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Pandemic: Managing Mortality Risk

BY DAVID RAINS

Could tapping into capital markets in the form of extreme-mortality bonds help to immunize the insurance industry against catastrophic risk?

THE RISK OF PANDEMIC DISEASE is so unmanageable that many insurance carriers don't even bother to try. Hedging the risk through traditional treaty reinsurance (in which the reinsurer assumes a specific portion or category of risk) is so costly that it can put pressure on earnings. When forced to balance quarterly performance results against potential long-term risk, most insurance companies have concluded that the likelihood of an event simply doesn't justify the expense. But does it? Three pandemics (and a near miss) have all occurred in the past century.

Fortunately, a new approach has surfaced in the area of insurance-linked securities (ILS).^{*} By tapping into the depth and flexibility of capital markets through extreme-mortality bonds—a subset of catastrophe bonds—insurance and reinsurance companies may be able to remove pandemic risk from their portfolios and better manage the cost of coverage.

Reinsuring a Remote Risk

Pandemic risk involves the widespread outbreak of a disease that is extremely difficult to treat. The rate of fatality can be very high, translating into billions of dollars in claims to insurers. Even if an insurance company has enough capital to withstand this sort of catastrophe, it may be forced as a result to operate on a thin capital base, and the raising of funds takes time.

The implications are profound, yet the likelihood remains low. The three most recent influenza pandemics occurred in 1918, 1957, and 1968 (Some would consider the outbreak of SARS [se-

vere acute respiratory syndrome] in this century to be a very close call). Vaccine development has kept the probability of future outbreaks to a minimum, and enhanced identification and treatment capabilities prevent diseases from spreading rapidly. Risk Management Solutions' (RMS) pandemic model puts an outbreak on the level of the 1957 influenza pandemic as a 1-in-40-years event. According to RMS, the chances of a 1918-caliber outbreak (which could result in at least 2 million fatalities in the United States alone) are even more remote: 1 in 475 years.

In the competition between nature and medicine, however, the former has first-mover advantage. The development of remedies and vaccines is necessarily reactive, explored only in response to an existing need. While medical advances have improved our ability to mitigate pandemic risk, other factors have converged to increase the potential severity of an outbreak. The world's population is growing rapidly, particularly in emerging economies. At the same time, markets around the world are interconnected, and insurance companies are globalizing their life portfolios. Even as pandemic risk becomes medically more remote, the costs of such an event grow higher.

Given the difficulties—and lack of perceived benefit—associated with transferring pandemic risk, insurers have traditionally downplayed its importance. Typically, they believe that having enough capital relative to peers provides ample protection, under the assumption that not being the first carrier drained of capital is sufficient. They argue that doomsday scenarios, in which the implications are world-changing, simply cannot be hedged.

Of course, pandemic risk management isn't that straightforward. Armed with the appropriate tools, there's plenty of space between the mundane and the extreme for insurance carriers to address as part of a prudent risk management program. Until recently, however, effective hedging mechanisms have been in short supply.

Treaty reinsurance has been the primary tool for insurers seeking to remove risk from their portfolios, but it's a problematic option. Even when reinsurers charge extremely high rates to write the business, they still can't provide reliable coverage. The risk is moved but not completely removed, because the insurer remains vulnerable to counterparty credit risk related to the covering reinsurer's cost in repaying the contract (though bond swap

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counterparties in securitized insurance risk transactions do present some counterparty credit exposure). Put more simply, although traditional reinsurance allows an insurer to shift a substantial amount of risk (perfectly correlated with the amount of risk with which the reinsurer is already saturated), the insurer remains reliant upon the solvency of its reinsurer. In the event of a pandemic outbreak, the reinsurer might not be able to cover the total insured losses without putting its rating—or even its solvency—at risk. If the reinsurer is driven to insolvency by the loss, the original insurer receives little protection and could be obliterated as well.

A Capital Idea

The only viable approach, it seems, is to push the risk out of the reinsurance market almost completely. The vast resources of capital markets provide the support necessary for carriers to dispose of pandemic risk in a cost-effective and reliable manner.

In 2007, close to \$60 trillion in securities was traded in public capital markets. There's significant depth to this venue that doesn't exist for traditional reinsurance. It provides the needed capacity for carriers to hedge pandemic risk. Extreme-mortality bonds, which belong to the ILS asset class that helps carriers transfer pandemic risk from their portfolios, bridge the gap between needs of insurers and capital market resources. Pools of insureds underlie each extreme-mortality bond, providing the necessary reference point for measuring fatality levels and determining when payments are necessary.

The extreme-mortality-bond asset class is still in its infancy and accounts for only a small fraction of newly issued capacity. As of Sept. 30, 2008, only one has been issued for the year, with total limits of \$100 million. For the natural catastrophe bond market, 13 have been issued in 2008 (as of Sept. 30, 2008), with outstanding limits of \$2.7 billion. Clearly, these are relatively new instruments that the market is only beginning to grasp.

Like property-catastrophe bonds, extreme-mortality bonds are linked to event triggers. A specific event occurs, leading to the possibility of a payout. For property-catastrophe bonds, there are indemnity triggers and non-indemnity triggers. The former involve payment based on actual losses, while the latter use index or modeled-loss estimates. Currently, extreme-mortality bonds have been structured with index triggers only. An extreme-mortality bond's index is defined by an underlying pool of insureds. This group is used to fashion a "mortality index," which is usually tied to an existing reference point, such as metrics from the U.S. Centers for Disease Control. Weighted by age, sex, and geography, scenarios are evaluated using mortality models to define the parameters of protection offered by the bond. This index can be customized to meet the specific risks that the issuing insurer wants to hedge, or it could be designed in a manner that will appeal to likely investors. After all, securitizing risks that investors have no interest in buying will not help the carrier transfer them.

If a certain mortality rate is reached (i.e., the attachment point), payments begin. If mortality exceeds the bond's exhaustion point, the

entire face amount will have been paid. The attachment rate, from the investor's perspective, is the minimum mortality rate at which a loss will occur. At the exhaustion point, all principal and future interest payments have been consumed. Investors hope for a loss-free bond, which would result in regular interest payments throughout the life of the security, as well as a return of principal when it reaches maturity.

The possibility of attachment and exhaustion is ascertained using modeled scenarios. Thus, the process is driven by estimates. Payouts refer to indexes rather than actual losses. For insurers, this could become problematic, as the protection offered by an extreme-mortality bond may not correspond to actual losses. When this mismatch in coverage occurs, the pool's mortality rates may not be consistent with the world's behavior. If actual losses are more extreme than movements in the bond's index, the mismatch favors investors. This likelihood, called basis risk, is among the chief concerns surrounding extreme-mortality bonds.

Basis risk has been addressed in non-life lines through indemnity triggers, which result in a payout commensurate with actual losses. So far, though, investors still seem to prefer the index-based alternatives. Also, the maturity of property-catastrophe models relative to their mortality counterparts inherently mitigates basis risk. For extreme-mortality bonds, index triggers leave issuers exposed to this risk. As a result of these two factors, extreme-mortality bond issuers do retain some exposure.

Of course, the exposure to basis risk is substantially lower than simply retaining the risk in its entirety, without a hedge. At least the bond offers some protection, and any gaps in coverage are likely to be small relative to the security afforded. For the most devastating scenarios, basis risk is minimized as it's unlikely that any particular subset of insureds differs enough from the global population's response to pandemic illness to affect bond exhaustion. Extreme-mortality bonds may not provide perfect coverage, but they do deliver considerable protection.

Despite the stubbornness of basis risk, there are advantages to extreme-mortality bonds. Chief among them is the fact that risk is distributed across capital markets. The diversification of capital sources—as a result of having many investors—alleviates concerns as to counterparty credit risk. With treaty reinsurance, the reinsurer's insolvency leaves the cedent exposed. Since extreme mortality bonds are sold to investors with cash up front, counterparty credit risk doesn't exist. Further, bondholders interested in reallocating capital can sell these securities in the secondary market, managing their portfolio risk on an ongoing basis.

Investors also benefit from the transparency afforded by extreme-mortality bonds. Details of assumptions, modeled loss scenarios, and risks are disclosed, allowing potential buyers to make informed decisions. The principal concern at present is that many investors aren't familiar enough with extreme-mortality bonds to use the disclosed information effectively. Most participants in this market tend to specialize in pandemic or insurance risk, though the investor base is likely to grow with the frequency with which these instruments are issued.

Charting a Pandemic

In January 2005, the World Health Organization (WHO) identified the H5N1 virus as having the potential to cause a global pandemic. The WHO has developed a chart indicating six phases of a pandemic, ranging from the low risk of animal-to-human infection to sustained transmission in the general public. The H5N1 virus is currently in Phase 3.

Phase 6	Increased and sustained transmission in the general population.
Phase 5	Larger cluster(s), but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk).
Phase 4	Small cluster(s) with limited human-to-human transmission, but spread is highly localized, suggesting that the virus is not well adapted to humans.
Phase 3	Human infection(s) with a new subtype but no human-to-human spread or, at most, rare instances of spread to a close contact.
Phase 2	No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.
Phase 1	No new influenza virus subtypes have been detected, but an influenza virus subtype that has caused human infection may be present in animals. If virus is present in animals, the risk of human infection or disease is considered to be low.

Source: *Emerging Issue: Global Pandemic*, a Guy Carpenter specialty practice briefing, March 21, 2006, www.guycarp.com/portal/extranet/pdf/GCBriefings/Pandemic_Briefing032106.pdf

While extreme-mortality bonds appear to be exotic investment instruments, mostly because of the underlying indexes, they are actually fairly straightforward. The high level of transparency enables investors to understand the risks they face and make decisions based on their portfolio objectives. Further, the funds are managed in a trust. Consequently, investors and issuers are exposed to minimal credit risk. These factors, in addition to the fact that bond sizes result in limited liability to the investor, translate to a relatively stable investment environment.

The use of mortality bonds doesn't preclude insurer investment in pandemic risk. In fact, it becomes substantially easier through the purchase of mortality securities. Instead of being forced into an all-or-nothing situation, carriers can assume risk in manageable portions. Using this approach, disciplined and specific portfolio management is possible.

Securing a Reliable Hedge

The extreme-mortality bond sector is in its infancy, but the potential afforded by these instruments is striking. Carriers now have a way to truly transfer pandemic risk without incurring counterparty credit risk (and effectively invalidating the hedge). The only way to remove this peril from a portfolio is to push it out of the reinsurance market entirely. Using capital markets, this is possible.

These seemingly exotic tools are really just new and unfamiliar. As carriers and investors begin to understand both the mechanics and advantages of extreme-mortality bonds, it's likely that activity in these securities will increase. To date, life risks have been stubborn, complicating holistic portfolio management. This is beginning to change.

Mortality bonds have a long way to go. Key stakeholders—such as rating agencies, accountants, and regulators—still don't recognize this form of risk transfer in evaluating solvency and capital strength. Nevertheless, life carriers face a substantial threat to solvency in pandemic risk, and mortality bonds provide a solution. As this sector matures, its impact on the business of managing risk will only grow larger.

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