wharton.upenn.edu).

The material in this article has been co-authored by Alex Cowley and J. David Cummins and reflects solely the opinion of the co-authors and not that of Lehman Brothers or the Wharton School. The article should not be construed as a product of Lehman Brothers or its Research Department. It is for informational purposes only and has been compiled based upon publicly available sources of data. The co-authors assume full responsibility for its contents. Lehman Brothers makes no representation that the information contained in this document is accurate or complete. Opinions expressed herein are solely those of the co-authors and are subject to change without notice. Readers are advised to make an independent review regarding the economic benefits and risks of any of the transactions described herein, including without limitation purchasing or selling any of the financial instruments mentioned in this article, and must reach their own conclusions regarding the legal, tax, accounting, and other aspects of any transaction involving the financial instrument in relation to their particular circumstances.

The securitization era began in the 1970s with the securitization of mortgage loans by the government sponsored enterprises (GSEs) Fannie Mae, Ginnie Mae, and Freddie Mac, which were created by the federal government with the objective of facilitating home ownership by providing a reliable supply of home mortgage financing. The securitization process enabled mortgage originators such as banks, thrift institutions, and insurers to move mortgage loans off their balance sheets, freeing up funds for additional lending. In the process, a new class of highly rated, liquid securities was created, enhancing portfolio opportunities for investors. The next major development in securitization was the introduction of asset-backed securities (ABS) based on other types of assets. This market began in 1985 with the securitization of approximately \$1 billion in automobile loans and later expanded to include credit card receivables, home equity loans, aircraft-backed loans, student loans, and numerous other asset classes. In 2003, new issue volume of mortgage-backed and nonmortgage-backed ABS reached \$2.1 trillion and \$585 billion, respectively.<sup>1</sup>

Although the insurance industry in the United States accounts for approximately \$4 trillion in assets with corresponding liabilities and equity capital that would seem to be candidates for securitization, securitization has been relatively slow to catch on in this industry. The first U.S. insurance securitizations took place in 1988 and involved sales of rights to emerging profits from blocks of life insurance policies and annuities (Millette et al., 2002). Insurance linked securitizations accelerated during the 1990s with the development of catastrophic risk (CAT) bonds and options and a growing volume of life insurance and annuity securitizations. However, the volume of insurance transactions remains small in comparison with other types of ABS.

Securitization has the potential to improve market efficiency and capital utilization in the insurance industry, enabling insurers to compete more effectively with other financial institutions. Through securitization insurers can reduce their cost of capital, increase return on equity, and improve other measures of operating performance. Securitization offers insurers the opportunity to unlock the embedded profits in blocks of insurance presently carried on balance sheet and to provide an alternative source of financing in an industry where traditional financing mechanisms are often restricted due to regulation. Securitized transactions also permit insurers to achieve liquidity goals and can add transparency to many on-balance-sheet assets and liabilities traditionally characterized by illiquidity, complexity, and informational opacity. Securitization also offers new sources of risk capital to hedge against underwriting risk more efficiently than traditional techniques such as reinsurance and letters of credit.

The objective of this article is to analyze securitization in the insurance industry with an emphasis on the lessons to be learned from prior securitizations as well as techniques that can be employed to mitigate the remaining impediments to the more widespread securitization of insurance risk. Because the securitization of catastrophic property risk has been discussed in numerous prior publications (e.g., Froot, 2001; Lane and Beckwith, 2002; Cummins and Lewis, 2003; Cummins, Lalonde, and Phillips, 2004), this article focuses on life insurance and annuity securitizations. The article begins with an overview and analysis of asset-backed securities. This is

---

<sup>1</sup> Data on mortgage backed and other asset backed securities are from the Bond Market Association (<http://www.bondmarkets.com>).

followed by a discussion of securitization as a potential source of value creation in the insurance industry. The principal life insurance and annuity securitizations that have been conducted in recent years are then analyzed, followed by a discussion of possible approaches to overcoming impediments to securitization.

## **OVERVIEW OF SECURITIZATION**

This section provides an overview of securitization to set the stage for the analysis of securitization in the life insurance industry. The section begins by providing a generic model of the structure of asset-backed securities, which applies to most of the securitizations that have been conducted to date. The discussion then turns to an analysis of the economic rationale for securitization, considering the advantages to both issuers and investors.

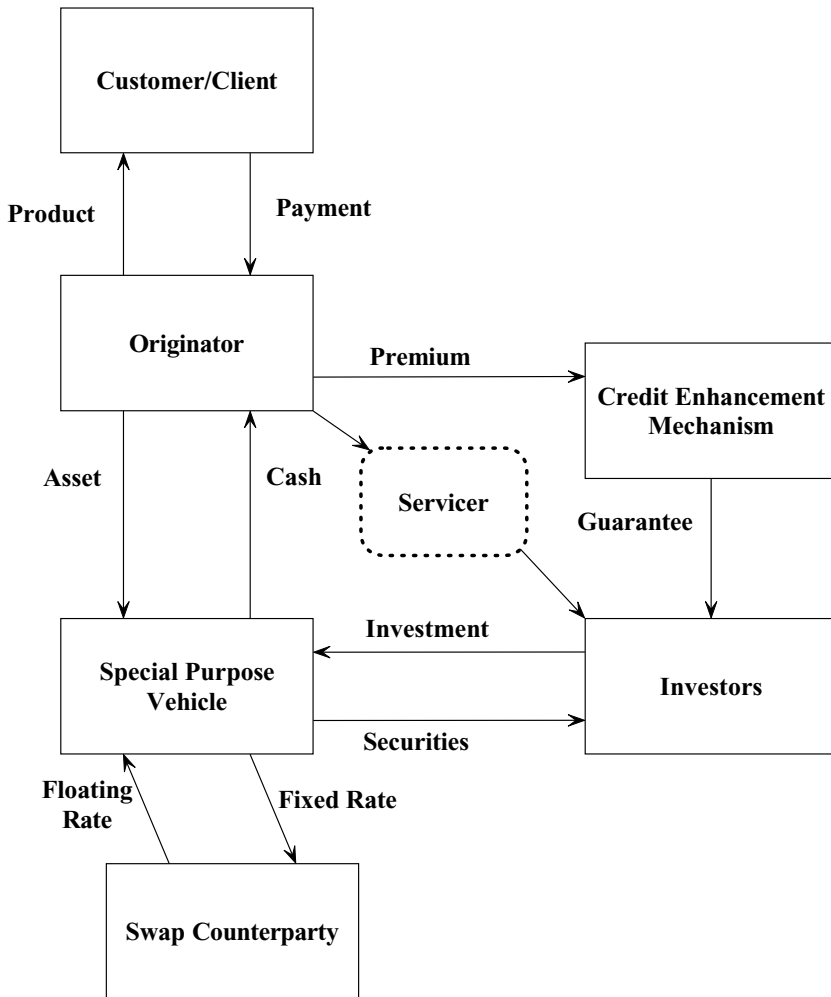
### **The Structure of Asset-Backed Securities**

Although asset-backed securities (ABS) have been issued based on a wide range of different cash flows and a variety of marketable securities, the overall design structure of an asset-backed transaction is reasonably generic. Discussing the general ABS structure enables us to introduce several important elements that are present in most insurance-linked transactions. The general ABS structure is illustrated in Figure 1. The transaction begins with an originator, which initiates the contracts giving rise to the cash flows that are ultimately securitized. Originators include banks and thrift institutions, which generate residential and commercial mortgages and other types of loans, credit card companies that issue installment debt, life insurance companies selling insurance policies and annuities, and industrial firms such as automobile and aircraft manufacturers that sell their products under various types of financing agreements. The originator provides a product to a customer or client, who agrees to make a series of payments over some future period of time. The present value of the principal and interest payments constitutes an asset of the originator.

In a conventional commercial or financial transaction, the originator keeps the asset generated from the sale of its product on its balance sheet. The ABS market enables the originator to move the asset off balance sheet through securitization. This is usually done by transferring the asset to a special purpose vehicle (SPV), a passive financial entity that exists solely to house the asset and issue securities with the asset as collateral. The transfer to the SPV may be a "true sale," in which case all rights to the asset are transferred to the SPV, with the originator retaining no residual interest, or the originator may retain some residual interest and/or credit obligation under the ABS arrangement. The SPV issues securities to investors, who contribute funds to the SPV. The SPV then remits all or part of the proceeds from the securities issuance to the originator in return for transferring the asset or otherwise committing the rights to the cash flows to the SPV. Issues where the investors sole claim is against the SPV rather than the originator are said to be *nonrecourse* transactions.

Securities issued by SPVs are usually structured to appeal to various classes of investors in recognition of the different investment tastes of institutional investors, hedge funds, high wealth individuals, and others. Consequently, in most ABS transactions there are several classes or tranches of securities, which often have differing degrees of seniority with respect to the underlying cash flows. In many cases, it is

**FIGURE 1**  
Structure of an Asset-Backed Security



desirable to pay a floating rate of interest to the holders of the SPV securities, even though the underlying assets may pay interest at a fixed rate, to shelter investors from interest rate risk. Thus, it is common for the SPV to enter into a swap transaction, either over-the-counter or through an exchange, whereby the assets' fixed rate of interest is swapped for a floating rate tied to a widely used index such as LIBOR.

ABS transactions usually involve some form of credit enhancement to protect investors from two types of risks: (1) the risk that the originator will default on its obligations to the SPV in cases where a residual interest or obligation is retained by the originator; and/or (2) the risk that contingencies such as defaults among the originator's customers will reduce the market value of the assets in the SPV. Credit enhancement mechanisms can be broadly categorized as *internal* and *external*. An

example of internal credit enhancement is *overcollateralization*, whereby the value of assets transferred to the SPV is larger than the amount of securities that are issued to investors. Another common form of internal credit enhancement is *subordination*, whereby several classes or tranches of securities are issued by the SPV some of which are subordinated, i.e., designated to absorb abnormal credit events, and others with varying levels of seniority, which are protected from default risk by the presence of subordinated classes. External credit-enhancement mechanisms include surety bonds, credit insurance, parental guarantees, and letters of credit from financial institutions such as banks and reinsurers.

In most ABS transactions, it is also important to have a servicing institution, which provides service to the customer/clients, monitors their payments of principal and interest, and generally maintains the integrity of the cash flows and payment process. This function is particularly important for life insurance and annuities, where policy persistency is typically an important determinant of the success of an asset-backed structure. In many cases it makes sense for the originator to retain the servicing function, especially for complex financial products such as life insurance and annuities that are not fully standardized across originators.

Although Figure 1 provides a useful overview of an ABS transaction, there are many important variants of the basic structure and many important details that are not included in the figure. In some transactions, there is another entity such as a trust that buys assets from the SPV and then repackages the cash flows and sells the resulting securities.<sup>2</sup> In some transactions, such as CAT bonds and mortality bonds, there may be no transfer of assets from the originator to the SPV. In this type of transaction, the originator pays a premium to the SPV in return for an option which triggers payment from the SPV to the originator on the occurrence of a defined contingency. The investors contribute proceeds to the SPV and are compensated by investment earnings on the proceeds plus the option premium paid by the originator. It is also possible to combine an asset transfer to the SPV with the sale of an option to the originator, and numerous other variations on the basic theme can easily be envisioned.

There is an important distinction between the securitization of assets and liabilities that is particularly important for regulated financial institutions such as insurers. In an asset transaction such as a mortgage loan or bank business loan, the borrower receives funding on the initiation of the transaction and then makes principal and interest payments over time to retire the loan. Thus, the originator is exposed to the credit risk of the borrower, but the borrower is not exposed to the credit risk of the issuer. Hence, the sale or transfer of loans to another financial institution or to a special purpose vehicle does not materially affect the economic position of the borrower, making possible true sales of assets that extinguish the interests of the originating institution.

In the case of liabilities, such as insurance policies, however, the transaction is reversed, with the policyholder making payments over time and receiving payment from the issuing institution (e.g., a life insurance death benefit or annuity payments) at a later date. Thus, the policyholder is exposed to the credit risk of the financial institution,

---

<sup>2</sup> The separate trust entity is often used to meet legal or regulatory requirements.

and the sale or transfer of the policy obligation to another party could significantly affect the economic position of the buyer by potentially increasing the exposure to default risk. The reversal of the credit risk exposure in a liability transaction creates a barrier to the true sale of liabilities, and regulators in most jurisdictions generally will not permit insurers to engage in transactions that extinguish the insurer's liability to policyholders. Hence, the majority, if not all, of the life insurance and annuity transactions that have taken place are, technically, in fact *monetizations* rather than securitizations in that there is no "true sale" of the asset to a SPV; instead, there is an ongoing direct relationship between the policyholder and the insurer. Nevertheless, we will refer to these transactions as securitizations, as they have many similarities with such transactions and the market generally refers to them as securitizations. One implication of there not being a "true sale" of the asset to a special purpose vehicle is that transactions are typically "on balance sheet," i.e., both the proceeds and the debt will appear on the insurer's consolidated financial statements.

### Economic Rationale for Securitization

Like financial intermediation and hedging transactions undertaken by widely held corporations, the existence of securitization is difficult to explain in terms of the pure theory of finance. In the pure theory of finance, assets are traded in frictionless and complete capital markets. In such a world, the value of a stream of cash flows is determined by the amount, timing, and risk characteristics of the cash flows; and, in fact, each cash flow has a unique value regardless of its ownership. In the context of a corporation, the Modigliani–Miller capital irrelevancy theorem, which posits the existence of frictionless and complete capital markets, implies that the way the firm's cash flows are apportioned among various classes of claimants is irrelevant to the value of the firm. Hence, in a purely theoretical world, transferring cash flows to a SPV and apportioning them in various ways among tranches of security holders would have no impact on the overall economic value of the flows. Therefore, because securitization is costly, ABS transactions would be difficult to justify in frictionless and complete markets.

The existence of widespread securitization in real world capital markets suggests that violations of the assumptions of perfect market finance theory are responsible for the existence of gains from trade in securitization transactions. Among the important underlying assumptions is that markets are frictionless and complete, with no transactions costs or other market imperfections, and that bankruptcy costs do not exist. Perfect markets theory also assumes that markets are free of agency costs, i.e., managers and employees of firms are assumed to pursue the objectives of the firm's owners and other claimants. Markets are also assumed to be informationally transparent such that there are no informational asymmetries between the buyers and sellers of financial products. Finally, the perfect markets model does not allow for the existence of taxation and regulation, both of which can provide motives for securitization.

A variety of market frictions relating to transactions costs, agency costs, informational asymmetries, taxation, and regulation provide opportunities for value creation using asset-backed securities. Specific discussion in the context of life insurance transactions is presented below. However, it is useful to provide some general discussion

of the value creation attainable through securitization. The existence of bankruptcy costs provides one important rationale for securitization. As a firm's financial condition deteriorates, it is likely to suffer financial rating downgrades which increase its cost of capital and increase the difficulty of raising new funds. Regulated financial institutions are especially susceptible to financial distress costs because they incur increased regulatory scrutiny, operating restrictions, and possible seizure by regulatory authorities. The sensitivity of capital and regulatory costs to financial distress provides an important motivation for securitization. In many instances, the firm can reduce its leverage, manage risk, and otherwise enhance its financial strength through securitization.

Securitization also provides an alternative mechanism to help firms manage interest rate risk. For example, banks tend to have mostly short-term liabilities such as demand deposits, creating a source of interest rate risk if they hold long-term assets such as mortgages. Securitization enables banks to utilize their expertise in originating mortgages without having to deal with the interest rate risk problems created by holding the mortgages until maturity.

The reduction of informational asymmetries provides another important role for securitization. Financial institutions such as banks and insurance companies tend to be rather opaque in the sense that there are significant informational asymmetries between the financial institutions and investors with respect to the characteristics of bank loan portfolios and insurer life insurance and annuity portfolios. In addition, life insurers invest heavily in privately placed bonds, which are not transparent to investors. Securitization permits institutions to create pools of relatively homogeneous assets such as mortgages, privately placed bonds, and insurance policies, which can be separated from the originators' other operations by segregating them in SPVs. To the extent that the institutions are willing to disclose sufficient information about the cash flows that are committed to the SPV, financial engineers and actuaries can develop simulation models that provide information to investors to mitigate the informational asymmetries inherent in these otherwise opaque institutions. This in turn tends to raise the credit rating of the securities issued by the SPVs, enabling the originators to reduce the cost of capital.

The existence of agency costs also provides a rationale for securitization. Agency costs arise when the managers of the firm pursue their own interests rather than the interests of the owners of the firm. The owners' objective is to maximize firm value, whereas the managers are also motivated to maximize their own net worth and protect their job security. Although mechanisms such as stock options and compensation systems are available to align the interests of owners and managers, no such system is perfect and unresolved agency costs always exist. Investors tend to require higher costs of capital to provide capital to originators to compensate them for anticipated agency costs. Such costs are likely to be relatively high in large complex organizations such as the multinational conglomerates that now dominate the financial services industry, because monitoring and controlling managers is more difficult in firms that operate in a diverse range of businesses and geographical areas.<sup>3</sup> Securitization can help to

---

<sup>3</sup> For further analysis of the relationship between agency costs and securitization see Iacobucci and Winter (2003).

resolve investor concerns about agency costs by isolating a block of assets or rights to cash flows in a special purpose vehicle. Because the SPV exists only to hold the assets and is a passive entity which is not "managed" for any other purpose, the investors in the SPV's securities can focus on the assets that are included in the SPV and generally can be assured that the assets are insulated from the originator's other business activities. Even in instances when the originator retains no residual interest in or credit obligation to the SPV, investors interests can be protected through the use of tranching and credit enhancement. Thus, even considering the costs of structuring and credit enhancement, securitization may represent a relatively attractive way for the originator to raise capital.

Financial institutions can utilize securitization to reduce deadweight costs to the firm's owners arising from regulation. Both banks and insurers are subject to regulatory capital and accounting rules that do not always accord with market realities and hence create costs for the firm. Securitization can often be used to move off-balance-sheet asset or liability accounts that have especially onerous capital requirements, thus freeing up capital for the firm to use in its other operations and reducing the expected costs of regulatory intervention arising from any deterioration in these asset and liability accounts. Regulatory requirements are an especially powerful motivation for securitization in the life insurance industry, as discussed below.

From the investor perspective, an important source of gains from trade in securitization is the creation of new classes of securities that appeal to investors with different appetites for risk. Securitization can create nonredundant securities that enable investors to improve portfolio efficiency. Securities based on catastrophic property, mortality, and longevity risk are nonredundant because the covered events are not otherwise traded in securities markets. Securities based on these risks also are likely to have relatively low correlation with market systematic risk, making them even more valuable for diversification purposes.

Even in cases where securities on an underlying are already traded, securitization can reduce investor transactions costs and improve portfolio efficiency by enabling investors to take on only those components of a particular asset's cash flows that accord with their preferences and portfolio needs or to take a position in assets that may otherwise be unavailable or difficult to replicate. For example, prior to the development of the ABS market, it was difficult for most investors to take an optimal position in automobile loans. Investors could buy shares in auto makers such as General Motors, but would be subjected to the overall risk of GM rather than just investing in the auto loan portfolio. Moreover, GM stock is "lumpy" in the sense that a share of GM represents value-weighted proportional shares in all of GM's various operations. Investors desiring a different weighting on the auto loan component of GM would have had a difficult time in optimally structuring their portfolios. The same reasoning applies to bank loans, credit card loans, aircraft loans, and many other assets now traded in the ABS market. To the extent that investors find that securitized assets improve portfolio efficiency and reduce transactions costs, they are willing to take on the risk of investing in these assets for a lower capital cost than would be required to maintain the assets on the balance sheets of the originators. Of course, in the limit, such "arbitrage" gains will be competed away as the market converges towards full efficiency; but



the level of activity in the ABS market and low penetration of securitization in the insurance industry suggests that significant gains will continue to be available for the foreseeable future.

Securitization also can add value for investors and hence for originators by facilitating the acquisition of specialized investment information. Evaluating potential investments is costly, particularly when considering the specialized cash flow patterns and “waterfalls” that comprise complex ABS such as commercial mortgage-backed securities. By structuring an asset-backed transaction into tranches with varying degrees of seniority and informational complexity, securitization allows investors with relatively low levels of expertise to take positions in the more senior securities offered by the SPV, leaving the more complicated and risky tranches to be evaluated by specialists who can exploit informational economies of scale and recover their investment in information over a wide range of transactions. This benefits both the senior and subordinated tranche investors and hence adds value to the transaction (Plantain, 2002).

Of course, the number and complexity of the transactions implicit in most ABS transactions create significant costs to undertaking such a transaction. The SPV must be established and capitalized with attendant legal and administrative costs. Financial and actuarial modeling of the SPV asset cash flows must be conducted to provide information to investors. The transaction must be evaluated and rated by the financial rating agencies. The securities to be issued by the SPV must be designed, underwritten, and marketed; and the swap counterparty must be compensated. Direct or indirect costs must be incurred to provide credit enhancement and ongoing servicing of the assets placed in the trust. Ultimately, the transaction will be undertaken only if the expected benefits outweigh all of the attendant costs. So far, expected benefits apparently have been significantly larger than expected costs for a wide variety of ABS transactions. It remains to be seen whether this will be the case in the life insurance industry.

### **SECURITIZATION IN THE LIFE INSURANCE INDUSTRY: GENERAL CONSIDERATIONS**

This section provides an overview of the opportunities and driving forces behind securitization in the life insurance industry. The discussion begins by considering some of the assets, liabilities, and cash flows that are candidates for securitization for life insurers. Next, we discuss the principal economic and regulatory forces providing the impetus for securitization in insurance. The section concludes with a discussion of the traditional model of insurers as financial intermediaries serving a *risk warehousing* function and interprets securitization as a step in the evolution away from risk warehousing and towards a model of *risk intermediation*.

#### **Candidates for Securitization**

The economic value of the assets and liabilities that comprise an insurance company’s balance sheet constitute the risk-adjusted present values of cash flows inherent in each asset and liability account. In principle, any such account or any series of cash flows is a candidate for securitization. To provide an overview of the potential for securitization in life insurance and annuities, this section briefly discusses the cash flows and asset

and liability balance sheet items that are the most likely targets for securitization activity.

The principal cash inflows arising from operating a life insurance and annuity business include premiums and annuity considerations from both new and in-force business, as well as investment income and proceeds from investment sales and maturities. Insurers also increasingly receive fee income from universal life and variable life insurance and annuity products. Fees are received for mortality and expenses as well as investment fees equal to the difference between the investment yield rate and the rate credited to policyholders (the net interest margin).

Outflows include policy death benefits, annuity payments, and policy surrenders. Among the expense outflows, the expenses of policy origination are particularly important as the acquisition costs for insurance and annuity policies tend to be front-end loaded. Hence, insurers make an investment to put policies on the books and then amortize the acquisition costs out of the premiums, investment income, and fee income received over the policies' lifetime. This amortization process has provided the motivation for a number of securitizations in the life insurance industry. A problem that arises with respect to the front-end loading of expenses is that regulators in many countries require insurers to establish reserves for newly issued policies that do not fully recognize the prepayment of expenses as an offsetting asset item on the balance sheet.<sup>4</sup> Accordingly, writing new business generates a need for cash to fund the costs of acquisition and also reduces the insurer's regulatory capital. Insurers also incur cash outflows for taxes, with income taxation usually imposing the most serious burden.

A number of risks associated with insurer cash flows can be managed through securitization. Among the most significant are the risks of mortality and longevity. An increase in mortality rates would adversely affect the amount and timing of death benefits paid by the insurer, while an increase in longevity would increase cash outflows due to annuity payments. Although many insurers are hedged to a degree against mortality and longevity risk because they issue both life insurance and annuity contracts, the hedging is rarely complete, leaving many insurers exposed to adverse mortality deviations. Mortality risk traditionally has been considered relatively unimportant by life insurers because of long-term secular declines in mortality rates and the ease of diversifying mortality risk in large policy pools. However, the exposure to epidemics and the increased probability of mass mortality events due to terrorism suggest that insurers' should give more attention to managing mortality risk. Longevity risk is also a concern, given the long-term improvements in mortality and the shift in emphasis of retirement plans in many countries away from public and toward privately funded pension schemes.

Persistency risk is also an important consideration in evaluating life insurance and annuity cash flows. As mentioned, the expenses of issuing insurance and annuity contracts are front loaded and are amortized over time out of premium and fee cash flows. To the extent that the proportion of contract holders voluntarily surrendering their policies is higher than expected, future cash inflows are reduced and prepaid

---

<sup>4</sup> Prepaid expenses are recognized through a deferred acquisition cost asset account in U.S. GAAP accounting.

expenses may not be fully recovered. Policy surrenders are correlated with interest rates and other economic conditions, such that potential changes in persistency create both interest rate risk and market systematic risk for insurers.

Most insurance and annuity contracts also contain embedded options that create risks for insurers. For example, many contracts contain minimum interest rate guarantees, whereby the insurer agrees that the rate of interest credited to the investment component of the policy will not fall below a particular level such as 4 percent. Such guarantees are put options on interest rates, which impose costs on insurers even when the options are out of the money and expose insurers to significant risk, which is exacerbated by the nonlinearity of the option payoff function.

In many insurance securitizations, an entire block of insurance or annuity policies is securitized. In such instances, the value of the securitization transaction reflects all of the underlying cash flows of the contracts and is exposed to all of the attendant risks. As explained below, the motivation for most whole-block securitizations undertaken to date has been to facilitate demutualization and/or to capitalize the expected future profits from the policy block. Evaluating the economic value of a policy block using modern financial concepts is equivalent to corporate capital budgeting and asset valuation. The cash flows arising from the block are estimated and then discounted using risk-adjusted discount rates that reflect the anticipated term structure of interest as well as adjustments for market risk.<sup>5</sup> Contingencies can be recognized by including discounting factors for mortality and persistency. The modeling can also be conducted using dynamic financial analysis, which facilitates risk evaluation using scenario modeling.

Various asset and liability accounts carried on balance sheet by insurers are also candidates for securitization. For example, many life insurers invest heavily in privately placed bonds. Such bonds tend to be illiquid, and it may be advantageous under some circumstances to liquidate private placements through securitization. Receivables from agents, reinsurers, and other creditors also can be securitized. On the liability side of the balance sheet, various accounts are candidates for securitization. Regulation can create the need for securitization if reserve requirements do not reflect the true economic value of the liability or if reserving places undue strain on the insurer's regulatory capital, e.g., as discussed below, term insurance reserve requirements under Regulation XXX in the United States have motivated securitization transactions.

#### Drivers of Demand for Securitization

A number of recent developments in financial markets have motivated increasing insurer interest in securitization. Perhaps the most important development in financial services market of the past two decades is the integration of the financial services sector. Deregulation and economic forces have led to the breakdown of the "fire walls" that traditionally separated financial intermediaries such as commercial banks, thrift

---

<sup>5</sup> Models of fair market values for blocks of insurance and annuity policies are developed in Becker (1999), Girard (2000, 2002), Perrott and Hines (2002), and Reitano (1997).

institutions, investment banks, mutual fund companies, investment advisory firms, and insurance companies.<sup>6</sup>

The result of the European and U.S. deregulation has been an unprecedented wave of financial services sector consolidation, resulting in the creation of large, multinational financial conglomerates offering all types of financial services (Group of 10, 2001). This development, along with bank entry into the annuity and life insurance market during the 1980s, subjected life insurers to increasing competition from “nontraditional” competitors including multinational conglomerates, banks, mutual fund companies, and investment advisors (Cummins and Santomero, 1999). The result was the elimination of the “safe haven” previously enjoyed by life insurers, leading to severe downward pressure on insurance prices and profits. Financial services consolidation and the disappearance of the safe haven motivated a wave of demutualizations during the 1990s as mutuals converted to the stock ownership form to compete more effectively with the international financial conglomerates in raising capital and participating in the mergers and acquisitions market. Demutualizations often are accompanied by the securitization of blocks of insurance business. For stock insurers, the disappearance of the safe haven motivated insurers to focus on optimizing their capital structure to maximize value for shareholders. Securitization provides a mechanism that insurers can use to improve capital efficiency.

Interest in securitization also has intensified because of a shift in the types of products offered by insurers and their competitors. The market has evolved away from traditional participating life insurance contracts and toward universal life and variable life insurance and annuity contracts. The deemphasis of traditional contracts has motivated insurers to consider securitization of older blocks of insurance policies to realize embedded economic values and free up funds to invest in new ventures. In addition, sales growth in the newer life insurance and annuity products has placed a capital strain on many insurers due to accounting requirements relating to prepaid acquisition costs. This is particularly an issue with variable products because the full amount contributed by the policyholder in initial premiums or annuity considerations generally is credited to the policyholder’s investment account, with acquisition costs and other origination expenses recovered later from fee income and early surrender penalties, often referred to as contingent deferred sales charges. The reduced margins available in these products due to intensified competition implies that the acquisition costs may be recovered more slowly than on traditional products, providing another motivation for securitization. Insurers are also motivated to free up capital from existing blocks of business in order to invest in new distribution networks and improved information technology systems to keep pace with competitors in providing services to customers.

---

<sup>6</sup> The European Union gradually deregulated the financial services sector, culminating in the virtual deregulation of financial services in the Second Banking and Third Insurance Directives of the mid 1990s (see Group of 10, 2001). In the United States, banking deregulation took place through a series of regulatory rulings and law changes such as the granting of permission for banks to sell annuities and life insurance by the Office of the Comptroller of the Currency (OCC) in the 1980s. Also important was the Riegle-Neil Interstate Banking and Branching Efficiency Act of 1994 and the Gramm-Leach-Bliley Act of 1999, which permits the formation of financial holding companies which can own all types of financial subsidiaries.

The adoption of SFAS 115 in 1993 by the Financial Accounting Standards Board led most insurers to adopt mark-to-market accounting for most assets in their U.S. GAAP accounting statements, and the International Accounting Standards Board has announced the objective of implementing mark-to-market accounting for insurance liabilities by 2007 (Fore, 2003). The adoption of full mark-to-market accounting will place further pressure on insurers to rationalize their use of capital. In addition, because market values of insurance liabilities traditionally have been unobservable due to the lack of a secondary market in insurance contracts, securitization has the potential to provide valuable information that can be utilized in calibrating models for valuing nonsecuritized blocks of business. By securitizing parts of their existing insurance product portfolio, insurers may be able to create *tracking securities* that enable them to obtain more accurate valuation of the nontraded segments of their portfolios.

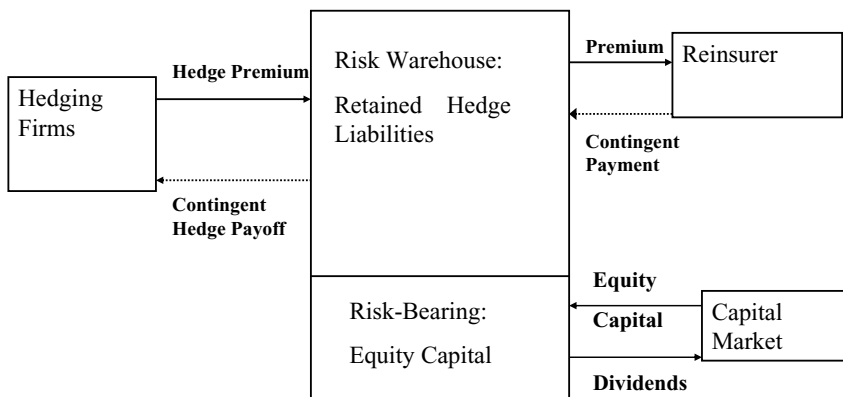
Insurance product and solvency regulation also will continue to provide situations where insurers can gain value through securitization. The evolution of reserving and risk-based capital standards is likely to create regulatory costs that can be partially mitigated through securitization. Opportunities for “regulatory arbitrage” by financial conglomerates that must satisfy both banking and insurance solvency standards are likely to continue to exist and to motivate securitizations.

### Warehousing Versus Intermediation: An Evolving Business Model

In a broader context, the growth of securitization is part of the evolution of the financial services sector away from traditional financial intermediaries that originated assets and liabilities that were held on balance sheet. The market has been trending toward intermediaries that originate various types of financial instruments that are passed through to capital markets, with the resulting risks borne directly by investors as part of their portfolios rather than by the originating financial institutions.

The traditional insurer risk-warehousing model is illustrated in Figure 2. For purposes of this discussion, we focus on the case where customers of the insurer are hedging risk such as the risk of mortality shocks rather than purchasing investments. For example,

**FIGURE 2**  
Traditional Insurer Model: Risk-Warehousing and Risk-Bearing



the warehouser might be a reinsurer that writes contracts to help primary insurers hedge mortality risk. However, the same concepts apply to the case of a life insurer that raises funds by selling asset accumulation products to consumers.

Insurers following the traditional risk warehousing approach serve as originators by issuing risk hedging products to client/customers. The customers pay a premium to the insurer in return for payments contingent on the occurrence of the risks covered by the insurance contracts. The insurer then warehouses the risks on balance sheet and bears the risk by holding equity capital. Capital markets serve as the ultimate risk bearer in traditional insurance and reinsurance markets, but this is accomplished through the ownership by investors of insurance company equity. Hence, investors typically do not have the option of investing in particular cash flow streams originated by the insurer as in the case of securitization transactions.

The risk warehousing model has a number of disadvantages. For example, insurance and annuity contracts held on balance sheet tend to be opaque to the market, making it difficult for equity holders to evaluate the firm and potentially raising the cost of capital. In addition, it is not clear that the most efficient way to provide these types of financial products is through a risk warehouse primarily financed with equity capital. Among other problems, risk warehouses tend to be subject to relatively high agency costs due to their opacity and complexity.

The alternative to the risk warehousing approach is the risk intermediary, which traditionally described the operating strategy of an investment bank. Like the risk warehouser, the intermediary originates hedging or financing products with client/customers. However, instead of retaining the resulting risk on balance sheet, the risk intermediary repackages the hedging product for financing in the capital market.<sup>7</sup> The risk is sold to investors in the form of various types of securities and the funding (in the case of a transaction to raise capital) or contingent payment (in the case of a hedge) reverts to the hedger. Ideally, the risk intermediary retains little or no risk on the deal, although in some instances it is advantageous for the intermediary to take some residual risk in return for an expected return. The intermediary maintains equity capital to bear some residual risk and finance its operations, but the amount of equity is much smaller than for the risk warehouse.

The risk warehousing model originally developed because regulation and limitations on the available financial and computer technology prevented the direct trading of insurance risk on securities markets. Technology is no longer a barrier, and regulators are gradually becoming accommodated to the idea of securitization (International Association of Insurance Supervisors, 2003). The primary continuing advantage of the opaque risk-warehouse approach to providing insurance products is that it tends to protect private information on clients, products, and markets that has been developed by insurers over the years. Thus, securitization is most likely to occur where the capital efficiency and financing benefits are sufficient to offset the value of private information lost during the securitization process.

---

<sup>7</sup> As in Figure 1, there usually but not always would be a special purpose vehicle and/or a trust standing between the intermediary and investors. This detail is suppressed for purposes of the present discussion.

**FIGURE 3**  
Convergence—Toward Intermediation

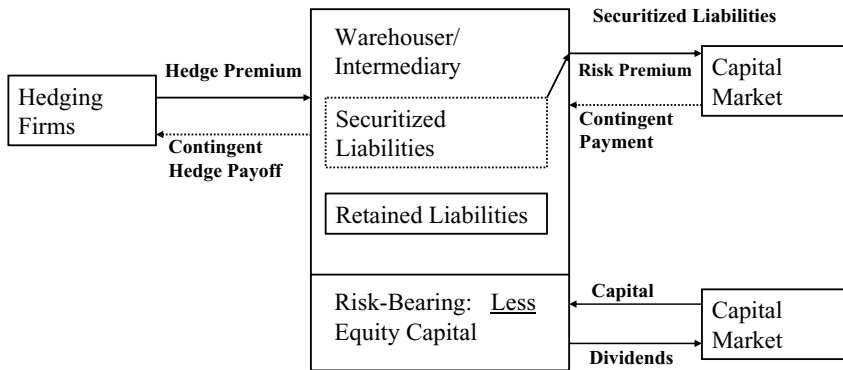


Figure 3 illustrates the convergence of the two models. The evolving warehouse/intermediary in this diagram securitizes part of the risks that had been retained in the warehouse, passing the risks along to the capital markets. The risks where the benefits of securitization most significantly exceed the costs are the first to be securitized. Other risks where the benefit/cost tradeoff is closer to a wash or where costs exceed benefits are retained within the warehouse. These are risks where the information opacity problems are greatest and/or those where the value of private information is especially high. In the evolutionary model, the warehouse/intermediary still retains a significant amount of equity capitalization but the amount of equity is smaller than for the pure risk warehousing model. Capital market investors absorb the risks of the hedgers both through securitized financial instruments and through holding equity shares in the risk warehouse. In this case, investors have the opportunity to invest in the company's equity, the performance of which reflects the overall fortunes of the enterprise, but also have the ability to invest in securities that depend upon specific cash flows that are more or less insulated from the company's overall performance.

In the context of financial intermediation, the special purpose vehicle can be viewed as a type of passive financial intermediary. This intermediary exists only to receive the proceeds of designated cash flows and pass them along to investors. Thus, the SPV probably represents the ultimate stage of evolution away from the traditional risk warehouse model of insurance and reinsurance, and is a significant step in the direction of the world envisioned by perfect markets finance theory where individual cash flows (primitive securities) are traded independently of intermediaries. In this case, of course, the active intermediary (insurer or investment bank) still exists to execute the transaction and the passive intermediary (SPV) plays the role of isolating the rights to a particular set of cash flows from the operational and credit risks of the originator. However, securitization and SPVs represent an important step away from the intensively managed, complex, and opaque institutions that presently dominate the insurance industry. Of course, as mentioned, the ability of insurers to move liability accounts off balance sheet is likely to be limited by economic and regulatory concerns regarding the credit risk exposure of policyholders.

Nevertheless, partial intermediation through monetization transactions as well as asset and risk securitizations that do not change the insurer-policyholder relationship provide mechanisms whereby insurers can move away from the traditional role of risk warehousing.

### **LIFE INSURANCE AND ANNUITY SECURITIZATIONS**

This section discusses several of the most important insurance and annuity securitizations that have taken place over the past decade. It does not attempt to present an exhaustive list of transactions but rather focuses on transactions that are typical, innovative, and/or likely to serve as models for future transactions.

The most significant securitizations of recent years fall into five primary categories: (1) Securitization of future cash flows from a block of business. Transactions falling into this category include so-called VIF ("value in force") or embedded value securitizations, which securitize a block of insurance or annuity business to achieve a business objective such as capitalization of prepaid acquisition expenses or monetization of the embedded value from the block. This type of transactions also includes closed block and open block securitizations undertaken to support demutualization. (2) Reserve funding securitizations. Securitizations also have been undertaken to ease regulatory reserve requirements such as those associated with Regulation XXX and Actuarial Guideline AXXX, which have increased reserves for U.S. term life insurance policies with long-term premium guarantees and universal life policies with secondary guarantees, respectively. Other such transactions could be undertaken to reduce risk-based capital requirements or achieve other regulatory or risk-financing goals. (3) Life insurance risk transfer securitizations designed to protect life insurers or reinsurers against mortality or longevity risk. The two final categories are (4) pure asset securitizations such as those involving commercial mortgages issued by insurers; and (5) viatical and life settlement securitizations.

Transactions falling into these five categories account for nearly all of the life insurance and annuity securitizations conducted to date. However, this article does not cover pure asset securitizations because such transactions have been extensively analyzed in the finance literature. Viatical and life settlement securitizations are not included in the analysis because they have different motivations and objectives from the insurer risk-hedging and financing securitizations that are the focus of the present discussion.<sup>8</sup> The securitizations discussed in this article are summarized in Figure 4. A summary of earlier transactions appears in Millette et al. (2002).

---

<sup>8</sup> Viatical and life settlement securitizations have been conducted as attempts to generate a secondary market in insurance and annuity policies. In these transactions, an intermediary, often a broker or entrepreneur, buys up life insurance policies from policyholders who would like to realize cash for their policies rather than holding them until they mature as death benefits. The sellers of the policies may be suffering from a serious disease such as AIDS (this type of transaction is a *viatical*), but in other cases may seek to obtain cash by selling their insurance policy, either because it is a term insurance policy with no cash value or the broker offers the insured more than the cash value of the policy (this transaction would be a *life settlement*). The policies purchased by the broker may be placed in a trust and securitized for sale to investors. For further discussion see Gora (2000) and Conning and Company (1999).



**FIGURE 4**  
Life Insurance Securitization Deals Since 1996

<b>Issuer</b>	<b>Date</b>	<b>Amount (millions)</b>	<b>Purpose</b>
American Skandia	1996-1998	\$900+	Liquidity / M&E Securitization
Hannover Re	1998-2002	€731	VIF Securitization
NPI	April 1998	£260	VIF Monetization
Prudential	Dec 2001	\$1,750	Closed Block Monetization
MONY	April 2002	\$300	Closed Block Monetization
Genworth I	Jul 2003	\$1,150	Reg XXX Financing
Forethought	June 2004	\$150	VIF Monetization
Barclays Life	Oct 2003	£400	VIF Monetization
Banner Life	Nov 2004	\$600	Reg XXX Financing
Genworth II	Dec 2004	\$850	Reg XXX Financing
Friends Provident	Dec 2004	£380	VIF Monetization

### Block of Business Securitizations

Because the expense of writing new life insurance policies is generally incurred by the insurer in the first policy year and then amortized over the term of the policy, writing new business can create liquidity problems for life insurers. In addition, regulatory accounting requirements usually result in an increase in insurer leverage associated with new business because regulators require that reserves be established for newly issued policies whereas the profits on the policies tend to be “end-loaded,” emerging gradually over the life of the policy. Consequently, one motivation for life insurance securitizations is to reduce leverage and obtain immediate access to the “profits” expected to emerge from a block of life insurance policies, usually referred to as the present value of in-force business or more simply value in force (VIF). The emergence of profits from a given block of business is affected by various risks, including mortality risk, investment risk, and policy persistency risk, such that the VIF tends to be somewhat volatile. In principle, it is possible for a VIF securitization to result in a true transfer of risk from the insurer to the bondholders as well as no recourse from the securitized bondholder to the insurer (Moody’s Investors Service, 2002). If the transaction can be arranged so that only specified profit flows are used to fund payments to bondholders, nonsecuritized cash flows are unencumbered and can be used by the insurer in its other operations. On the other hand, a typical senior debt issue is funded from a variety of profit sources, making a securitized structure a potentially more efficient method of financing. Thus, with an appropriately designed securitization structure, the insurance company can access cheaper financing, thereby reducing

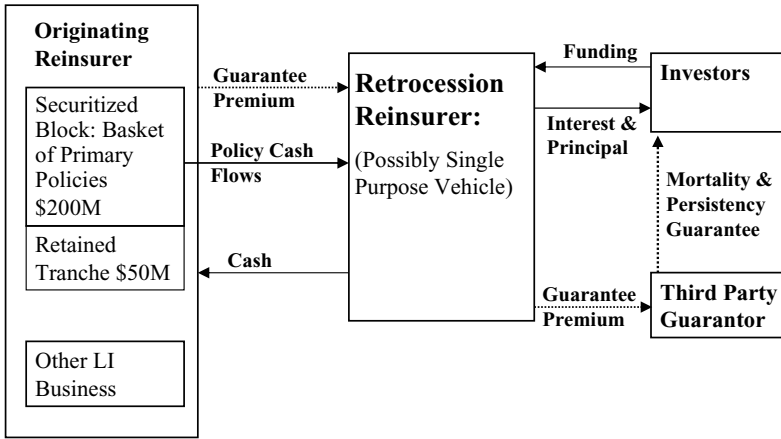
the weighted average cost of capital and thus improving the ROE for the book of business.

From 1996–2000, American Skandia Life Assurance Company (ASLAC) issued 13 securitization transactions designed to capitalize the embedded values in blocks of variable annuity contracts issued by ASLAC. The trusts issuing the notes are collateralized by a portion of the so-called M&E (“mortality & expense”) fees and the early surrender penalties, often referred to as contingent deferred sales charges (CDSC), expected to be realized on the annuity policies. In its 2000–2001 GAAP annual report, the company listed 12 outstanding issues from 1997–2000 with total initial issue value of \$862 million and maturities in the range of 7–8 years (American Skandia, 2002). The spreads over Treasury suggest a rating somewhere in the Baa category. The objective of the transactions was to provide liquidity for the acquisition of new business during a period when ASLAC’s variable annuity business was growing rapidly. The company received debt treatment of the issues under U.S. GAAP and favorable regulatory accounting treatment for the parent company in Sweden.

In a series of transactions (known as L1–L5) dating from 1998 through 2002, Hannover Re has used “closed block” securitizations to sell five large blocks of life, health, and personal accident reinsurance in the market. The sales, which totaled €431 million, were motivated by Hannover Re’s growth opportunities. Hannover Re was achieving substantial growth in its international life and accident reinsurance business, and the company also sought to achieve continued high growth rates in certain target reinsurance markets (Bütow, 2001). However, because German accounting rules require that acquisition costs from life and health reinsurance business have to be written off immediately in the year in which they are incurred, Hannover Re’s growth imposed a heavy burden on the its profit and loss account and regulatory capital position. The company sought to capitalize the acquisition costs and future profits on specified blocks of business through securitization. The initial securitization in 1998, “L1,” raised €51 million, primarily to finance growth in Germany and Austria. The second transaction, L2 in 1999, raised €130 million to finance continued expansion of its life, accident and health, and annuity reinsurance business in Western Europe (including Scandinavia) and North America by acquiring large blocks of existing business in what are known as *block assumption transactions* (BATs). These transactions were innovative because Hannover Re was acting as a “consolidator,” buying up blocks of business, providing acquisition cost financing for its client companies, and then securitizing the business to recover its own acquisition costs. Through consolidation the issuer can exploit informational economies of scale by conducting multiple transactions, spread the fixed costs of securitization over a broader investment base, and pool a larger number of underlying contracts to better diversify mortality and prepayment risk.

The L3 and L4 transactions, both executed in 2000, had similar financing objectives, with the L3 securitization (€50 million) targeting expansion in Asian emerging markets and the L4 transaction (€200 million) targeting further growth in Western Europe. In the L3 transaction, the insurers seeking capital relief through the transaction as well as the principal investors were located in the subject countries. This has the advantages of reducing informational asymmetries between the capital market investors and originating insurers (since both come from the same nation) and also helps to manage exchange rate risk because the transactions can be denominated in the same currency. In the L4 transaction, Hannover Re again acted as a consolidator in financing

**FIGURE 5**  
Value in Force Securitization



the acquisition costs of European insurers in the fast growing unit-linked life insurance market. Similarly, in the L5 transaction, which was executed in 2002 and raised €300 million, Hannover Re acted as a consolidator in financing the acquisition costs of European insurers by securitizing various acquisition costs associated with unit-linked business.

A VIF securitization is diagramed in Figure 5. The figure is based on several transactions that have been done recently but does not represent any particular transaction. It is assumed that an originating reinsurer has created a pool of insurance contracts that have been ceded to the reinsurer by a primary insurer or insurers. In originating the policies, the reinsurer has reimbursed the primary insurers for their acquisition costs. The remaining cash flows on the policies are sufficient to amortize the acquisition costs and provide a profit on the business. The insurer seeks to capitalize the acquisition costs and/or profit component of the policies. It enters into a transaction with a retrocessionaire, which may be an actively managed reinsurer or a SPV. The originating reinsurer assigns the rights to a significant proportion of the cash flows on the underlying insurance policies to the retrocessionaire, who repackages the cash flows and sells the resulting securities to investors. The principal raised from investors is passed to the originating reinsurer to finance acquisition costs and capitalize all or part of the VIF on the block.

Credit enhancement is an important aspect of most VIF securitizations. The consolidation of policies from several originating insurers provides one form of credit enhancement, by creating a more diversified pool of risk. The reinsurer also may be larger and have a better credit rating than some of the originating insurers, potentially reducing the overall costs of the transaction. In addition, the reinsurer may retain part of the securitized block of business for its own account either through a quota share arrangement or a more complicated tranching process where a higher priority in terms of rights to the cash flows is assigned to investors. Either arrangement helps to control moral hazard by giving the originator a strong incentive to perform the monitoring and servicing functions, and the tranching seniority arrangement has the

added benefit of providing additional security to the investors. The originating reinsurer also may provide a guarantee to the investors against adverse experience on the underlying policies for mortality, persistency, and other risks. The guarantee could be provided by the originator or, as in Figure 5, be purchased from a third-party guarantor. Finally, an interest rate swap could be arranged to insulate investors from interest rate risk. Of course, tranching, guarantees, and interest rate swaps add to the cost of the transaction and must be netted against expected benefits in evaluating the transaction's economic viability.

A second important type of block of business securitizations has been associated with demutualizations (Carroll and Duran, 1999; Puccia, 2001; Patrino et al., 2002). Many demutualizations have resulted in the creation of *closed blocks*, consisting of previously issued policies which are assigned assets and liabilities that are accounted for separately from the insurer's ongoing business. In some instances, the closed block cash flows have been securitized and sold to investors. Demutualizations have occurred in many industrialized economies, including the United Kingdom, the United States, and Canada (Swiss Re, 1999). Although closed blocks have been created in most demutualizations, only a fraction of these have been securitized. The following discussion focuses primarily on securitized transactions.

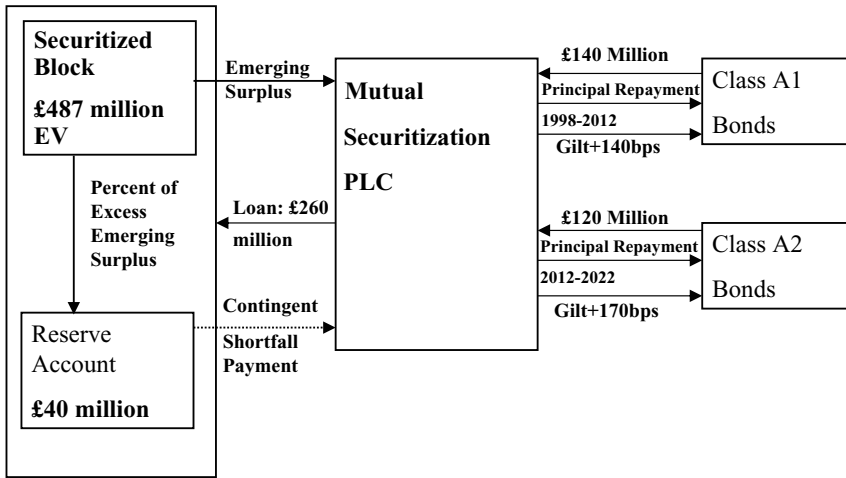
Recognizing the potential for agency conflicts between the owners of the demutualized insurer and the policyholders of the predecessor mutual, regulators have tended to require the creation of closed blocks of insurance consisting of participating policies that existed prior to the demutualization. However, there are also sound business reasons for the creation of a closed block. These include the realization of the VIF from the closed block for use in other activities and the removal of the prior participating business from active management, freeing managers to focus on the company's current strategic objectives. The latter benefit is particularly important in the life insurance industry, where the market has moved away from traditional life insurance products and toward more sophisticated asset accumulation products.

A predecessor to the closed block securitizations that have taken place in the United States is the "open block" securitization in 1998 of the National Provident Institution (NPI) in the United Kingdom. This first-of-its-kind transaction involved the direct sale of interests in an "open block" of life insurance policies underwritten by an insurance company. In an open block securitization, a SPV is established to make a loan to the operating unit of an insurance company in return for the right to the emerging profits on a specified block of life insurance policies. The SPV is funded through the issuance of floating and fixed rate structured notes placed directly in the capital markets to investors interested in taking a position in the present value of future profits on these life insurance policies. This transaction is considered an open block as the block of business was not separated from an accounting perspective from the rest of the business, and NPI continued to sell new policies, although these were not included in the securitization.<sup>9</sup>

---

<sup>9</sup> To provide some protection against credit risk, the bonds issued by the SPV were overcollateralized and the cash flows were subject to a "trigger event," through which all cash emerging from the subject business would be trapped in a reserve account if the securities suffered a ratings downgrade to Baa1/BBB+ (Millette, 2002).

**FIGURE 6**  
National Provident Institution Demutualization Securitization



Source: Millette, et al. (2002).

The NPI transaction is diagrammed in Figure 6. The securitized block of policies consisted of \$4.08 billion in policy values with an estimated embedded value of £487 million. Against this embedded value, the SPV, Mutual Securitization PLC, issued two amortizing sequential tranches of bonds, Class A1 bond with principal of £140 million and Class A2 bonds with principal of £120 million. The Class A1 bonds are amortized over the period 1998–2012 and the Class A2 bonds over the period 2012–2022. Mutual Securitization PLC loaned the £260 million in proceeds to NPI, enabling it to capitalize a portion of the embedded value of the block. The terms of the bond issuance called for NPI to maintain a £40 million reserve account to back the promise to pay principal and interest on the bonds. Accordingly, NPI realized £220 million in funds it could use in its continuing operations, and the loan to value ratio was about 45 percent after netting out the reserve account (220/487). Because NPI retained the right to issue an additional £30 million in bonds, which were never issued, another relevant overcollateralization ratio was the ratio of potential proceeds to total embedded value (290/487) of about 60 percent. Actuarial simulations revealed that the “worst case” ratio of proceeds to embedded value would be about 80 percent. Hence, the bonds were given high ratings by Moody’s and Standard & Poor’s (A3 and A, respectively) based on the degree of overcollateralization and NPI’s claims paying ability.

The NPI transaction is important because it illustrates many of the essential features of an insurance business-block securitization. However, the downside of the NPI transaction was that the offering documents were extremely complex, providing technical actuarial details that were not understandable by typical bond investors. This problem highlights the importance of transparency in securitizations and also provides insight into the value added by firms providing third-party credit enhancement. In addition to providing guarantees, such firms can specialize in the evaluation of complex offering documents and reduce the need for investors to expend resources on attaining a detailed understanding of specific transactions.

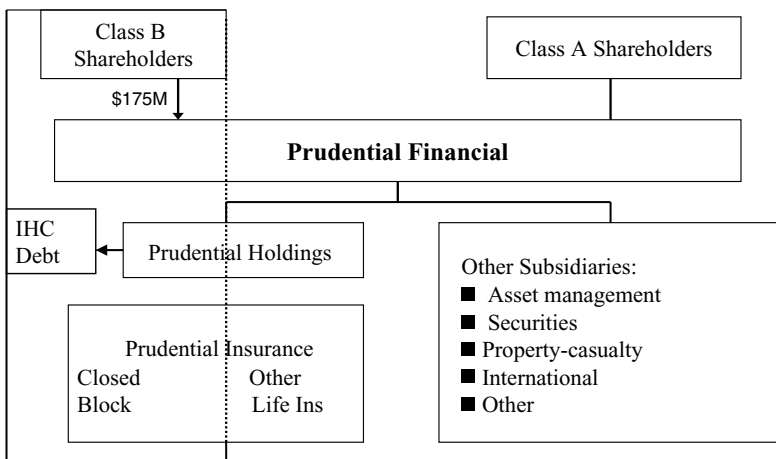
In December 2001, Prudential Financial executed a closed block securitization of participating insurance policies simultaneous with its demutualization. Prudential issued 110 million “class A” shares in its initial public offering, raising approximately \$3 billion, and distributed an additional 456 million shares to policyholders. At the same time, it securitized the closed block by issuing debt securities and “class B” equity, which holds the residual interest in the block. The Prudential closed block transaction is representative of *whole business securitizations*, “through which an entire operating business is isolated, its operations codified in servicing agreements, and its cashflows dedicated to investors” (Millette et al., 2002, p. 403).

The closed block financing raised an additional \$1.75 billion with issues of \$332.85 million of series A floating rate insured notes due in 2017, \$776.65 million of series B fixed rate notes due in 2023, and \$640.5 million of series C fixed-rate notes due in 2023. The various tranches were offered to appeal to different classes of investors, including investors with preferences for investment grade corporates as well as participants in the asset-backed securities market. Prudential also raised \$175 million by issuing “class B” stock, a tracking stock designed to reflect the value of the closed block.

The structure of Prudential Financial after the demutualization is shown in Figure 7. The parent corporation, Prudential Financial, created a downstream holding company, Prudential Holdings, to hold the common stock of Prudential Insurance, the former mutual company that houses the closed block and Prudential’s ongoing life insurance operations. Prudential’s other subsidiaries, engaged in various other financial businesses, were separated from its life insurance operations as part of Prudential’s shift in business strategy away from an emphasis on life insurance and toward a focus on diversified financial services. The closed block notes were issued by Prudential Holdings, whereas the class B stock was issued by Prudential Financial.

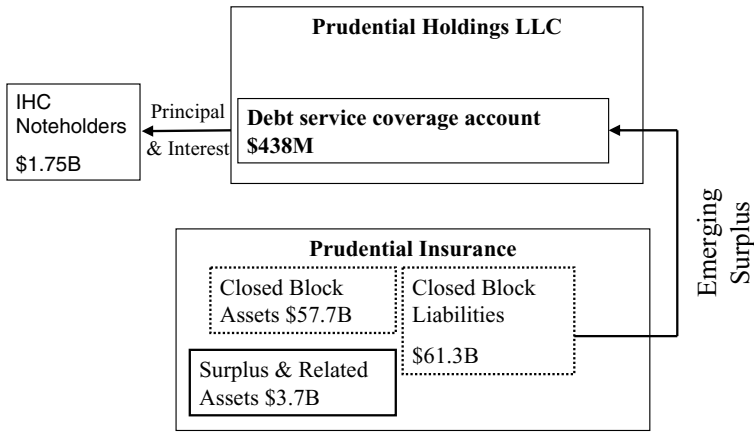
The structure of Prudential’s closed block is diagrammed in Figure 8. The closed block was established with \$57.7 billion in statutory assets and \$61.3 billion of statutory

**FIGURE 7**  
Prudential Financial—After Restructuring



Source: Millette, et al. (2002).

**FIGURE 8**  
Prudential—Around the Block



liabilities. The assets represent the closed block funding amount at the time of establishment that, together with future policyholder premium, is necessary to satisfy obligations of the closed block business (including policyholder dividends) as determined under expected assumptions. The excess of liabilities over assets is attributable to the conservative regulatory valuation standards, primarily with respect to interest and mortality assumptions, that were used to calculate statutory liabilities. Prudential is required to maintain assets outside of the closed block to cover the difference between statutory assets and liabilities and meet surplus requirements with respect to policies in the closed block. The initial amount of this “surplus and related assets” account was \$3.7 billion. The surplus and related assets are released over time as the policies included in the closed block are gradually runoff, creating a statutory net gain for the closed block. The statutory gains can be paid to Prudential Holdings as dividends and used to pay interest and principal on the debt. The present value of these cash flows constitutes the embedded value of the closed block.

To shield the bondholders from any shortfall in the flow of dividends from Prudential insurance, a debt service coverage account (DSCA) was set up within Prudential Holdings using 25 percent of the proceeds of the bond issue (\$438 million). Thus, the ratio of the bond proceeds to surplus and related assets is 47 percent gross of the DSCA and 35 percent net of the DSCA, providing a significant degree of overcollateralization.

In addition to overcollateralization, a number of other steps were taken to protect the bondholders from deterioration of experience on the closed block. For example, strict investment policy guidelines were adopted for the surplus and related assets, constraining investment in a number of ways including requiring a minimum of 90 percent commitment to investment grade assets. The bondholders also received a pledge of approximately 15 percent of the shares of Prudential Insurance as additional security. Bondholders are also protected by management’s ability to reduce policyholder dividend payments to reflect adverse mortality, investment, or lapse experience. This is an important feature of closed block transactions involving participating life insurance policies. In effect, the objective is to use the dividend scale

as a lever to enable the assets and liabilities of the closed block to runoff to zero by the time the last policy terminates. In addition to full disclosure of the experience of the closed block, other mechanisms were specified in the bond indenture to encourage management to appropriately reduce dividend payments in the event of adverse experience. Numerous bond covenants were also included to provide further protection to investors, including restrictions on Prudential Holdings incurring other types of indebtedness. Finally, the Series A and B notes were insured through a financial guarantee insurance policy issued by Financial Security Assurance (FSA).

The Prudential transaction may have been relatively advantageous to Prudential in comparison to the nonsecuritized closed block established as part of the demutualizations of Metropolitan Life and John Hancock. By securitizing the emerging surplus and regulatory capital emerging from the closed block, Prudential was able to raise capital at the holding company level, facilitating its deployment in Prudential's other businesses. The Prudential deal also differed significantly from NPI because Prudential did not retain an equity stake in the closed block but rather sold the ownership rights to class B shareholders. On the downside, the Prudential deal was extremely complex and costly to set up. Such complexity is inherent in the nature of traditional participating life insurance policies.

MONY life insurance company demutualized in 1998 and set up a closed block at that time. It securitized the closed block in April 2002, when it issued \$300 million of debt securities with an option to issue \$150 million more at a later date. The MONY transaction was a VIF securitization structured similarly to the Prudential transaction shown in Figures 7 and 8. Floating rate insured debt securities were issued benchmarked to 3-month LIBOR plus 55 basis points (MONY Holdings, 2002). The notes mature in January 2017 and annual scheduled amortization payments begin in January 2008. The transaction was rated Aaa by Moody's and AAA by Standard & Poor's, due to a third-party credit enhancement guarantee by AMBAC.<sup>10</sup> Including the costs of issuance of \$7.4 million and the insurance premium to AMBAC (75 basis points per annum), the all in fixed interest rate paid by MONY for the notes is 7.36 percent.

The future of life insurance closed block securitizations will be affected by rating agency treatment of closed block debt issues. In 2003, Moody's Investors Service (2003b) issued a report stating that it will treat insurer's closed block debt and interest expense no differently from senior unsecured debt issued by the company for purposes of calculating financial leverage and debt service coverage. This generally implies that insurers will not be able to increase leverage in their nonclosed block operations following the issuance of closed block debt without facing the risk of rating downgrades. This treatment of closed block debt casts some doubt on the future prospects for closed block securitization transactions.

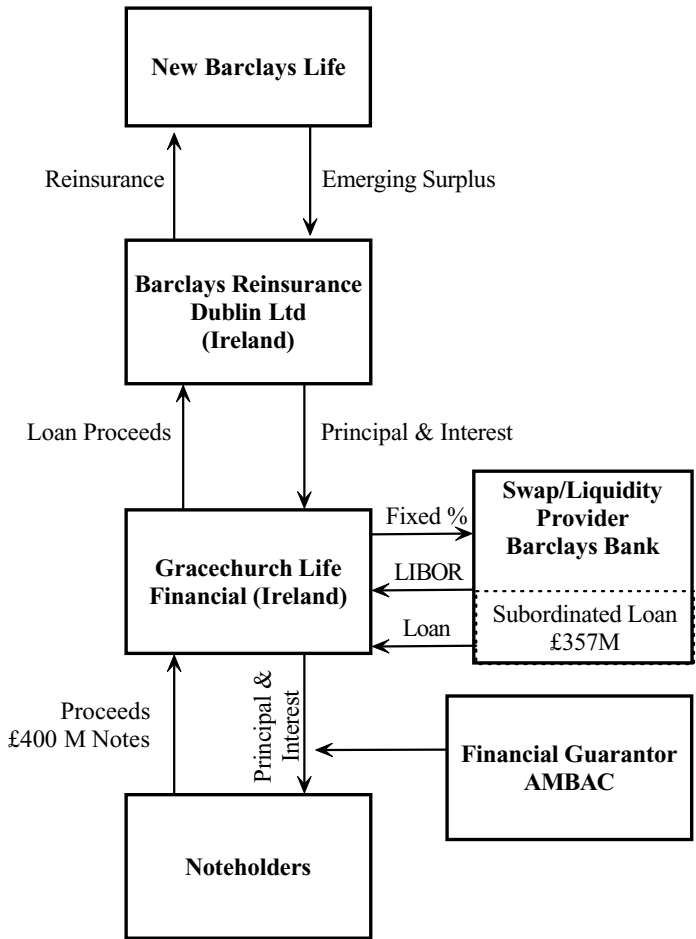
Closed block transactions also can be undertaken to realize embedded values from blocks of life insurance and annuity policies that are not part of a demutualization. Such a transaction was undertaken in November 2003 by New Barclays Life. The transaction securitized the emerging surplus from the entire closed book of New

---

<sup>10</sup> J.P. Morgan, *Global ABS/CDO Weekly Market Snapshot* (May 17, 2002). See also Form 10Q for MONY Group, U.S. Securities and Exchange Commission, November 15, 2002.



**FIGURE 9**  
New Barclays Life Securitization



Barclays Life. New Barclays Life was created to house the business of two Barclays subsidiaries which had originated the business but had ceased writing new business.

The Barclays transaction is diagrammed in Figure 9. The emerging surplus from New Barclays Life is paid to a newly created special purpose vehicle, Barclays Reinsurance Dublin Ltd. Barclays Reinsurance in turn passed the funds to Gracechurch Life Financial, which issued £400 million in floating rate secured notes due in 2013. The proceeds of the notes are passed by Gracechurch to Barclays Reinsurance and used to finance a reinsurance contract with New Barclays Life. As part of the transaction, Barclays Bank also made a subordinated loan of £357 million to Gracechurch Life Financial. The subordinated loan was designed to satisfy obligations to the noteholders in the event of deteriorating experience on the closed life insurance block. In addition, the issuer entered into an insurance agreement with AMBAC to guarantee the notes. As a result of these credit enhancements and the general credit quality of Barclays

Bank, the notes were rated Aaa by Moody's (see Moody's Investors Service, 2003a; Kane et al., 2003). In effect, Barclays Bank reduced its contingent loan exposure to its life business by £400 million and obtained regulatory capital relief. This is an innovative transaction partially motivated by regulation and partially by the quest for more efficient financing mechanisms.

In December 2004, Friends Provident Life and Pensions Ltd. (FPLP) executed a £380 million VIF Monetization by issuing Floating Rate Secured Notes via a special purpose vehicle, Box Hill Life Finance Plc. The Box Hill transaction, much like the Barclays Life transaction in November 2003, securitized the emerging surplus from a closed block of conventional, unit linked, and unitized life and pensions business. The transaction improved the quality of solvency held by FPLP under the Insurance Groups Directive by increasing its core Tier 1 capital. The transaction was able to raise 54% of the base case embedded value, an improvement over the 44% advance rate of the Barclays Life transaction.

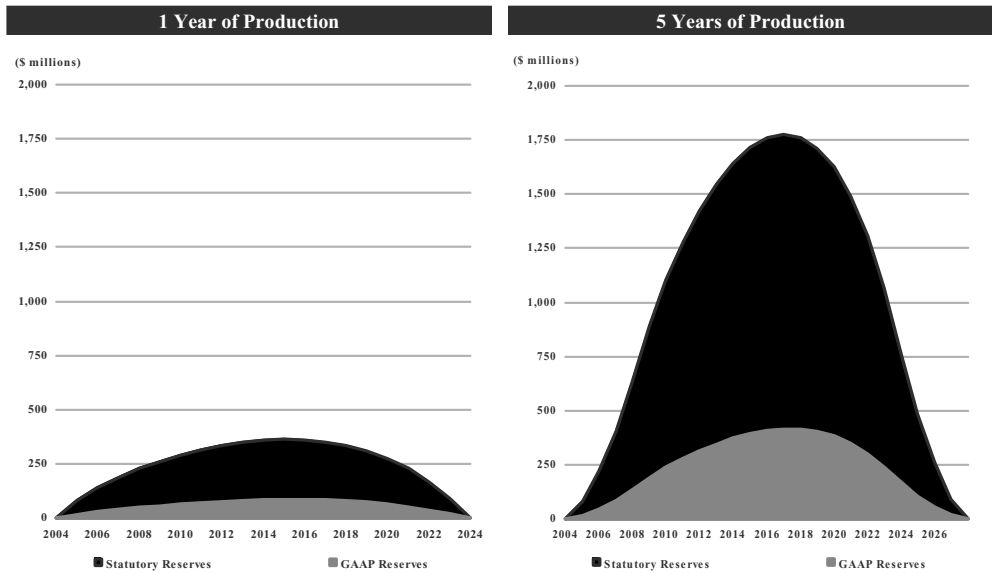
The Notes were issued in two classes. Class A1 (£280 million) was issued at L+20 with a weighted-average life of 2.9 years. Class A2 (£100 million) was issued at L+23 with a weighted-average life of 5.8 years. Credit enhancement on the notes consisted of a AAA financial guarantee from Ambac Assurance UK Ltd., a 2-year liquidity facility, a funding swap, and a £14 million reserve for the Class A2 notes. The two classes of Notes were, with respect to risk, ranked *pari passu* with one another, however, Class A1 will pay down prior to payments of principal to holders of Class A2. The Class A2 notes receive an additional 3 basis points in yield, reflecting the longer weighted average life.

### Reserve Funding Securitizations

Another important emerging class of life insurance transactions consists of reserve funding securitizations. In these transactions, the life insurer seeks relief from regulatory reserving requirements and/or seeks to reduce its leverage in order to finance new business or reduce its cost of capital. In July 2003, First Colony Life Insurance Company, a subsidiary of GE Financial (now Genworth Financial), concluded a \$1.15 billion facility, \$300 million of which was drawn down immediately, through a special purpose vehicle, River Lake Insurance Company ("River Lake"), to obtain reserve relief under Regulation XXX. In December 2003, an additional \$300 million was drawn down. Two other transactions of this nature were executed in 2004, one by Legal & General America, and the other being a second transaction by Genworth Financial. The size of the facilities were \$600 million and \$850 million, respectively.

Regulation XXX, which was promulgated by the National Association of Insurance Commissioners and became effective in most states on January 1, 2000, requires insurance companies to establish reserves using very conservative valuation assumptions. As a consequence, redundant excess reserves on certain types of level premium-term life insurance policies with long-term premium guarantees are established. The reserves typically build up and disappear over the premium guarantee period, creating a "hump-backed" capital strain for insurers writing this type of coverage. The XXX reserve pattern is diagrammed in Figure 10, which shows the regulatory reserve and an illustrative "best estimate" GAAP reserve for 1 and 5 years of

**FIGURE 10**  
Financing XXX Reserves



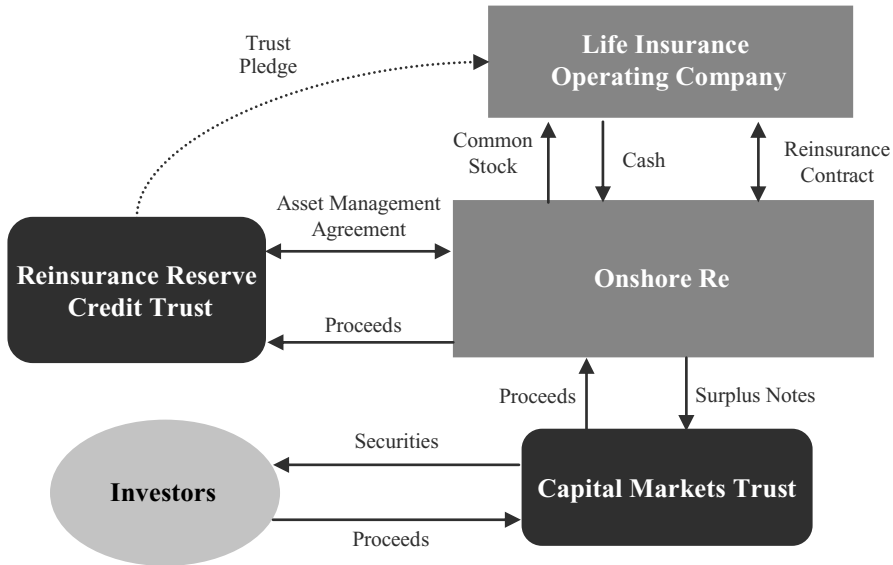
new policy production. The regulatory reserve is much more conservative than the GAAP reserve, primarily due to the conservative mortality assumptions required by regulators.

Insurers have sought alternative ways to mitigate the effects of Regulation XXX after finding that their original solution, offshore reinsurance backed by letters of credit, was becoming increasingly expensive and difficult to obtain and that the rating agencies were becoming less comfortable with a solutions that relied upon a 1-year letter of credit to back a 20- or 30-year liability. The rating agencies also forecast an increase in demand for letters of credit that is likely to expose insurers and reinsurers to liquidity and repricing risk that could adversely affect financial ratings, especially for business subject to XXX reserves (Moody’s Investor’s Service 2004b).<sup>11</sup>

A hypothetical reserve funding securitization is diagramed in Figure 11. The transaction provides reinsurance to the sponsoring insurer through an onshore special purpose vehicle (“Onshore Re”), which is wholly owned by the sponsor. The reinsurer issues equity capital to the sponsor in return for a cash payment. The sponsor

<sup>11</sup> S&P commented: “The key problem is [a Letter of Credit solution] is finite. Letters of credit generally have a one-year duration, after which they must be renewed. Pricing is rarely locked in and could rise if the credit rating on the company is lowered or if market conditions change . . . In addition, there is limited capacity to the available letters of credit” (Standard & Poor’s, 2004). Moody’s stated: “LOC demand for XXX reinsurance alone was \$9 billion as of year-end 2002. Ultimate demand is expected to exceed \$100 billion . . . With the projected explosive growth in LOC demand, there’s the risk of lack of capacity and upward pressure on LOC pricing over time” (Moody’s Investors Service, 2004a).

**FIGURE 11**  
Internal Reinsurance Using Nonrecourse Debt



thus takes the first dollar loss position in the transaction. However, most of the reinsurer's proceeds are raised by issuing surplus notes to a capital markets trust. The trust in turn issues debt securities to investors, raising funds to capitalize Onshore Re. To qualify for treatment as reinsurance for regulatory purposes, the funds are invested in a *reinsurance reserve credit trust*, which is pledged to the sponsoring life insurer.<sup>12</sup> If adverse mortality experience were to develop on the underlying insurance policies, funds would be released from the SPV to cover any shortfall. The cost to the insurer is the rate paid on the debt securities less the earned rate on the assets in the *reinsurance reserve credit trust* plus the cost of any financial guarantee policy as well as the cost of establishing the structure amortized over the expected life of the transaction. Such a transaction may be attractive to the sponsor even if the spread is somewhat higher than the cost of reinsurance or a letter of credit because it represents a long-term rather than short-term solution to the XXX problem which insulates the issuer from repricing risk.

The securities issued to the investors in Figure 11 are considered nonrecourse debt because the investors must look to Onshore Re to satisfy the interest and principal payments on the debt, i.e., they cannot proceed against the sponsoring insurer. Onshore Re is fully consolidated into the sponsoring insurer for GAAP accounting purposes. Because surplus notes are treated as debt for GAAP purposes, the transaction increases the GAAP debt capital of the sponsor, with offsetting assets raised in the transaction. As the debt is nonrecourse, the rating agencies ignore the debt in

<sup>12</sup> For a discussion of regulatory issues relating to onshore special purpose vehicles see Grace, Klein, and Phillips (2001).

their financial and operational leverage calculations (Levine, 2004), and consequently it should not adversely affect the insurer's cost of capital.

The primary objective of the transaction is reserve relief from a statutory accounting perspective, because Regulation XXX affects statutory reserves but not GAAP reserves. Because insurance regulators focus on companies rather than groups, Onshore Re and the sponsoring life insurer are treated separately for regulatory purposes. And, because surplus notes are treated as capital for regulatory purposes, Onshore Re can support the Regulation XXX reserves by a combination of equity capital and surplus notes. The sponsoring insurer in effect transfers its Regulation XXX problem to Onshore Re as part of the reinsurance transaction, reducing its statutory leverage and facilitating future growth in new business, which otherwise would place a burden on its statutory capital.

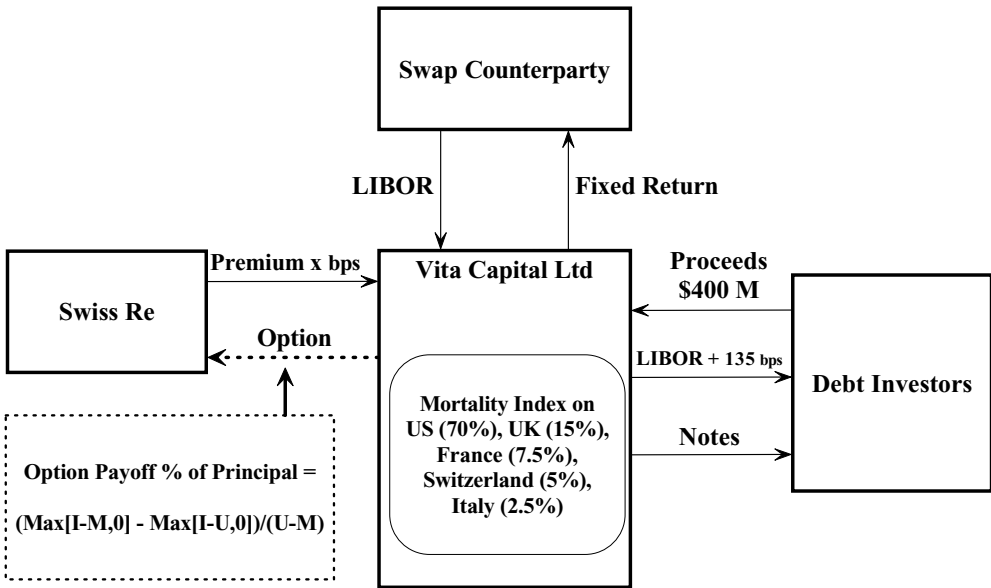
### Risk Transfer Securitizations

The final type of transaction considered in this article consists of pure risk transfer securitizations. Such securitizations can be used to protect an originating insurer against mortality risk in the case of life insurance or longevity risk in the case of annuity and pension products. For example, it would be possible to set up an asset-backed structure where the insurer would make payments equal to the expected mortality costs under a block of policies to a SPV and receive payments based on the actual mortality experience under the block. The SPV would be funded by issuing notes to investors, who would receive LIBOR plus a risk premium to compensate for bearing the mortality risk. The bond could be structured to track the experience on a specified block of life insurance policies. However, unlike the closed block transactions discussed above, the structure would cover only the mortality risk and not the other risks affecting the profitability of the policy block. Although it has been argued that such transactions would have maturity structures that might not appeal to investors (Millette et al., 2002), in fact the maturity would not need to extend until the entire policy block had expired but only for the period when the mortality risk is relatively high.

Another approach to a mortality risk securitization is a new product, the *mortality risk bond*, which covers the insurer for higher than expected mortality. Similar products also could be structured to cover longevity risk. The mortality risk bond is very similar to a CAT bond, which covers losses from property catastrophes (e.g., Froot, 2001; Lane and Beckwith, 2002), except that it is triggered by adverse mortality experience. The mortality trigger could be based on the experience of a specified insurer or reinsurer or it could be based on a mortality index.

The first known mortality risk bond was issued by Swiss Re in December 2003. The Swiss Re transaction is diagrammed in Figure 12. To carry out the transaction, Swiss Re set up a special purpose vehicle, Vita Capital Ltd. Vita Capital initially intended to sell \$250 million of mortality index notes in 2003 and \$150 million in a follow-up transaction in 2004. But due to strong investor demand it combined the issues. The bonds carried an A3/A+ ratings from Moody's and S&P, respectively. The notes mature on January 1, 2007 and carry a premium of 135 basis points over 3-month LIBOR. Vita Capital executed a swap transaction to swap Swiss Re's fixed premium payment for LIBOR. In return for paying the premium to Vita Capital, Swiss Re obtained a call option on the proceeds in the SPV. The option is triggered by a mortality

**FIGURE 12**  
Mortality Index Bond



index based on general population mortality in the United States and four European countries, with mortality weighted by country as shown in the figure. If cumulative adverse mortality exceeds 130 percent of the actual number of deaths in the indexed pool in 2002, Swiss Re would withdraw proceeds from the SPV (Siberon, 2003). The full amount of proceeds would flow to Swiss Re if cumulative adverse mortality reached 150 percent or more of the actual number of deaths in 2002, with proportionate payment from the SPV for adverse mortality falling between 130 and 150 percent. The contract is thus structured as a call option spread on the index with a lower strike price of 130 percent of 2002 mortality and an upper strike price of 150 percent.

The Swiss Re transaction is noteworthy because it focuses directly on mortality risk and hence is much simpler to model and understand than transactions involving all of the cash flows on whole blocks of life insurance policies. Basing the payoff on population mortality rather than the mortality of a specific insurer has the advantage of reducing investor concerns about moral hazard and also of basing the payoff a large and geographically diversified pool of risks. The downside of index transactions, of course, is that they expose the insurer to basis risk, i.e., the risk that the insurer's mortality experience could deteriorate significantly more than that of the index. For this reason, mortality index bonds are likely to appeal primarily to large, diversified multinational insurers or to reinsurers whose business is broadly diversified geographically.

**SECURITIZATION: GENERALIZATIONS AND PROSPECTS**

It is possible to draw some generalizations from the life insurance and annuity securitizations that have taken place to date as well as some conclusions about future prospects. One important conclusion is that securitization has the potential to increase the efficiency of both insurance and financial markets. Securitization can increase the efficiency of insurance markets by utilizing capital more effectively, thus reducing the cost of capital and hence the cost of insurance, for any given level of risk-bearing capacity. Securitization can accomplish this goal by spreading risk more broadly through the economy rather than by warehousing risk in insurance and reinsurance companies, which have lower capacity and diversification potential than the capital market as a whole. Efficiency can also be improved by transferring risk to securities markets to the extent that removing risks from the insurance industry reduces transactions costs, agency costs, and regulatory costs. Securitization can improve the efficiency of securities markets by creating nonredundant securities, such as mortality risk bonds, which have low correlations with market systematic risks, by making other types of cash flows, such as insurance policy embedded values, available to wider classes of investors, and by creating pure play securities on these cash flows by removing or insulating them from the balance sheets of insurers.

A second important generalization is that in spite of the potential efficiency gains from securitization most of the transactions conducted to date have been driven in whole or in part by regulation. This is the case for the largest transactions, i.e., the U.S. closed block securitizations associated with demutualizations as well as the Regulation XXX securitizations discussed above. This situation contrasts with the market for CAT bonds and other catastrophic event-linked securities, which have been primarily motivated by risk financing needs. Even where regulation is not a driving force behind securitization, the fact that life insurers are heavily regulated implies that regulatory approval will be required and regulatory costs will be incurred in most life insurance securitizations, especially those that involve liabilities to policyholders. Thus, one important conclusion is that regulation could be restructured to facilitate securitization transactions that have the potential to enhance market efficiency, while providing less intrusive mechanisms for protecting policyholders against insolvency and management conduct risk.

A third generalization is that the life insurance securitization transactions executed to date have tended to be quite complex. This is perhaps inevitable when securitizing an entire block of insurance and annuity policies, where the underlying cash flows are determined by numerous contingencies including mortality, persistency, regulatory risk, insurer policy dividend decisions, and other factors. The actuarial and financial modeling undertaken in support of insurance securitizations are also quite complex and unfamiliar even to sophisticated investors. Each layer of complexity increases the degree of informational asymmetries between the investor and the issuer, reducing credit ratings and adding to costs. As a result, most extant insurance securitizations have been heavily overcollateralized and also have required the purchase of third-party guarantees. For the insurance securitization model to reach its full potential, creative approaches are needed that can simplify the process and increase the transparency of the transactions. In this regard, the Regulation XXX and mortality bond transactions are encouraging and perhaps suggest that a fruitful approach in the future will be to securitize particular cash flows and

contingencies rather than entire blocks of business. Although the securitization of emerging surplus may be advantageous in some circumstances, stripping out particular risks and cash flows is a promising idea that may reduce costs and permit volume to increase.

Besides regulation, perhaps the greatest impediment to the growth the ABS market in life insurance and annuities is the traditional complexity and opacity of insurance risk warehouses. Complexity and opacity enable insurers to protect private information on underwriting standards, contract design, and actuarial modeling. However, in the long run, it is likely to be advantageous to some insurers and to the market as a whole to forgo some of this private information in order to develop a more efficient market for risk-management and risk-transfer. One reason why spread costs tend to be somewhat high in insurance transactions is that significant informational asymmetries are present between risk-warehousing insurers that would like to securitize and the securities markets. This creates a classic adverse selection or "lemons" problem, which means that the market will not function optimally and in the extreme market failure may occur. Moral hazard, in terms of maintaining the originating insurer's incentives to properly monitor and service the cash flows arising from blocks of policies, also constitutes an important impediment. To a significant degree, it may be possible to overcome adverse selection and moral hazard problems by devising creative tranching structures. The transactions could be structured with senior tranches that are relatively information insensitive, backed by thorough disclosure and actuarial modeling, along with information-sensitive tranches, which are sold to specialist investors and/or retained by the sponsor. The retention of the riskier elements of the cash flows also helps to mitigate the originator's moral hazard problem. The future is expected to witness a range of transactions, some of which will unbundle and market specific risks or cash flows, and others that will use tranching arrangements to overcome information problems.

A final concluding comment is that life insurance and annuity securitizations will not achieve the level of success of mortgage-backed securities and other types of asset-backed securities until a substantial volume of transactions reaches the public markets. The transactions to date have almost exclusively been private placements. By definition, such transactions do not access the entire capital market and hence do not fully exploit the potential for diversification and efficiency. In addition, private placements tend to be obscure to the investing public in general such that investors in general do not become familiar with the securities and novelty premia are likely to continue to inflate the costs of securitized financing mechanisms. For a public market to develop, standardization and simplification of transactions will be required, and market participants should keep this objective in mind when structuring future transactions.

## REFERENCES

- American Skandia, 2002, *Consolidated US GAAP Statements: 2000–2001* (Shelton, CT).
- Becker, D., 1999, The Value of the Firm: The Option Adjusted Value of Distributable Earnings, in: *Society of Actuaries, Financial Reporting Section Monograph* (Schaumburg, IL: Society of Actuaries).



- Bütow, S., 2001, *Securitization in Life, Health, and Personal Accident Reinsurance, in Hannover Re's Perspectives—Current Topics of International Life Insurance*, Issue No. 7 (Hannover, Germany: Hannover Re).
- Carroll, C., and J. P. Duran, 1999, *Closed Blocks and Mutual Company Conversions, in Society of Actuaries, Financial Reporting Section Monograph* (Schaumburg, IL: Society of Actuaries).
- Conning and Company, 1999, *Viatical Settlements: The Emerging Secondary Market for Life Insurance Policies* (Hartford, CT).
- Cummins, J. D., and C. M. Lewis, 2003, Non-Traditional Asset-Backed Securities as Pension Fund Investments, in: O. Mitchell, and K. Smetters, eds., *The Pension Challenge: Risk Transfers and Retirement Income Security* (New York: Oxford University Press).
- Cummins, J. D., D. Lalonde, and R. D. Phillips, 2004, The Basis Risk of Index-Linked Catastrophic Loss Securities, *Journal of Financial Economics*, 63: 77-111.
- Cummins, J. D., and A. M. Santomero, 1999, *Changes in the Life Insurance Industry: Efficiency, Technology, and Risk Management* (Norwell, MA: Kluwer Academic Publishers).
- Fore, D. C., 2003, The Impact of Fair Value Accounting Standards on the Portfolio Composition of Life Insurance Companies, TIAA-CREF Institute Working Paper 13-050103, New York.
- Froot, K., 2001, The Market for Catastrophe Risk: A Clinical Examination, *Journal of Financial Economics*, 60: 529-571.
- Girard, L. N., 2002, An Approach to Fair Valuation of Insurance Liabilities Using the Firm's Cost of Capital, *North American Actuarial Journal*, 6: 18-46.
- Girard, L. N., 2000, Market Value of Insurance Liabilities: Reconciling the Actuarial Appraisal and Option Pricing Methods, *North American Actuarial Journal*, 4: 31-62.
- Gora, J. C., 2000, *Viatical and Life Settlements: The Challenge Facing the Life Insurance Industry* (Atlanta, GA: Life Office Management Association).
- Grace, M. F., R. W. Klein, and R. D. Phillips, 2001, Regulating Onshore Special Purpose Reinsurance Vehicles, *Journal of Insurance Regulation*, 19: 551-590.
- Group of 10, 2001, *Report on Consolidation in the Financial Sector* (Basel, Switzerland: Bank for International Settlements). Available at <http://www.bis.org/publ/gten05.htm>.
- Iacobucci, E. M., and R. A. Winter, 2003, *Asset Securitization and Asymmetric Information*, Working paper, Faculty of Law, University of Toronto.
- International Association of Insurance Supervisors, 2003, *Issues Paper on Life Insurance Securitization*, Basel, Switzerland.
- Kane, B., H. Wright, M. Bakhda, M. Brennan, and E. Lancaster, 2003, *Presale: Gracechurch Life Finance PLC* (London: Standard & Poor's).
- Lane, M., and R. G. Beckwith, 2002, *2002 Review of Trends in Insurance Securitization* (Kenilworth, IL: Lane Financial).
- Levine, J., 2004, *XXX Reserves: Credit and Analytic Issues*, Powerpoint presentation, Moody's Investors Service, New York.

- Millette, M. J., J. Kumar, O. T. Chaudhary, J. M. Keating, and S. I. Schreiber, 2002, Securitization of Life Insurance Businesses, in: M. Lane, ed., *Alternative Risk Strategies* (London: Risk Books).
- MONY Holdings, LLC, 2002, Form S-4, Registration Statement Under the Securities Act of 1933, U.S. Securities and Exchange Commission, Registration No. 333-96595, July 17.
- Moody's Investors Service, 2002, *Moody's Analysis of Life Insurance Embedded Values and Their Securitization*, London.
- Moody's Investors Service, 2003a, *Moody's Assigns Definitive Ratings to Floating Rate Secured Notes Issued by Gracechurch Life Finance PLC*, London.
- Moody's Investors Service, 2003b, *Moody's Comments on US Life Insurers' Closed Block Debt Issuance*, New York.
- Moody's Investors Service, 2004a, *XXX Reserves: Credit and Analytic Issues Presentation*, New York.
- Moody's Investors Service, 2004b, *Special Comment on Hidden Credit Risks of Regulation XXX/Guideline AXXX Reserves*, New York.
- Patrino, P. F., J. A. Burke, M. J. Barry, and D. M. Pawlowski, 2002, *Exiting the Closed Block* (New York: Fitch Ratings).
- Perrott, G., and W. Hines, 2002, Fair Value Accounting Compared to Other Accounting Systems, *North American Actuarial Journal*, 6: 62-90.
- Plantin, G., 2002, *Tranching*, Working Paper, University of Toulouse and London School of Economics.
- Puccia, M., 2001, *Insurance Capital Optimization: Reducing Risk Through the Creation of a Closed Block* (New York: Standard & Poor's).
- Reitano, R., 1997, Two Paradigms for the Market Value of Liabilities, *North American Actuarial Journal*, 1: 104-137.
- Siberon, J., W. Chang, S. Zerarka, and J. Doona, 2003, *Presale: Vita Capital Ltd.'s Principal-At-Risk Variable-Rate Mortality Catastrophe-Indexed Note* (New York: Standard & Poor's).
- Standard & Poor's, 2004, *Credit FAQ: The Looming Crisis of XXX Reserves*, New York.
- Swiss Re, 1999, Are Mutuals and Endangered Species? *Sigma*, No. 4, Zurich, Switzerland.