

**Catastrophe Risk Financing in the US and the EU:
A Comparative Analysis of Alternative Regulatory Approaches**

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Abstract

The regulation of insurance companies in the United States (US) and the European Union (EU) continues to evolve in response to market forces and the changing nature of risk but with somewhat different philosophies and at different rates. One important area where both economic realities and markets are changing is catastrophe risk and its financing. This paper examines and compares regulatory and other government policies in the US and the EU generally and their approaches to the financing of catastrophe risk specifically. It is important to understand the fundamental differences between the two systems to gain insights into their disparate treatment of catastrophe risk financing. While policies could be improved in both jurisdictions, we argue that the much greater reform is needed in the US relative to the EU regulatory policies that are being developed. We offer recommendations on how US policies could be significantly improved as well as comment on issues facing the EU. We conclude with some observations on the potential for further progress in advancing and harmonizing the US and EU regulatory systems.

Introduction

The threat of “natural” and “man-made” disasters continues to grow in many parts of the world do to a confluence of factors, including population growth and economic development, climatic changes and weather cycles, geologic activity, and political unrest. Figures 1 and 2 underscore the growing significance of catastrophe risk in terms of both actual and potential catastrophe losses.¹ Figure 1 plots total worldwide insured losses from natural disasters over time and Figure 2 shows aggregate loss exceedance probability curves for worldwide catastrophe losses and hurricane losses in Florida. The nature and severity of the catastrophe threat varies among countries and regions of the world but its implications raise certain common issues and increasing global integration intensifies the inter-dependencies between countries and the rippling effects of a disaster. At its core, the problem of catastrophe risk poses a number of challenges to mitigating its effects, financing the costs that are incurred, and responding to the needs of those affected.

The regulation of insurance and reinsurance companies, among other government policies, has significant implications for the management and financing of catastrophe risk. At present, the risk and cost of catastrophes are borne by many “stakeholders” in different ways through the interaction of public and private sectors that affect their incentives and the efficiency of catastrophe risk management. This paper examines the different regulatory systems and government policies of the United States (US) and the European Union (EU) generally and how they address catastrophe risk financing specifically. The link between the fundamental philosophies and elements of these

¹ The authors express their appreciation to Patricia Grossi and Risk Management Solutions, Inc. for permission to use the data from which Figure 2 was constructed.

regulatory systems and their treatment of risk financing is important. Current policies and the prospects for reforming any specific policy depend on the government frameworks in which they reside.

Box 1 summarizes and compares US and EU policies in several key areas.

[Insert Box 1]

There are reasons to prefer maximum reliance on private risk financing to the extent that is feasible and efficient but governments necessarily play some role and can either encourage or discourage private financing. Hence, it is important to assess government policies towards catastrophe risk financing to determine whether they enhance or diminish economic efficiency. In this context, the regulation of insurance and reinsurance markets and government insurance programs for catastrophe perils can have significant implications for private financing and risk management. There are a number of insights that can be gained from examining these issues that are important for the subject jurisdictions as well as other nations and economies affected by catastrophe risk.

To provide some additional context for our review, we note that advocates of international insurance regulatory standards have tended to embrace a “three pillar” approach to regulation (as described in International Actuarial Association, 2004) that encompasses:

Pillar I: Minimum Financial Requirements

Pillar II: Supervisory Review Process

Pillar III: Measures to Foster Market Discipline

It is helpful to consider this framework in evaluating regulatory systems in different jurisdictions.

The next two sections of this paper review the basic regulatory philosophies and systems in the US and the EU and how they differ. This is followed by a brief discussion of the efforts to harmonize international insurance regulation and the prospects for the convergence of the US and EU approaches. We then evaluate how regulatory policies in the US and the EU address catastrophe risk financing and how these policies could be improved. We conclude with a summary of our analysis and a discussion of its implications for catastrophe risk management and the prospects for improving government policies.

Solvency Regulation in the US

Overview

Insurance regulation in the US is rooted in its historical legacy. The states each retain the principal responsibility for regulating insurance – the federal government has the authority to supersede state regulation when it chooses but has only done so on a selective basis to date.² Principal responsibility for the financial regulation of an insurer is delegated to its domiciliary state but the other states still perform some financial monitoring of all insurers licensed to operate in their jurisdictions and can suspend or revoke their licenses. Each state retains the principal responsibility for regulating the market practices of all insurers operating in its jurisdiction. The states utilize the National Association of Insurance Commissioners (NAIC) to coordinate and support their regulatory activities.

² Klein (1995) and Klein (2005) provide more comprehensive and detailed reviews of the US insurance regulatory system.

Financial regulations, such as risk-based capital (RBC) requirements, are fairly uniform among the states but each still retains the authority to diverge from the common regulations. Market regulation (e.g., rates, policy forms, market conduct, etc.) can vary to a much a greater degree among the states. The market regulation of an insurer in a non-domiciliary state (e.g., the regulation of its rates) can affect its financial condition and risk. This can lead to an externality problem in that practices such as regulatory rate suppression in one state can spread financial distress or insolvency costs to other states (see Klein, 1995).

Legislation has been introduced in Congress that would establish an Optional Federal Charter (OFC) for insurers that choose to be federally regulated. OFC-chartered insurers would not be subject to state regulation. It is unlikely that OFC legislation will be enacted in the near future but many believe that some form of a federal system is inevitable. The philosophy and policies of a federal regulator are unknown at this time but they could embrace many reforms that would establish or more effective and efficient system.

The states have tended to apply a prescriptive or rules-based approach to regulating insurers' financial condition and market practices that is heavily influenced by an accounting perspective. This is reflected in a voluminous set of laws, regulations, rules and other measure that govern insurers' actions. Regulators tend to focus on insurers' compliance with these prescriptions rather than the prudence of their management and actions and their overall financial risk. To their credit, US regulators indicate that they are seeking to move toward a more risk-based and principles-based approach to financial regulation as well as easing inefficient constraints on insurers' activities. However, this

has been a slow evolution that has tended to lag behind economic realities and market developments and its ultimate consummation is not guaranteed.

The emphasis on an accounting rather than a financial risk view in US regulation affects insurers' incentives to use catastrophe risk financing devices. Because of the importance of obtaining "accounting credit" for risk transfer arrangements (explained further below), insurers are compelled to consider how these arrangements affect their financial statements in terms of valuing assets and liabilities, calculating losses and income, and estimating their risk exposure. If regulators placed more emphasis on financial risk assessment than accounting values, insurers would have greater incentives to use the most efficient methods. This is especially true with respect to catastrophe risk – currently US regulators tend to do very little to assess insurers' exposure to and management of catastrophe risk and hence insurers do not obtain a more favorable regulatory evaluation if they manage this risk well.

Accounting Standards

Insurers are generally subject to two sets of accounting standards in the US: 1) Statutory Accounting Principles (SAP); and 2) Generally Accepted Accounting Principles (GAAP). SAP rules are determined by state insurance regulators through the NAIC and insurers are required to file detailed financial statements and other reports in accordance with SAP. GAAP rules are determined by the Financial Accounting Standards Boards (FASB) and insurers are required to follow GAAP in their non-regulatory financial statements and the reports that stock insurers are required to file with the Securities and Exchange Commission (SEC).

SAP and GAAP are similar but there are some important differences. In concept, SAP is intended to determine the liquidation value of an insurer at a point in time whereas GAAP is intended to measure the value of a firm as a going concern which is the primary concern of investors. Hence, SAP does not recognize certain assets recognized by GAAP (e.g., “goodwill” or “franchise value”) and requires insurers to book all acquisition expenses at the time a policy is written rather than pro-rating or amortizing these expenses over the duration of the policy.

One aspect of SAP and GAAP, among others, is particularly relevant to the regulation of cat risk financing. The first is the “accounting credit” that insurers receive for reinsurance and other forms of risk transfer. “Credit” is obtained when an insurer is allowed to account for the amount of risk transferred by posting an asset or reducing a liability and decreasing estimates of their potential net losses. For example, insurers are not allowed to reflect premium cessions to or recoverables from foreign insurers that do not post collateral to cover their liabilities. The resulting accounting values are reflected in the calculation of insurers’ surplus and their RBC requirements, among other financial regulatory measures.

Capital Standards and Risk Analysis

The states impose two types of capital requirements on insurers. Each state has its own “fixed-minimum” requirement.³ Insurers are also subject to uniform RBC requirements based on a formula developed by the NAIC that is both complex and contains flaws as discussed below. An insurer is required to have capital that meets or

³ The state fixed minimum requirements are fairly crude and are not adjusted for the size of an insurer or factors associated with its financial risk. Among the states, they range from \$500,000 to \$6 million, with the median requirement in the area of \$2 million.

exceeds the higher of the two standards. All of the “charges” used to calculate an insurer’s RBC requirement involve the application of selected factors to various accounting values. The charges are summed into several baskets and subjected to a covariance adjustment to reflect the independence of certain risks, using the basic formula shown below.⁴

R0: Investments in Affiliates

R1: Fixed Income Assets (interest rate and credit risk)

R2: Equity Assets (“market value” risk)

R3: Credit (risk associated with reinsurance recoverables)

R4: Loss Reserves (risk associated with adverse loss development)

R5: Premiums (risks of under-pricing and rapid growth)

$$RBC = 0.5[R0 + \sqrt{R1^2 + R2^2 + R3^2 + R4^2 + R5^2}]$$

Currently, the current risk-based capital requirement for US insurers does not consider catastrophe risk explicitly.

Under the US RBC system, certain company or regulatory actions are authorized or mandated according to the relationship of an insurers’ Total Adjusted Capital (TAC) to its RBC requirement – see Box 2 below. TAC is essentially equal to an insurer’s actual surplus with minor adjustments for determining its RBC compliance. Because the US RBC system does not allow a great amount of regulatory discretion, its imperfections and stringency are significant considerations. US regulators have tended to set the RBC bar

⁴. The inclusion of the 0.5 factor in the RBC formula is essentially a political concession to the insurance industry. As shown in Box 2, company action is required at 200% of its RBC requirement. This is really the operative level of RBC, but halving the formula calculation and calling this the RBC requirement allows insurers to report higher ratios of their actual capital to their RBC requirements.

fairly low to avoid being forced to take actions against insurers that are not warranted. As reflected in Figure 3, relatively few insurers (3.1 percent) fall below their Authorized Control Level RBC requirement (the 200 percent level) and many of these insurers are already under some form of regulatory supervision. Insurers with TAC/RBC ratios in excess of 400 percent account for 86.9 percent of all insurers and 47.4 percent of insurers have a TAC/RBC ratio greater than 1,000 percent. Another way to gauge the US system is to compare insurers' regulatory RBC requirements with how they perform in meeting rating agencies' capital standards. This is reflected in Figure 4, which groups insurers into several classes according to the relationship of their TAC/RBC ratio to their Best's Capital Adequacy Ratio (BCAR). Figure 4 reveals that most property-casualty insurers have TAC/RBC ratios considerably higher than their respective BCARs.⁵

[Insert Box 2 & Figures 3 & 4]

A full discussion of the issues with the US RBC formula is beyond the scope of this paper but they are addressed in Cummins, Harrington and Klein (2002). One significant aspect of the formula is the use of selected factors to calculate RBC charges for asset risks that are uniform for all insurers.⁶ A second notable problem is the calculation of insurers' RBC charges for risks related to errors in reserving, pricing and underwriting. These charges are based on an insurer's historical experience which can be

⁵ A.M. Best is a US rating agency that has developed its own Best's Capital Adequacy Ratio (BCAR), as other US rating agencies have developed their own capital standards. In Best's explanation of its system, a BCAR of less than 100% is considered "inadequate", a BCAR of 100%-200% is considered "adequate", and a BCAR exceeding 200% is considered "more than adequate".

⁶ These factors were selected on the basis of statistical analysis of historical data on declines in asset values due to changes in interest rates, bond/loan defaults, etc. and the judgment of actuaries and regulators.

misleading and potentially manipulated, e.g., by setting lower reserves insurers can reduce their RBC charge for reserve risk.⁷

Currently, US property-casualty insurers are not subject to any requirements to perform internal risk modeling or allowed to use it as an optional approach to demonstrate the adequacy of their capital and financial risk management. US regulatory standards also have not embraced an Enterprise Risk Management (ERM) perspective in requiring insurers to evaluate the full range of risks they face and their interaction. Consequently, regulators do not provide any incentives for insurers to employ internal risk modeling or ERM, although some insurers may still retain internal incentives to undertake these analyses. This, in turn, diminishes insurers' regulatory incentives to better manage and finance their catastrophe risk.

US regulators also tend to be cautious in accepting or approving new approaches to risk financing by insurers or their participation in alternative financing mechanisms for insureds. Generally, transactions involving the transfer or hedging of risk are not prohibited but neither do insurers gain any credit for such transactions beyond those involving what regulators consider to be "authorized reinsurance" or insurance-linked securities issued through US-regulated entities.⁸ Conversely, regulators tend to take a dim view of insurers taking large positions on the risk-assumption side of derivatives.

Company Versus Group Perspective

⁷ In the short-term, an insurer can lower its RBC requirement by underestimating its loss reserves. In the long-term, inevitable adverse loss development will eventually increase the insurer's RBC requirement but there will be a lag between reserve underestimation and its detection by regulators and its reflection in the RBC formula.

⁸ As noted below, US insurers issuing cat bonds through offshore SPRVs have tended to deposit the associated trust funds in US institutions. This allows these insurers to treat these securitizations as "authorized" reinsurance because the funds effectively collateralize the reinsurance or risk transfer arrangement.

US regulators focus on the financial condition of each insurance company within a group, although they also pay some attention to the financial condition of an insurer's group and its implications for adversely affecting its members. One reason for the company focus may stem from US law and its principle of the "corporate veil". From a legal perspective, except under special circumstances (e.g., deliberate fraud), the parent company or group of a subsidiary insurance company is not required to bail out the subsidiary if it becomes insolvent. Although insurance groups have rarely exercised this option in practice, it still looms as a possibility that regulators must consider. Unfortunately, one of the consequences of the individual company approach to regulation is that less consideration is given to capital and risk management at the group level.

Solvency Monitoring, Intervention and Market Conditions

The second and third pillars of the international regulatory vision encompass solvency monitoring, regulatory intervention and market conditions that promote solvency and curtail excessive financial risk. The US has a highly-developed monitoring framework that, arguably, is motivated in part by its relatively low capital requirements. The NAIC has developed several tools for financial monitoring, including two early warning systems (IRIS and FAST) and a set of applications that state regulators can use and customize to analyze an insurer (Klein, 2005).⁹ These systems are static, "ratio-based" tools. They involve no dynamic testing or modeling, which admittedly is difficult to perform using a standard approach but not impossible. The NAIC provides other ratio-

⁹ IRIS is the acronym for the Insurance Regulatory Information System. FAST is the acronym for the Financial Analysis Solvency Tracking system. An insurer's IRIS ratio results are publicly available. The specifications of the FAST system and an insurer's FAST results are not public See Klein (2005) for more detailed descriptions of these systems.

based analysis tools to regulators which they can readily modify for their particular needs and regulators also may develop their own monitoring and analysis tools.

Although each state is expected to perform extensive monitoring of the insurers domiciled in its jurisdiction, there is second level of monitoring at the national level performed by the NAIC for companies considered to be “nationally significant”, i.e., insurers that write business in 17 or more states and write annual premiums of \$50 million or more (for property-casualty insurers). NAIC analysts, using the FAST system, score insurers in terms of their need for further review. Insurers that score above a certain level or set off other warning triggers are subject to further analysis and potential review by an NAIC working group comprised of regulators from different states. If warranted, the regulators of “targeted” insurers are queried about the financial condition of the insurer and may be compelled to take actions deemed appropriate by the working group.¹⁰ This second layer of review enhances and widens the oversight of insurers and has likely prompted more timely regulatory intervention for certain insurers.

Finally, in theory, solvency/financial regulation and market regulation (e.g., rates, policy forms, market practices, etc.) should be coordinated to promote the safe and viable operation of efficient insurers. However, it appears that some US regulators tend to prioritize the “affordability and availability” of insurance over solvency considerations. In practice, regulators in some states attempt to suppress insurers’ rate levels and compress rate structures in the personal and certain commercial lines (e.g., property insurance in hurricane-prone states) and impose other restrictions or mandates that increase insurers’ financial risk. US regulators rarely if ever disapprove or prevent

¹⁰ Other states retain leverage over the domiciliary regulator as they can suspend the licenses of non-domestic insurers operating in their jurisdictions. Such actions would effectively halt an insurer an insurer in its tracks and force its domiciliary regulator to seize the insurer.

excessive under-pricing, lax underwriting and the assumption of large concentrations of catastrophe exposures (Klein, 1995). This is reflected by the financial failure of five insurers in Florida following the 2004-2005 storm seasons that were allowed to write large concentration of high-risk exposures without adequate management of their catastrophe risk.¹¹

Solvency Regulation in the EU

Overview

From a jurisdictional standpoint, countries in the EU face some of the same challenges that the states in the US have faced in coordinating and harmonizing their insurance regulatory activities. However, the situation is not exactly the same – the EU is comprised of sovereign countries and the EU’s authority and influence differs from that of the federal government in the US. The EU must achieve a consensus among its members in support of its regulatory standards and other policies. At the present time, EU member states are subject to some common, minimum standards (based on the Solvency I EU directive) on top of which the majority of jurisdictions are applying their own additional standards. Hence, in some instances we refer to country-specific policies, recognizing that that they must ultimately converge.

A principal goal of EU policies has been to facilitate cross-border trade within the EU and make it easier and more efficient for an insurer domiciled in one member country to sell insurance in other member countries, either across borders or through the establishment of branch companies, as well as engage in trade beyond Europe. EU member countries will continue to regulate the insurers domiciled in their respective

¹¹ See Klein (2007) for a more detailed discussion of the financial and market regulation of property insurers subject to hurricane risk in Florida and other states.

jurisdictions but each will do so according to EU policies and standards. To the extent that EU countries abide by similar standards and policies, confidence in the adequacy of each country's regulation is increased and insurers do not have to deal with vastly different regulatory requirements or discrimination across countries.

The two most important aspects of the EU's regulatory approach is its guiding philosophy and its program to develop a stronger and more effective approach to insurance regulation as reflected in the Solvency II initiative (see Eling, Schmeiser and Schmit, 2007; Trainar, 2006). This initiative follows Solvency I regulations that took effect in 2004. The EU took a major step when the European Commission published its long-awaited proposal for a Solvency II Directive in July 2007. The Proposal articulates a view for a new regulatory framework reflecting the economic substance of insurance, focused on the management of risk, and grounded in risk-sensitive capital requirements. The Proposal follows the high-level 3-pillar philosophy as developed for bank regulation in the Basel II accords (Commission of the European Communities, 2007) but the Proposal has some substantial differences with Basel II as well as innovations. The Proposal will need to be adopted by the Ministries of Finance (Ecofin Council and European Parliament).

The Framework Directive will be supported by technical implementing measures that will have the force of law. The substance of these implementing measures will be primarily formulated by the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS) – the cooperation body consisting of the relevant supervisory authorities from each member state.¹² In addition to the legislative framework, CEIOPS

¹² This period of further development will be extremely important in terms of its additional specification of EU solvency policy and its implementation. As has occurred in the development of the proposed directive,

will work on joint implementation guidelines in order to ensure consistent implementation across all member states. The new regime will be in place and operational towards the end of 2012 or early 2013. This new framework will establish a more advanced and uniform approach to solvency regulation among EU countries with particular emphasis on risk-sensitive capital requirements and risk management, effectively supplanting the different regulatory systems and policies currently employed by different countries.

Unlike the US, many European countries have been moving much more quickly to apply what might be labeled as a “prudential” or principles-based approach to insurance regulation (distinguished from a prescriptive or rules-based approach). In a prudential system, emphasis is placed on insurers’ maintaining an adequate “solvency margin” and the competence and judgment of an insurer’s management and actions with an insurer’s financial risk being the ultimate point of focus for supervisors. EU regulators tend not to subject insurers to the kind of voluminous and detailed set of rules used in the US. Instead, they maintain closer scrutiny of how insurers are managed and exercise greater discretion in the actions or interventions they may employ to correct practices or problems as they deem necessary. Many EU countries have also more quickly embraced a financial/economic approach (contrasted with an accounting approach) to insurer regulation than their US counterparts. This approach tends to allow insurers greater freedom as long as they use that freedom judiciously, do not engage in excessively hazardous ventures or transactions, and ultimately keep their financial risk within reasonable bounds.

various stakeholder groups will be heavily involved in expressing their opinions in this process which the EU must consider in finalizing and implementing its standards.

Accounting Standards

The Solvency II directive suggests that EU insurance accounting standards will be broadly compatible with international accounting standards although it does not indicate how closely EU standards will conform to international standards. Specifically, the Commission's Proposal notes that:

In line with the latest developments in risk management, in the context of the International Association of Insurance Supervisors, the International Accounting Standards Board and the International Actuarial Association and with recent developments in other financial sectors, an economic risk-based approach should be adopted which provides incentives for insurance and reinsurance undertakings to properly measure and manage their risks. Harmonization should be increased by providing specific rules for the valuation of assets and liabilities, including technical provisions.

There are several issues in melding EU accounting standards with international standards. One is that IFRS is compulsory only for companies that have to establish consolidated accounts, i.e., insurer groups. Hence, IFRS is not compulsory for stand-alone companies. The second problem is that there are currently no IASB standards for insurance liabilities, which we discuss further below. Hence, the Solvency II Directive has to be further developed without the articulation of what international standards for insurers' reserves will be.

In the international accounting and regulatory community (IASB and IAIS), there are still no final agreements on the exact definition of the fair value of insurance liabilities (which is the sum of the present value of expected payouts plus a market risk margin). Accountants are called in to perform tests of whether a contract carries enough elements of transfer of risk in order to qualify for reinsurance accounting or hedging accounting. One of the key issues is whether a risky liability should be valued within the

context of the entity's own portfolio, or should be valued with respect to an average third party "market" portfolio. It appears that the accounting rules that will be finalized will have an impact on insurance-linked securities.

Capital Standards and Risk Analysis

The EU philosophy is reflected in its approach to capital requirements. As noted above, Solvency II has taken a cue from the Basel II banking accords. In the banking sector, international regulators have divided a bank's capital into three tiers, reflecting the extent to which instruments meet the key underlying principles of capital, loss absorbency and permanence.

- Tier 1 capital is the core bank capital from a regulator's point of view. Only assets considered to be the most reliable and liquid can qualify as core capital. Examples of Tier 1 capital include common stock, preferred stock that is irredeemable and non-cumulative, and retained earnings. Certain subordinated debt is also included in Tier 1 capital.
- Tier 2 and Tier 3 capital is secondary bank capital that includes items such as undisclosed reserves, revaluation reserves, general provisions, hybrid instruments and subordinated term debt.
- Currently, Tier 2 and Tier 3 capital is limited to 100% of Tier 1 capital.

The current Solvency II initiative for insurance explicitly establishes a two-level capital requirement, specifying a Minimum Capital Requirement (MCR) and a Solvency Capital Requirement (SCR) that also utilizes a three-tier approach.

- The Minimum Capital Requirement (MCR) represents an absolute regulatory minimum level of capital needed by an insurer. The calculation method for and the calibration of MCR will be set by the legislators.
- The Solvency Capital Requirement (SCR) will be the "normal" operating requirement level of capital for an insurer. This capital level may be derived either through a firm's own internal capital model or through a standard model formula set out in the implementing legislation adopted by the EU.

The MCR standard has two components: 1) an absolute minimum (also called the “minimum guarantee fund”); and 2) an additional solvency margin. For non-life insurers, the absolute minimum is equal to 18 percent of the first €50 million of premiums and 16 percent for premiums above that level. The margin component is based on claims – 26 percent for the first €35 million and 23 percent for claims above that amount. While this MCR standard may be considered factor-based, it is still more responsive to differences in insurers’ size as reflected by their premiums and claims than the US fixed-minimum capital standards which are only crudely adjusted for insurer characteristics. It also should be noted that the MCR factors are envisioned to be applicable only during the transition period until Solvency II is implemented. Long term, the MCR is expected to be a certain “confidence margin” or a certain fraction (e.g., one third) of the SCR.

The SCR is the most important contribution of Solvency II. It is intended to be the amount of capital that an insurer needs to remain viable from a business perspective and maintain its default risk or probability (using a Value-at-Risk (VaR) approach) below a certain level.¹³ If an insurer fails to meet its SCR standard, it does not trigger a set of mandatory actions per se, but does require the insurer and its regulatory supervisor to evaluate and correct the deficiency if deemed necessary. In this sense, the SCR standard does not carry the prescribed company and regulatory actions embodied in the US RBC standards. At the same time, the SCR standard is based on a much more sophisticated approach to determining an insurer’s capital needs than US RBC (even using the standard model) and is likely to be a more stringent standard than the RBC requirement that would be set for a comparable insurer.

¹³ The current proposed directive has set this at a 0.5 percent level.

The ability of an insurer to use an internal risk model rather than a standard formula to determine its SCR is a significant forward step in insurer solvency regulation. An internal model, properly designed and estimated for a given insurer, should provide a more accurate assessment of an insurer's risk and capital needs and enable it to more efficiently manage that risk. The internal model used by an insurer must be validated and its use monitored and performance periodically checked by its regulatory supervisor. The issue of whether regulators may require certain insurers to use internal modeling is still a matter to be resolved in EU deliberations. Some are concerned that allowing all insurers to opt for either the standard model or an internal model would promote "adverse model shopping."

Insurers that do not use a validated certified internal model must use a standard model that is being developed by supervisors collectively in the EU. The rules that will govern whether an internal model will be strictly optional for all insurers necessarily have implications for the importance of the standard model and how it is designed. In its current stage of development, the structure of the EU formula borrows heavily from a formula developed by the German Insurance Association, although other formulas may also influence what is adopted (see Eling, Schmeiser, and Schmit, 2007).¹⁴ Also, the calibration of the standard model will be determined by the EU. Standard models have their limitations but, obviously, there are numerous design and specification issues in developing the best possible model for its intended purposes.

The basic elements of the standard model (formula) and the specific risks they address are summarized in Box 3. The basic elements include underwriting risk, market risk, credit risk and operational risk. It appears that the EU standard model will have

¹⁴ Schubert and Griebmann (2007) outline the German formula.

several advantages over the US RBC formula. First, it will use a more sophisticated approach in accounting for diversification effects and the interactions among different risks. Second, the model will allow for the use of “undertaking-specific” parameters rather than standard ones applied to all insurers. Third, the model will also include a catastrophe risk component.¹⁵ Hence, it will likely be superior to its US analog. At the same time, some in the EU may view the contemplated standard model as being too complex and come close to constituting a “standardized internal model.”

[Insert Box 3]

In general, the EU approach embraces a more comprehensive approach to determining whether an insurer has adequate capital and is appropriately managing its overall financial risk. This approach recognizes both the independence and interaction of the various risks that an insurer faces, consistent with the enterprise risk management (ERM) concept. The broader view potentially allows insurers more flexibility in managing individual risks and to take advantage of the independence of some risks and address the interdependence of others. This kind of perspective could lead to greater regulatory acceptance and recognition of alternative catastrophe risk financing methods by assessing their ultimate effect on an insurer’s financial risk rather than the attributes of a particular method or device in isolation.

Group Versus Subsidiary Focus

The EU approach encompasses regulation at both a company and group level. The main focus is on individual companies but that there is additional, ‘supplementary’ supervision at group level aimed at capturing group-wide risks. A group approach to solvency regulation reflects the view that an insurance group is a single economic entity in which risk can be pooled and diversified. A group guarantee for a subsidiary can be viewed as a form of contingent capital. This diversification effect is most pronounced for reinsurance groups, whose business models and value proposition are based on diversification of risk, both by risk type and by region.

At the same time, in applying such an approach, EU supervisors will need to assess the nature of the guarantees between a group or parent company and its subsidiaries. The key question that would need to be resolved is how to ensure the fungibility of capital across the group. This will require a legal underpinning to meet regulatory requirements.

The EU view is reflected in the position taken by the Financial Services Authority (FSA) in the UK which recognizes that if insurance entities are required to hold higher levels of capital in their locale, it would not give due recognition to the diversification benefits that legitimately exist at a group level. This would create an inefficient fragmentation of a group's capital which in turn could translate into higher prices for policyholders and higher financial risk. The UK is urging the EU to adopt this approach.

The UK Treasury and the FSA jointly published a discussion paper which reflected on how group supervision might be undertaken in the context of Solvency II (see HM Treasury and FSA, 2006). The paper proposes two essential policies regarding group versus subsidiary regulatory treatment. First, insurance groups should be allowed

greater freedom to allocate their capital resources among different subsidiaries within the EU. Subsidiaries within a group should not be required to hold capital locally in excess of their MCR. Rather, capital in excess of the MCR and any Pillar 2 requirements may be held at group level, for the benefit of subsidiaries. The SCR and Pillar 2 requirements would be set at the group level with the group being able to claim a capital benefit to the extent that the risk is effectively diversified across the group.

Second, there are respective responsibilities of the supervisors of groups and their subsidiaries. The group supervisor would be responsible for ensuring the group's compliance with its obligations to support its subsidiaries, as well as for meeting its SCR and Pillar 2 requirements. The local supervisors would be responsible for enforcing the MCR, governance issues relating to the subsidiary and its conduct of business. The success of this approach will require: 1) the group supervisor to coordinate supervisory activities and group-wide approaches to capital and supervision; and 2) the ability to remove some of the duplicative effects of group and entity supervision arrangements.

It should be noted that the approach advocated by UK on groups would require a greater degree of cooperation, information exchange, joint supervision and exchange of staff between supervisors if it is going to prove practical. To help accomplish this, the approach would also include incentives for supervisors to adhere to these practices as they would need the help and assistance of other supervisors to fulfill their responsibilities.

Solvency Monitoring, Intervention and Market Conditions

Solvency monitoring will also be important beyond the capital requirements imposed on insurers (see Eling, Schmeiser, and Schmit, 2007). This is an area that will be

subject to further development as the EU process continues. In a principles-based system, solvency monitoring will likely have a different character than that in the US. In such a system, solvency monitoring may tend to be more “informal” and rely on both qualitative as well as quantitative analysis. The reliance on static, ratio-based early warning systems in the US arguably has its limitations and the combination of internal risk models, a better standard model and the monitoring measures employed by the best EU regulators are likely to be superior to the systems and tools used by US regulators.

As presently contemplated, insurers would be required to demonstrate to supervisors that they have adequate systems and controls in place to manage current and future risks. In addition, the so-called Own Risk and Solvency Assessment would require firms to analyze and report to supervisors how they see their current and future position for all risks, not just for those risks captured by the standard model. This is a significant development and is already in place in the UK in the form of its ICAS assessment.

However, a chain is no stronger than its weakest link and proper supervision by and good communication among all regulators is critical in a multi-jurisdictional scheme.¹⁶ First, insurers that do not use internal risk modeling warrant additional monitoring that helps to remedy this deficiency. Second, ideally, monitoring tracks major transactions by insurers that could significantly affect their financial risk before these transactions are reflected in insurers’ regulatory reports. Admittedly, this can be difficult to do but the US experience has demonstrated the potential for such transactions to undo an insurer before regulators become cognizant of what has happened. Third, EU members need to have some level of confidence in the adequacy of each other’s monitoring efforts

¹⁶ Eling, Schmeiser, and Schmit (2007) discuss some of these issues.

and that insurer issues that affect multiple EU member states are communicated to all EU member states affected.

Finally, in terms of “market regulation”, it would be desirable for all EU members to employ policies that do not undermine solvency goals. Our impression is that the EU regulatory policy seeks to promote reliance on market forces to the maximum extent possible rather than regulation to constrain prices and possibly other aspects of insurers’ products and market practices. A significant element of the EU legal framework has been to abolish controls on rates and policy forms.

Solvency II also includes considerable supervisory reporting and public disclosure which is aimed at ensuring that informed market participants will be in a position to evaluate and question various aspects of insurers’ operations, e.g. an insurer’s risk management practices or business plans, and to reward or punish those firms that they believe to be lacking or not engaging in best practices. If EU members embrace this philosophy, it should help to promote efficient and viable markets and insurers and avoid the problems created by excessive market regulation in the US. However, it would be unrealistic to believe that EU governments are fully insulated from political pressures to artificially lower the cost of insuring catastrophe risk. More favorable treatment of broad risk diversification and alternative forms of catastrophe risk financing should reduce some of this pressure.

Efforts Toward Harmonizing International Regulation

There has been a significant effort to improve and “harmonize” insurance regulation among various countries in order to reduce barriers to trade and establish certain international standards that could increase one country’s confidence in another

country's regulation of an insurer. The guiding vision of this effort is to elevate the sophistication and effectiveness of insurance solvency regulation to a fairly high level among countries, as well to make regulatory standards, policies and processes more similar and transparent (see International Actuarial Association, 2004). These international efforts will have implications for the regulation of catastrophe risk financing and hopefully will improve it for those countries that embrace these efforts. Understandably, these international efforts are tracking closely with Solvency II.

The efforts to develop international standards have tended to focus on capital adequacy and accounting/financial reporting systems. Basel II and Solvency II reflect the most recent initiatives to develop international solvency standards for banks and insurers. As noted above, an important element of Solvency II would place significant emphasis on an insurer's dynamic analysis of its financial risk for those insurers that are in a position to establish their capital needs using this approach. Another initiative has addressed the development of new international accounting standards (including GAAP and Fair Value) that would make insurers' financial statements more transparent and comparable across countries. The International Association of Insurance Supervisors (IAIS) has been a major supporter of this effort.

An additional major force has been international trade agreements including the most recent General Agreements on Tariffs and Trade (GATT) accords administered by the World Trade Organization (WTO).¹⁷ GATT provisions on financial services have sought to ease barriers to trade in insurance markets by reducing unnecessary national regulatory impediments and enhancing the transparency of each country's regulatory systems and requirements. This has prompted many countries to upgrade their regulation

¹⁷ See Grace and Skipper, 1998 for a discussion of international trade in insurance.

of financial services and insurance in order to allow foreign insurers to enter their markets and compete with domestic insurers without undermining the financial viability of their domestic industry. The World Bank and other organizations have been active in assisting developing countries in improving their financial regulatory systems to accommodate the changes required by GATT.

Understandably, these international regulatory initiatives have proceeded with considerable debate. Some US insurers are not enthusiastic about complying with the international standards being proposed but they also recognize that compliance with some standards will be necessary if they are or intend to be involved in international transactions.¹⁸ US regulation may be pulled into the Solvency II approach in order to facilitate cross-border trade in insurance but it is not clear how quickly such a development would occur. Historically, the size and relative autonomy of the US insurance market has reduced US incentives to embrace an international approach to solvency regulation but the economic realities of global trade and the growth of other economies should pressure the US to alter its perspective. Indeed, some have opined that EU-regulated insurers will have an advantage over US insurers.¹⁹

Evaluation of US and EU Regulation of Catastrophe Risk Financing

In terms of its economic implications for an insurer's catastrophe risk, securitization can offer risk transfer benefits similar to a reinsurance contract at a potentially lower cost for higher layers of risk. However, the implications of

¹⁸ One factor chilling US insurers' enthusiasm may be the tendency of US regulators to layer additional solvency requirements (e.g., dynamic solvency testing) on top of existing ones, rather than replace antiquated requirements with newer ones or allow insurers to choose one approach over another to demonstrate the adequacy of their capital.

¹⁹ See "Guy Carpenter Chief: Solvency II Gives an Edge to European Insurers," BestWire, October 22, 2007.

securitization for an insurer's regulatory capital calculations and regulatory assessments of its financial condition and risk can vary considerably among regulatory systems depending on their standards and policies. This could lead to a situation in a particular regulatory jurisdiction in which risk was transferred but there would be little or no regulatory recognition of the capital relief that motivated a securitization transaction. This situation would be unfortunate given the need for insurers to employ efficient catastrophe risk financing strategies. Below we discuss the implications of the US and the EU systems for the full array of catastrophe risk financing methods and devices.

Figure 5 reveals the flow of new capital into conventional reinsurance as well as other risk financing devices following major catastrophe loss shocks in 1992-1993, 2001-2002 and 2005-2006. While conventional reinsurance has still drawn the bulk of this new capital, other devices have commanded a small but growing share of this new capital. This also reflected in Figure 6 which shows the strong growth of cat bond issuances since 1996.²⁰ These are positive developments but experts in this area would probably agree that these devices have realized only a fraction of their potential in financing catastrophe risk. We discuss some of the regulatory and other government policies that may be affecting the use and growth of alternative risk financing.

[Insert Figures 5 & 6]

US Regulatory Approaches

Overview

²⁰ The authors express their appreciation to Morton Lane and Lane Financial LLC to reproduce Figures 5 and 6 from its publications.

Regulators can influence the use of risk financing mechanisms in several ways as depicted in Figure 7. First, they can impose constraints on or bar insurers from using certain instruments or create other impediments. Second, regulation can either facilitate or inhibit catastrophe risk financing. For example, if regulators allow an insurer to use a particular instrument, they determine how the insurer can reflect the instrument in its financial reporting, e.g., can it gain “accounting credit” on its financial statement in terms of reducing its losses, decreasing its liabilities, and or increasing its assets (as we discuss below). Further and very importantly, there is the question of whether an insurer’s use of catastrophe risk financing is considered in regulatory assessments of its capital adequacy and financial risk which would tend to “boost” insurers’ motivation to use efficient risk financing devices. Finally, other regulatory/government policies, such as the regulation of insurers’ rates and market practices, the creation of government insurers/reinsurers, and tax rules also influence the economic feasibility and viability of these catastrophe financing instruments. Certain government actions, such as the creation of public insurance/reinsurance mechanisms, can “detract” from or reduce the demand for private risk financing.

[Insert Figure 7]

In discussing the interaction of US regulation with cat risk financing, it is also important to recognize the influence of rating agencies. Because of their important role in insurance markets, changes in rating agency policies can have a significant impact on insurers’ actions and catastrophe risk management. Arguably, recent rating agency

initiatives regarding catastrophe risk are likely having a greater effect on insurers than regulators.

Surplus and Catastrophe Reserves

Holding additional surplus to handle catastrophe losses has served as a conventional catastrophe risk financing mechanism and is an insurer's first layer of protection – any catastrophe losses it retains essentially must come out of surplus and special catastrophe reserves if allowed. US regulators do not discourage this practice but government policies have made this a more costly technique than it would need to be. First, insurers are generally compelled to keep catastrophe funds in their general surplus account which makes it subject to depletions arising from other contingencies. Second, regulators may treat “extra surplus” as something that would justify greater restrictions on an insurer's prices. A third problem is that additions to surplus are taxed as income and the investment earnings on this surplus are also taxed which retards its accumulation (this is determined at the federal level). Under US SAP and GAAP accounting rules, there is no provision for catastrophe reserves, i.e., losses that have not yet been incurred.

The idea of allowing insurers to set up “catastrophe reserves” that could offer significant tax advantages has been nominally endorsed by state regulators but the necessary accounting and tax provisions to facilitate such reserves have not been enacted (Davidson 1996; Harrington and Niehaus 2001).²¹ In concept, an insurer would be allowed to contribute up to a certain amount of its income every year to a reserve intended to fund future catastrophe losses – the reserve would be reported as a liability in

²¹ New York has recently issued a proposed regulation that would require insurers to establish catastrophe reserves, but it would not change current state and federal tax rules.

an insurer's financial statement. Fundamental to this concept is the policy that contributions to the reserve and investment earnings associated with the reserve would not be taxed. Accounting and tax rules would govern contributions to and withdrawals from the reserve.²² Such a provision for catastrophe reserves would allow insurers to more readily set aside and accumulate additional funds to cover retained catastrophe losses.

The primary barrier to catastrophe reserves appears to be the federal government which has been cool to the idea because of concerns that such reserves would be manipulated to reduce the tax liability of an insurer. This contrasts with tax policies in EU countries which typically allow insurers to deduct contributions to and investment earnings on catastrophe reserves from their income in determining their tax liability (U.S. General Accountability Office, 2005). Historically, US insurers have not been aggressive in pushing for tax-favored catastrophe reserves in the Congress because of concerns that it would lead to a "quid pro quo" in terms of increasing the taxation of insurers in some other area. There is no indication that the current Congress would be any more supportive of tax-favored catastrophe reserves.

The NAIC has also been working on adding a catastrophe risk component to its RBC requirement. The current formula only reflects catastrophe risk to a limited degree to the extent that "underwriting risk" charges (reflected in the R5 component) are based on 10 years of historical experience.²³ The NAIC P-C RCB Working Group has recommended that a catastrophe risk charge be added to current RBC formula. Initial regulatory proposals contemplated a cat risk charge equal to the "one-in-250-years level"

²² Withdrawals not used to fund catastrophe losses would ultimately be taxed.

²³ Insurers with higher loss ratios during the previous 10 years have a higher factor applied to their premiums to determine the amount of the R5 charge.

of expected annual losses (net of reinsurance) generated by an approved catastrophe risk model. The creation of an RBC catastrophe risk charge could be associated with accounting provisions to enable insurers to establish catastrophe reserves.

However, such an approach has generated a number of concerns among insurers and industry actuaries. Two prominent issues are what would constitute an “approved cat model” and the proposal of a one-in-250-years standard versus something lower (e.g., a one-in-100-years standard). There are a number of other issues associated with how an insurer’s cat modeling would be reviewed and verified and related details. Of course, provisions for catastrophe reserves and recognition of catastrophe risk financing instruments would be important issues in the development of an RBC catastrophe risk component.

It is not clear what the industry would view to be acceptable in terms of more explicitly evaluating insurers’ catastrophe risk. It appears to favor the approaches used by rating agencies and some EU countries that examine the adequacy of an insurer’s catastrophe risk management (as an element of solvency monitoring) using internal risk modeling or other techniques but not the inclusion of a specific capital charge. Of course, insurers would also likely be supportive of the allowance of catastrophe reserves if such reserves would receive favorable tax treatment without a corresponding “quid pro quo”. Given the issues associated with an RCB cat risk charge and the lack of consensus, it may be some time before the NAIC modifies its RCB formula to explicitly reflect catastrophe risk.

US rating agencies are strengthening their assessments of insurers’ capital requirements with respect to their catastrophe risk exposures, primarily due to the

increased risk of hurricane losses (A.M. Best. 2006). These strengthened requirements are set within a context of the agencies' more extensive analysis of insurers' catastrophe risk exposure and management than that performed by regulators. These changes, combined with other initiatives discussed earlier, are increasing insurers' motivation to utilize conventional and alternative catastrophe risk financing measures.²⁴

Reinsurance

Reinsurance continues to be the primary vehicle used by insurers to diversify their catastrophe risk. The primary issue in the US has been the disparate treatment of domestic versus foreign reinsurers. Insurers are allowed "full credit" for contracts placed with reinsurers domiciled and regulated in the US and some "approved" foreign insurers that deposit funds in US financial institutions according to regulatory collateral requirements. These rules require foreign reinsurers to provide collateral equal to their gross liabilities to ceding US insurers.

This policy affects insurers' accounts and reported income in several ways. First, insurers are not allowed to subtract premiums ceded to unauthorized insurers in calculating their net premiums which is used as a proxy measure of their potential future liabilities and risk. Second, insurers are not allowed to count recoverables from unauthorized reinsurers as an asset except to the extent that ceding insurers hold or have access to collateral deposited by the reinsurers. US insurers are only allowed to value reinsurance recoverables up to the amount of collateral provided. All other things equal,

²⁴ It is our impression that this "strengthening" is focusing on revised models of insurers' catastrophe risk exposure rather than changing the associated minimum PMLs which have been set at 100-year events for hurricanes and 250-year events for earthquakes.

this has the effect of increasing insurers' net losses incurred and decreasing their income, assets and surplus. This would be the case for all types of reinsurance contracts.

Cummins (2007) strongly criticizes the US policy as being antiquated, unnecessary and inefficient. He argues that insurers have access to information and diversification measures to manage the counter-party risk associated with reinsurance contracts – resources that were not available in the 1940s-1950s when the US rules were established. Cummins cites three major sources of inefficiencies associated with US collateralization requirements: 1) collateralization is expensive for foreign reinsurers; 2) the requirements reduce the supply of reinsurance for US insurers; and 3) collateralization reduces incentives for US reinsurers to assess the credit quality of foreign reinsurers. Cummins also notes that the US requirements are inconsistent with global insurance/reinsurance markets and are directly opposed to the EU Reinsurance Directive that effectively abolishes collateralization.²⁵

While US reinsurance policy has not caused US insurers to avoid contracts with “non-approved” foreign reinsurers, it is likely to have had some chilling effect on the demand for such contracts. US insurers and foreign reinsurers have continued to push US regulators to adopt a more reasonable, “merit-based” policy. The most recent proposal from the NAIC would place reinsurers (regardless of their domicile) into six rating categories that would determine the percentage of their gross liabilities that would need to be collateralized for ceding insurers to receive “accounting credit” – the better the rating, the lower the collateral requirement.²⁶ The NAIC would establish a Reinsurance

²⁵ See European Parliament (2005) and Evans (2007).

²⁶ New York has already moved forward in issuing proposed regulations that would ease collateral requirements for reinsurers non-authorized reinsurers on a sliding scale based on the reinsurers' financial strength ratings issued by rating agencies.

Evaluation Office (REO) that would determine the ratings for reinsurers based on a number of criteria.

Cummins argues that even this proposed approach would be a “second-best” solution that is overly bureaucratic and insufficient. His preferred approach would eliminate collateral requirements for all reinsurers, except for those in default. It should be noted, however, that the US approach is embedded in a system that relies more on accounting values and less on risk analysis. In essence, the many properly-managed companies are punished for the potential sins of a few improperly-managed companies. US regulators tend to subject all insurers to the same rules, rather than distinguish the small number that might not manage their reinsurance arrangements properly. The EU has the advantage of relying on a better regulatory approach and the high standards each of its members will enforce for reinsurers they regulate.

Despite its limitations, even the current reinsurance NAIC proposal is contentious and US reinsurers have strongly resisted relaxing current regulatory requirements. Some of the resistance of US reinsurers may be at least indirectly prompted by antiquated US regulatory policies that place them at a competitive disadvantage relative to foreign reinsurers. The current NAIC proposal (dated December 10, 2006) may be taken off the table at some point and US regulators may go back to “the drawing board” in terms of modifying their approach to how they value the reinsurance transactions of US insurers.

Catastrophe Options and Swaps

As noted in Klein and Wang (2007), attempts to establish markets for catastrophe put options for natural disasters have not proved to be successful in the past but there are recent efforts to reestablish viable options markets. US regulators allow insurers to use

options for risk hedging purposes but there are no provisions for valuing such transactions in financial reporting prior to their triggering and the secondary importance of financial risk assessment among US regulators further diminishes insurers' incentives to use such devices. Presumably, if a catastrophe option was triggered an insurer could report its expected payoff as an asset pending the receipt of a cash payment. Of course, this is a hypothetical discussion as no US insurer has purchased a catastrophe option that has been triggered to date.

Another problem is that US regulators tend to take a dim view of insurers taking the "risk assumption" side of such options – at least anything that would constitute more than a very small fraction of their investments. Admittedly, insurers would not provide the lion's share of the capital for such instruments but some may be in position to play a bigger role than they currently do. Insurers' familiarity with catastrophe risks and their varying levels of catastrophe exposures suggest that at least some may be in a good position to take a speculative position that would not unduly increase their financial risk. It would offer insurers without primary catastrophe exposures to undertake some catastrophe risk at a profit. Also, insurers with catastrophe exposures in one part of the country could hedge that risk and assume catastrophe risk in other regions as an alternative form of geographic diversification that would not entail the transactions costs of underwriting catastrophe coverage at a primary level in diverse geographic locations or issuing reinsurance contracts. Unfortunately, the current US regulatory system does not appear to be equipped to evaluate insurers' positions in catastrophe options or assess their overall impact on their financial risk.

Regulators have allowed insurers to engage in catastrophe swaps, albeit without associated financial accounting provisions or recognition of its favorable impact on their financial risk. As with a catastrophe option, we presume that if an insurer ultimately experienced losses that created an expected payoff from a catastrophe swap, it would be allowed to book the payoff as an asset pending receipt of a cash payment. While catastrophe swaps are unlikely to play a major role in risk financing/management, more favorable regulatory treatment in the US would increase the incentives to use swaps when their underlying attributes would make them economically desirable.

Catastrophe Bonds

Regulatory and Tax Treatment

Historically, US regulators had made “onshore” issuances of catastrophe bonds difficult because of the lack of an accepted regulatory framework that would govern and provide insurers accounting credit for such transactions, as well as permit favorable tax treatment.²⁷ Starting in the late 1990s, a number of US insurers and some reinsurers sought to make the use of onshore cat bonds easier under an acceptable and uniform set of rules and favorable federal tax treatment.²⁸ Due to these efforts, in 1999, the NAIC adopted a model act for a Protected Cell (PC) and in 2001 it adopted a model act for Special Purpose Reinsurance Vehicles (SPRV) to facilitate “onshore” or US-regulated issuances of cat bond or other catastrophe securities. From a statutory accounting perspective, cat bond transactions using US-regulated entities (i.e., protected cells or

²⁷ “Onshore” securitization refers to transactions that would be accomplished through a US-regulated entity or mechanism. “Offshore” securitizations refer to transactions that are conducted using non-US entities or mechanisms.

²⁸ While offshore SPRVs were readily available, promoters of onshore SPRVs contended that they would be advantageous to some insurers and perhaps viewed more favorably by regulators and other stakeholders in an insurer.

onshore SPRVs) would be treated essentially like reinsurance transactions with US reinsurers.

SAP accounting rules have been developed for PC securitizations.²⁹ These rules allow insurers to reduce their written and earned premiums by the amount paid to the PC to underwrite the risk that has been securitized. Hence, for accounting purposes, these payments would be treated like premiums ceded in authorized reinsurance transactions which would reduce an insurer's net premiums as a proxy measure for its potential liabilities. Further, any "recoverables" from the PC as the result of an indemnity-based securitized event are recognized as a reduction of the insurer's gross incurred losses and loss adjustment expense incurred. Consequently, securitizations through a PC would be treated in a manner very similar to conventional authorized reinsurance transactions. Unfortunately, despite favorable regulatory accounting treatment of onshore securitizations, unfavorable tax treatment and other factors have discouraged the use of these onshore vehicles – to our knowledge there have been no onshore securitizations since these models were adopted.

Interestingly, many US insurers issuing cat bonds through offshore SPRVs have the trust funds associated with these instruments hold their deposits in US certified institutions. This effectively provides the collateral required for the "reinsurer" (i.e., the SPRV) to be treated as authorized under US regulations without the SPRV actually being located and regulated in the US. Consequently, regulatory accounting rules have not been an issue for US insurers that have issued cat bonds through offshore vehicles.

²⁹ See NAIC, "Statement of Statutory Accounting Principles No. 74: Accounting for the Issuance of Insurance Linked Securities Issued by a Property and Casualty Insurers through a Protected Cell," January 1, 2001.

Hence, that the principal inhibitor to onshore SPRVs appears be their tax treatment. This factor, combined with the regulatory requirements for these entities, probably explains why the desired onshore securitizations have not occurred.³⁰ Currently, profits earned by offshore reinsurer affiliates of US insurers are not taxed in the calculation of the consolidated profits of US insurers.³¹ However, premiums paid to an offshore reinsurer (affiliated or not) are subject to an excise tax based on the gross premiums paid “regardless of the eventual outcome of the coverage”. Offshore SPVs also have much lighter regulatory burdens and the transactions can be completed more quickly. The boom of SPV facilities in Bermuda and Cayman Islands has promoted the establishment of specialized law firms and professional services for such facilities.

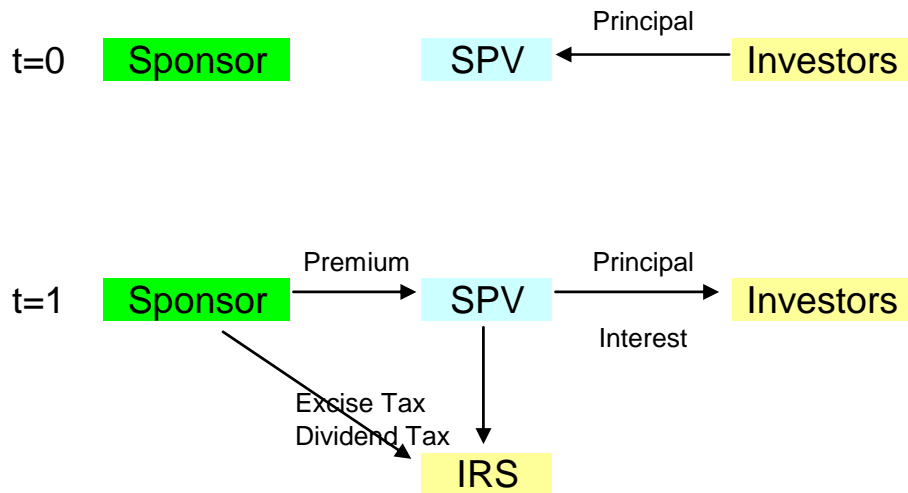
Illustration of Taxation for Onshore versus Offshore Securitizations

Below we illustrate the tax implications of an onshore versus an offshore cat bond issuance using a hypothetical example.³² There are three parties involved in the cat bond: The Sponsor, Investors, and the Issuer (SPV).

³⁰ Cummins (2006b) observes that the NAIC model act still impose a number of regulatory hurdles in forming and using onshore SPRVs.

³¹ The tax treatment of offshore reinsurance (and by implication offshore SPRVs) has attracted the attention of the IRS and the Congress at the urging of US reinsurers.

³² We wish to thank Mike Remmes and Mark Cavanaugh for their advice which helped us in developing this tax illustration. However, any omissions remain the responsibility of the authors.



In our illustrative example, we assume that the cat bond has a \$200 million face value covering US hurricane losses and there is a 1 percent probability of loss to the cat bond. The cat bond has a 1-year maturity and offers investors a 12 percent yield (i.e., a 7 percent yield spread over the 5 percent LIBOR rate). At time $t=0$, investors contribute \$200 million in principal to the SPV Trust Fund, which will grow at the LIBOR rate of 5 percent per annum.³³ We first consider the case of a US domestic onshore SPV facility (see Table 1). We assume that there is no loss to the cat bond over the year. At $t=1$, the Sponsor contributes the 7 percent yield spread to the SPV Trust Fund and the SPV pays investors the full principal plus 12 percent interest.

[Insert Table 1]

According to IRS rules, part of the SPV Trust Fund must be treated as equity. The IRS rationale is that “equity investments” are more likely to suffer a loss than “debt”. The

³³ The Sponsor does not contribute to the Trust Fund at time $t=0$.

more remote is the likelihood of loss to the cat bond, the larger the portion of the Trust Fund that is treated as debt. To minimize the portion of “equity” treatment, it is common for the issuer to divide the cat bond into a series of tranches so that the higher-rated tranches can be qualified mostly as debt.

For the cat bond in this illustrative example, a simple rule of thumb used by tax professionals is that 20 percent of the Trust Fund is treated as equity and the other 80 percent of Trust Fund is treated as debt. Over the course of one year, the initial \$200 million SPV Trust Fund receives a total of \$24 million in income (reflecting the total 12 percent yield). With 20 percent of the SPV Trust Fund being treated as equity, \$4.8 million (20 percent of \$24 million) of income is subject to corporate taxation. At a corporate tax rate of 35 percent, the tax on \$4.8 million income is \$1,680,000, which has to be covered by the Sponsor. Thus, the total cost to the Sponsor has increased from \$14,000,000 to \$15,680,000.

Now consider the case of an offshore SPV facility (as shown in Table 2). There is no corporate tax liability incurred by the SPV. For an offshore SPV facility, in most cases there is no flow-through income to the cat bond issuer. The facility is not owned or controlled by the sponsor; instead, the Trust Fund owns the offshore facility and has its own board of directors. However, the US sponsor will need to pay a 1 percent excise tax to the IRS. The total cost to the Sponsor will be \$14,140,000 (\$14,000,000 plus the 1 percent excise tax). When we compare the total cost to the Sponsor, the onshore SPV would incur a total tax liability of \$15,680,000, which is 10.9 percent more than the tax liability \$14,140,000 for an offshore SPV.

[Insert Table 2]

For US corporate investors, investing in an onshore SPV would have some tax advantages due to dividend deductions on the equity portion of the SPV. However, for tax-exempt investors (such as pension funds), there is no difference between an onshore and an offshore SPV. Given the diversity of investors with different tax situations, we focus our comparison on the tax liability of the Sponsor, rather than investors. In Table 3, we summarize the different tax rates for domestic versus foreign investors, and for onshore versus offshore SPVs. In our illustration we assume that investors are US domestic taxable corporations.

[Insert Table 3]

Regulation and Government Insurance/Reinsurance Programs

Many aspects of primary insurers' market activities related to the underwriting, financing and management of catastrophe risk are regulated by the states. These activities include pricing, selection/rejection of insureds, policy terminations, policy provisions, and claims settlement, among others. Various government insurance/reinsurance schemes further undermine private risk financing. A detailed discussion of the exercise and implications of this kind of regulation is beyond the scope of this paper, but some discussion of the most important issues and problems in this area is warranted.

The severity of regulatory constraints in a given state tends to vary directly with the severity or cost of catastrophe risk. There is no question that Florida tops the list in this respect and it has resulted in many unwise government actions. Florida experienced a

wave of rate increases and other changes following Hurricane Andrew which was followed by a second wave of rate increases and other market adjustments after the 2004-2005 storm seasons. Towards the end of 2006, a considerable public backlash had developed which played a prominent role in state legislative and gubernatorial elections.

By the end of 2006, Florida insurance regulators began disapproving or shaving rate increases filed by insurers, but bigger changes were in store for 2007 (Grace and Klein, 2007). In its 2007 session, the Florida legislature, with their governor leading the way, greatly expanded the state's assumption of catastrophe risk exposure (Chernick and Appel, 2007). The state's residual market mechanism for property insurance was modified to compete with private insurers with a lower rate structure that is virtually guaranteed to swallow a large portion of the highest-risk exposures. The Florida Hurricane Catastrophe Fund (FHCF) also expanded its reinsurance coverage for primary insurers with rates set below those charged by private reinsurers.³⁴ The objective of both actions was to significantly lower the price of insurance for property-owners in high risk areas. These measures also will tend to crowd out private financing of catastrophe risk and any funding shortfalls of these mechanisms will be covered by assessments on other insurance buyers and potentially state general fund appropriations. The ultimate consequence could be large subsidies paid by other insurance buyers and taxpayers if a large hurricane or a series of hurricanes hit the state.

³⁴ The FHCF is a state-sponsored mechanism that offers catastrophe reinsurance at a lower effective price than private reinsurance markets. Two cost advantages of such government mechanisms are their tax-exempt status and the fact that they do not charge for their implicit cost of capital. Also, these mechanisms typically have authority to issue bonds to cover losses that exceed their assets. The FHCF is the only state-sponsored reinsurance mechanism of its kind. The California Earthquake Authority (CEA) is the only other state-sponsored catastrophe insurance mechanism but it provides earthquake coverage at a primary level rather than operating as a reinsurance mechanism.

To date, other coastal states have not yet followed Florida's lead but there is the possibility that some may do so. California, for example, has almost destroyed residential purchase of earthquake insurance coverage. Prior to the Northridge Earthquake in 1994, more than 30 percent of California homes had earthquake insurance. Northridge destabilized the private earthquake insurance market which was hampered by various regulatory constraints. Consequently, the state established a government earthquake insurer, the California Earthquake Authority (CEA), in 1996. Unfortunately, its poor design coupled with other government policies caused the purchase of earthquake insurance to plunge to 12 percent of residential properties (Insurance Information Institute, 2007). Hence, most of the residential earthquake exposure in California is uninsured which, in turn, has significantly reduced the demand for earthquake risk financing by primary insurers and reinsurers. This means that when the next severe earthquake strikes California there will strong demands for large amounts of state and federal disaster aid.

Catastrophe-prone states and groups with interests in lowering the price of insurance are also pushing the establishment of a federal catastrophe reinsurance fund.³⁵ Some large writers of property insurance also support this proposal but many other insurers and reinsurers oppose it. The most prominent overall plan has three elements:

1. The establishment of state/regional catastrophe funds would cover lower layers of risks.
2. A national (federal) backstop mechanism would provide reinsurance for higher layers of risk above that covered by state/regional funds (and private reinsurance).

³⁵ See Watkins, et. al. (2007) for one evaluation of a national catastrophe program that concludes that it could produce significant costs savings for insureds. It is important to stress that there are different views on merits of such a plan and experts that might take issue with the conclusions of the cited study.

3. Various provisions for education, financial assistance, and other measures to mitigate catastrophe risk and improve disaster recovery.

Other proposed national catastrophe insurance/reinsurance plans with differing characteristics have been placed on the legislative table. The different plans and the varying opinions on their merits will likely continue to generate considerable debate and preclude any action in the near term.

These proposals would be on top of the US National Flood Insurance Program (NFIP) in which a federal entity covers residential and commercial property up to certain limits. The NFIP has been plagued by inadequate rates and lax underwriting which has required large bailouts from federal taxpayers. These bailouts will likely increase as flood losses associated with hurricanes and other storms continue to rise.

Finally, there is the problem associated with the demand for large amounts of federal disaster aid following catastrophes because of the lack of pre-event insurance and other financing by those affected. Government insurance/reinsurance schemes are often sold with the fiction that they will reduce the amount of federal disaster aid. Hurricane Katrina resulted in more than \$100 billion disaster aid payments to affected areas.³⁶ However, the unfortunate reality is that increased subsidization of government insurance has been accompanied by rising amounts of disaster aid, i.e., the worst of all possible worlds. A recent working paper by Cummins, Suher and Zanjani (2007) conservatively estimates that the net present value of the federal government's liability for disaster aid for natural catastrophes (over a 75-year period) is between \$1.2 and \$7.1 trillion.

³⁶ It should be noted that a large portion of disaster aid payments to local and state governments to assist them in repairing damages to their infrastructure, but anticipation of these payments discourages government entities to insure or set aside funds to cover natural disasters.

In sum, the current US government posture toward catastrophe risk and its financing is a growing disaster in itself. There is essentially little support for and encouragement of conventional or alternative private catastrophe risk financing. Further, state regulatory policies and management of special catastrophe funds as well as residual market mechanisms further depress the demand for and supply of private capital and have increased government underwriting of catastrophe risk at inadequate prices. The proposal for a national cat fund would likely exacerbate under-pricing and government absorption of catastrophe risk. Together, these policies and proposals are moving in the wrong direction – they are discouraging efficient risk management by property owners and other stakeholders.

EU Regulatory Approaches

Overview

EU regulatory treatment of catastrophe risk and its financing, particularly in the context of Solvency II, has not yet been fully specified. This lack of specificity is, in part, due to its principles-based approach that tends to shy away from setting detailed rules which would establish regulatory treatment of a particular risk financing device ex ante. Another factor is that Solvency II is still taking shape and some of its more detailed elements have not been developed. Ultimately, the treatment of cat risk financing devices will unfold as various transactions are reviewed by regulators. Despite these generalities and uncertainties, it is possible to discuss certain established or likely regulatory policies and speculate on others that will affect catastrophe risk financing.³⁷

³⁷ See Butt (2007) and De Mey (2007) for further discussion of the implications of Solvency II for insurer risk financing and their use of capital markets.

Securitization and Cat Bonds

While risk transfer through securitization has not yet received extensive policy development, the issue has received attention. For example, the EU Reinsurance Directive allows member states to establish Special Purpose Vehicles (Evans, 2007). The EU Reinsurance Directive recognizes that an SPV can "assume risks from insurance or reinsurance undertakings and which fully funds its exposure to such risks through the proceeds of a debt issuance or some other financing mechanism where the repayment rights of the providers of such debt or other financing mechanism are subordinated to the reinsurance obligations of such a vehicle." This will also be possible under Solvency II. Further, the movement to a risk-sensitive solvency system across the EU that recognizes economic reality should mean that firms will have even a greater motivation to securitize, use SPVs and purchase reinsurance by getting appropriate credit for it.

It should be noted that the Solvency II Directive will consider all risk mitigation schemes without limits and collateralization obligations but will include credit risk. Hence, the Directive could be viewed as more "liberal" than the Reinsurance Directive which could still allow national constraints.

As we discuss, while the directive tends to provide insurers with greater flexibility and greater recognition of alternative risk transfer, greater specification of EU policies will likely take several steps. After the most recent Solvency II directive distribution and approval, further development will occur in terms of calibration, implementation measures, and the actual enforcement of the new standards by EU regulators. Finally, some discretion will be left to EU members in terms of specific regulatory requirements governing SPVs and cat bonds.

Some clues as to how EU policies will be further developed might be gleaned from the positions taken by its members. For example, in the UK, the FSA has specified the regulatory treatment of securitization as part of its national implementation of the Reinsurance Directive. Currently, an insurance special purpose vehicle (ISPV) in the UK would be treated the same way as reinsurance in terms of recognizing its risk transfer although an ISPV would not be regulated like a reinsurer. An ISPV needs to be authorized, supervised, and taxed, and maintain a regulatory capital surplus level as would be required of an insurance company. At the same time, the FSA recognizes that there is a relatively lower level of risk associated with the structure of ISPV transactions than certain other securitization transactions.

FSA supervision will take place through the oversight of the ceding company, rather than separate supervision of the ISPV. In his speech in late 2006, the FSA regulator Julian Adams stated that:

It is often said that reinsurance is insurance between consenting adults, and we believe that our approach to ISPVs is an extension of this general principle. By placing the onus for risk identification and mitigation on firms' senior management, and deliberately not prescribing in advance structures that we will and will not accept, we hope to encourage innovation in the market, and we believe that we are creating the opportunity for a significant new market here in the UK.

The FSA will examine to what extent risks are mitigated or transferred from the ceding company to the ISPV. This reflects a principles-based approach that will assess ISPV arrangements on a case-by-case basis and the appropriate credit will depend on how risks are managed. This approach is based on the FSA principle of senior management responsibility.

The FSA is concerned that some ISPVs might be established merely to achieve a form of regulatory arbitrage. For all ISPV transactions, the FSA will assess whether there is sufficient and genuine risk transfer. The FSA is conscious that for intra-group ISPVs risk transfer may not be the only driver – achieving a particular tax outcome or a desired corporate structure may be factors behind the transactions. For such intra-group ISPVs, the FSA will look at how the proposed risk transfer takes effect both at an entity and group level. While the assessment of risk transfer will need some risk modeling demonstration associated with coverage attachments and limits, there are other important considerations. Other considerations include whether the ISPV contracts specify forced commutation clauses and whether ISPV transactions are unwound in exactly the same way as established in the contract.

For an ISPV, like a reinsurance contract and over-the-counter derivatives, the specific contract terms are fundamentally important for assessing whether there is a real risk transfer. In addition to coverage limits, it is important to determine how triggers will function in stressed circumstances and how the indemnity coverage will operate in response to differing events. The precise nature of the contracts involved will influence what we will see and this is another rationale for the FSA's non-prescriptive, case-by-case approach. However, a case by case approach, at least early on, could create some uncertainty among insurers as to how a specific transaction will be treated by regulators. Over time, the precedents set in terms of the regulatory treatment of past transactions may provide greater guidance to insurers as to what they might expect in terms of future transactions.

France offers another example of an EU country that has established policies on the issuance of cat bonds. Based on communications with French industry experts, it is our understanding that cat bonds can cover risks either through a derivative mechanism or through a reinsurance contract between the SPV and the reinsured. If a French insurer uses the reinsurance approach, the legal structure of the SPV and the reinsurance contract with the SPV must be recognized under French law.

The adoption of the EU directive will establish the principles for the SPV in French law but its supervisory authority will still be responsible for determining certain regulatory standards for SPVs. For example, in France, it is not yet clear how the French supervisory authority will treat SPVs and their insurance-linked securities, particularly concerning their solvency requirements. Further, for a cat bond issued through an SPV to be accepted as reinsurance, the arrangement must be “indemnity-based”. This can raise issues with respect to cat bonds with parametric or other triggers not based solely on the issuing insurer’s actual losses. The concern arises with bonds that would pay an insurer more than its actual losses. This may require greater use of “ultimate net loss” clauses which limit the payment to the issuing insurer to no more than its actual losses.

Capital Standards and Catastrophe Risk

The discussion of capital standards in the proposed Solvency II directive does contain some elements related to catastrophe risk that will undergo further development in the next stage of the Solvency II process. The directive states that the SCR should contain a catastrophe risk component. The directive also appears to indicate that the use of various “loss-absorbing” instruments will be considered in determining an insurer’s SCR and whether it meets this requirement. The specification of these provisions, of

course, will occur in the further delineation of Solvency II policies and their implementation. We should note that the proposed directive sets a 0.5 percent default probability (equivalent to a one-in-200-years probable maximum loss) as the standard or goal in determining an insurer's SCR.

Harmonization of the Treatment of Hybrid Capital and Securitization

Banks and insurance companies have shown substantial interest in the broader hybrid category (including securitization), which can count toward their capital-reserve requirements with minimal damage to their credit ratings or equity base. This kind of debt or equity financing boosts the financial capacity of an insurer in a manner that significantly subordinates the claims of these lenders and equity investors to other claims against a bank or insurer. Currently EU regulatory treatment of contingent capital is still evolving.³⁸ Indeed, the EU is undergoing a process of consultations with the industry and member states with the main goal of harmonization across sectors and member states. The recent Solvency II directive should provide further insights as to how alternative risk financing will be treated, but hopefully experience as well as further articulation of policies in this area will provide additional guidance to insurers.

In the current Solvency II initiative, there has been a debate as to how to count certain types of loan capital in determining regulatory solvency capital. Certain types of loan capital have the characteristics of equity and have the capacity to absorb losses, which are commonly referred to as Deeply Subordinated Debt (DSD) and are not

³⁸ Note, catastrophe risk financing devices, broadly defined, may or may not involve risk transfer. There are some potential financing mechanisms such as finite risk/reinsurance arrangements and letters of credit that provide liquidity to an insurer suffering a catastrophe loss shock but ultimately provide little or no risk transfer – funds obtained must ultimately be paid back. The issues for regulators are proper disclosure and transparency and the long-term implications of how much risk is actually transferred versus just purely financed under favorable terms but no actual risk transfer.

currently covered by any EU Directive. The Directive fully recognized subordinated debt in Tiers 1-3. Discussion has ceased on this policy and only the limits for Tier 1 remain a matter of contention. Some EU states (e.g., France) argue that DSDs are adequate for solvency purposes and should be counted toward part of the Tier 1 capital. The French delegation states in their letter to the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS):

From an economic point of view, hybrid capital can, under certain conditions, offer guarantees very close to those of own funds and, in any case, much higher guarantees than those provided by subordinated debt. Thus, the insurance directives could be adapted, through the comity procedure, to better take into account hybrid capital for the constitution of the solvency margin and thus reconcile both regulatory and economic demands.

In response to the French delegation proposal, CEIOPS is openly asking for public advice on this issue. CEIOPS is seeking stakeholders' views on cross-sector alignment, the need for changing the definition of eligible elements of capital and potential quantitative impacts.

Although Solvency II has not made any new rules on the treatment of hybrid capital, one development seems to be clear - regulators are moving toward a principles-based approach. The principles-based approach can help facilitate greater harmony and improvement. This should be beneficial to insurers' and reinsurers' use of alternative methods to financing catastrophe risk as well as other types of financial/underwriting risk.

In a letter submitted by the European Securitization Forum (ESF) to the CEIOPS regarding securitization and Solvency II, the ESF recommends that securitization, reinsurance and credit derivatives be treated in a similar way from a capital relief

perspective, irrespective of the legal form of transfer. The ESF contends that this will help harmonize regulatory treatment across different financial sectors.

Some insurers believe that one of the greatest benefits that Solvency II could offer would be greater clarity that would allow them to establish structures more easily and a framework for buyers to work within. This could allow additional countries to enter the securitization markets, which has been dominated by the UK and the Netherlands, and further increase the supply of such instruments (see Watson, 2007).

As a final observation, it is important to stress that under the EU system, the specific accounting treatment of risk financing devices is not as critical as it is under the US system. In the US system, accounting treatment is important because it significantly affects all aspects of the financial assessment of insurers and directly affects the US formula-based approach to measuring capital adequacy. In the EU system, accounting treatment directly affects the MCR component of capital requirements but accounting values are not the only input in the internal modeling approach to determining the SCR component. In other words, in determining whether an insurer meets its SCR requirement, whether a particular instrument is reflected in an insurer's capital or alternatively determined to reduce the potential demands on an insurer's capital, the ultimate effect is essentially the same. The standard model may ply some middle ground in terms of reliance on accounting values versus other measures of an insurer's financial risk.

Government Insurance and Catastrophe Reserves

The U.S. General Accountability Office (GAO) reviewed six European countries – France, Germany, Italy, Spain, Switzerland and the UK – to examine their approaches

to managing and financing catastrophe risk (see U.S. GAO, 2005). The GAO found that all six countries have developed and employed a combination of public and private approaches to deal with catastrophes but only three impose government-mandated insurance that cover disaster risk.³⁹ The perils covered differ by country and typically include flood coverage but the coverage of other perils, e.g., earthquakes, windstorms, etc., vary. The differences presumably reflect the nature of the perils to which each country is most exposed.

France and Spain have national programs that require property owners to purchase catastrophe coverage that are backed with unlimited government guarantees. Switzerland mandates natural catastrophe coverage but does not provide any explicit government financial guaranty. The other countries rely on optional private insurance to cover natural disasters. In the UK, flood coverage is typically included in private property insurance policies.

All six countries allow the use of catastrophe or equalization reserves for natural disaster risks. However, equalization reserves are no longer allowed at the consolidated level. The specific policies in each country are summarized in Table 4. All six countries allow for some form of tax deductibility for these reserves. However, it should be noted that international GAAP standards do not currently recognize equalization reserves which is an issue that will need to be addressed.

[Insert Table 4]

Opportunities for Greater Harmony and Improvement

³⁹ Freeman (2004) also reviews government catastrophe insurance programs in EU countries.

Given current limits aggregate capacity of the insurance/reinsurance industry, the remaining uncovered exposure to large catastrophes requires other financing vehicles. While additional capital has flowed to conventional reinsurers, it is inefficient to finance the higher layers of catastrophe risk using the equity held within reinsurers. Indeed, both insurers and reinsurers have increased their use of alternative risk financing to augment their capacity. The use of such vehicles could be facilitated and encouraged by appropriate regulatory policies, especially in the US, which is lagging behind the EU in terms of moving towards a principles-based approach to solvency regulation and a more supportive environment for alternative risk financing. Further, greater use of alternative risk financing could increase the supply of catastrophe insurance and lower its price.

In the US, several constraints and other policies retard the more extensive use of alternative catastrophe risk financing. Currently, regulators only allow accounting credit for transactions with authorized reinsurers which precludes recognition of offshore reinsurance transactions (unless trust funds are held in the US as collateral) or any other alternative form of risk transfer. Broadening acceptance of reinsurance transactions in jurisdictions with good regulatory frameworks could substantially encourage US insurers' use of reinsurance, especially for insurers who presently have insufficient capacity to withstand their potential catastrophe losses.

Further expansion of the recognition of alternative risk transfers could encourage insurers of sufficient size to transfer catastrophe risk at higher layers and increase their level of protection. The NAIC has adopted model acts that would regulate and recognize onshore securitizations but the lack of favorable tax treatment (among other factors) for these arrangements has stymied their utilization. Regulatory recognition of offshore

securitizations could further encourage insurers to use this approach to better manage their catastrophe risk. The same could be said for other devices such as the use of cat options and swaps. Regulatory reforms in these areas would prove to be beneficial when the US is struck by a large catastrophe. They could also help to improve the affordability and availability of property insurance at a primary level if insurers can utilize and achieve credit for these transfers due to their lower cost.

Finally, if insurers were allowed to demonstrate their capital adequacy and proper risk management through approved internal risk models (and/or more sophisticated standard models), in lieu of other regulatory requirements or constraints, it could encourage both broader use of this approach as well as risk financing devices that would affect it. This should be an ultimate goal of US regulators and its adoption would avoid industry opposition if it was an option for insurers rather than a requirement. The replacement of arbitrary, prescriptive rules in favor of a principles-based, risk-focused regulatory approach could be an attractive tradeoff to many insurers and increase their national and international competitiveness.

The EU has progressed much farther in developing such an approach to solvency regulation which should help to encourage EU insurers to efficiently manage their catastrophe risk. The main issue for EU insurers may be how specific risk transfer transactions (and potentially different contract structures) will be viewed by regulators in their application of EU policies. This issue is coupled with broader issues to be resolved which also could affect cat risk financing, directly or indirectly. To some degree, uncertainty about how specific transactions will be treated inherently arises from the superior principles-based approach. EU regulators may understandably be reluctant to

“approve” transactions in advance, but as their experience develops they may be able to develop guidelines for various instruments and transfer/financing structures. Ultimately, over time, insurers will be able to see how previous transactions have been treated that will help them in considering new transactions or instruments with “new” features.

All of this said, the public, legislators and even some insurers may perceive that there are limits to the amount of protection that can be achieved through private markets alone or harbor concerns about the cost of that protection. This is a particular issue in the US where property owners in high-risk areas are vociferous in their criticism of insurance rate increases. The principle motivation for political support of government insurance/reinsurance mechanisms in the US is lower insurance rates, not protection against large catastrophes.

Insurers who support government reinsurance programs express concerns about the uncertainty associated with pricing and managing catastrophe risk. They may also have concerns that state legislators/regulators will not allow them to charge what they believe to be adequate rates. This, of course, has become a reality in Florida and a possibility in other states.

Regardless of whether there is a true or a perceived gap in private financing of catastrophes, government catastrophe insurance/reinsurance may become a more pervasive phenomenon in the US and continue in the EU in those countries that already have such institutions.⁴⁰ Political pressures for such policies could rise in EU countries in the face of increased catastrophe risk and losses, although favorable treatment of

⁴⁰ In our view, it would be desirable to maximize reliance on private market capital before government insurance/reinsurance is contemplated. However, the “availability” of capital is probably not the driving motivation of advocates of government programs. The perceived lower cost of government reinsurance (whether legitimate or “manufactured”) is the principal concern of coastal politicians and their constituents.

alternative cat risk financing should reduce such pressures. The danger associated with such schemes is that government entities are subject to political pressure to charge inadequate premiums to cover the risk they are assuming. The ultimate consequence of such practices could be substantial taxpayer subsidies when the catastrophes hit. Hence, stakeholders in both the US and the EU must be attentive to the lure of subsidized catastrophe insurance/reinsurance schemes.

In terms of public solutions, for those committed to the idea of government reinsurers, one might propose that they issue pre-event cat bonds rather than engage in post-event borrowing and assessments that run a greater risk of taxpayer subsidies. For example, pre-event financing is being used by the recently-established, multi-country Caribbean Catastrophe Risk Insurance Facility (CCRIF). Government purchase of catastrophe options also might be more feasible given that its portfolio of exposures would be aligned with the parametric triggers that would be used for such options. Private insurers and reinsurers could help to facilitate the aggregation of policies (by providing fronting, pricing and claims handling services as well as underwriting lower layers of risk) and cede higher risk layers through excess of loss reinsurance with a government reinsurer. The primary advantage of this approach would be that the government would pay for the cost of issuing of catastrophe bonds (and/or options) up front, which in turn, should be reflected in the premiums paid by those (property-owners) who are ultimately receiving the protection. The emergence of some alternative proposals that utilize this kind of approach in the US is a positive development.

Conclusions

Natural disasters present a substantial and growing threat to many countries and warrant efficient risk management. The financing of catastrophe risks requires an economically-sound and collaborative approach among private insurers/reinsurers, capital markets and governments. In our opinion, private-sector solutions should be fully utilized to their maximum capability before government mechanisms play a role. Obviously, there are different opinions and preferences on the dimensions of the appropriate private-public partnership. The removal of unnecessary and welfare-diminishing regulatory and tax constraints could substantially boost the capacity of the private capital markets to assume more catastrophe risk. The US regulatory and tax framework currently inhibits the development of the markets for catastrophe bonds and other alternative financial instruments. Further, the government absorption of catastrophe exposures in the US unnecessarily reduces the demand for private risk financing. EU regulatory and tax policies appear to be more favorable to catastrophe risk financing although further regulatory guidance in this area could be helpful to insurers and reinsurers.

Movement to a principles-based regulatory approach – as reflected in the evolving EU system – would be a substantial and beneficial advance in the US. The EU does face regulatory issues that will need to be addressed and some EU countries have opted for government solutions to catastrophe risk financing. Hence, there is room for improvement in both jurisdictions. Unfortunately, as demonstrated in the US, there is the danger for politicians to court public favor with short-sighted measures that distort incentives and encourage excessive risk-taking rather than optimal risk mitigation. The counter-strategy is public education of those who stand to lose from unwise government policies. This is an enormous challenge but a better strategy is not obvious. “Small”

catastrophes could ultimately be beneficial by revealing the deficiencies in unsound policies and help to vaccinate the public against political imprudence. Hopefully, wisdom will prevail before the US or other exposed countries suffer a mega-disaster.

At the same time, in writing this paper, we became impressed with the lack of government attention to role of alternative mechanisms in financing catastrophe risk in both the US and to a lesser extent in the EU. For both systems, it is difficult to find documents that provide clear and thorough discussion of how regulation and other government policies should accommodate and promote the use of private financial markets in catastrophe risk management and financing. In the US, most of the attention has been focused on alleged gaps in the supply of catastrophe insurance and reinsurance and the need for government mechanisms to fill the gap. In the EU, the supply of catastrophe insurance appears to be less of an issue but discussions of how Solvency II should influence catastrophe risk financing are more scarce than we had expected. Greater public attention to this matter is needed in order to promote and fully realize the potential role of financial markets in managing catastrophe risk.

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