

IN THIS ISSUE

Air Navigation Services: Financing Air Traffic Infrastructure in Emerging Markets	1
Economic Exposures to Natural Disasters Public Policy and Alternative Risk Management Approaches	1
Infonet	11



INFRASTRUCTURE

Air Navigation Services: Financing Air Traffic Infrastructure in Emerging Markets

*Ellis J. Juan**

The development and efficient management of Air Navigation Services (ANS)¹ in emerging economies is facing difficulties due to the limitations imposed by a centralized public administration process. Increasing fiscal pressures, coupled with the limited func-

tionality of central government institutions and a redefinition of the role of the Air Force, are having an impact on the provision of adequate ANS in emerging markets.

Fiscal pressures and budgetary allocation procedures affecting central-

► p.2

*Ellis J. Juan is Head of the Capital Markets Unit of the Private Sector Department, Inter-American Development Bank.

[1] In the context of this document, Air Navigation Services (ANS) encompasses all activities necessary to efficiently operate and provide air traffic services for a particular country's airspace, excluding the provision of technical regulation services (i.e., safety regulation). ANS includes the provision of air traffic control services, en route navigational services, flight information services and the necessary support related services.



FINANCIAL MARKETS

Economic Exposures to Natural Disasters Public Policy and Alternative Risk Management Approaches

*Torben Andersen and Pietro Masci**

1. Introduction: The Economic Costs of Natural Disasters

Natural disasters can be defined as sudden and temporary events triggered

by natural hazards that crush the response capacity of the people and organizations involved and seriously hit

► p.6

*Torben Andersen is Visiting Professor of Strategy and Financial economics at George Mason University and Pietro Masci is Division Chief at Infrastructure and Financial Markets Division of Inter-American Development Bank.



◀ p.1 **Air Navigation Services**

ized institutions (integrated government departments)² result in a failure to adopt full-cost recovery systems for ANS charges, as well as independent revenue generation. Owing to the scarcity of funds, maintenance and upgrading of equipment and systems are inadequate, and remuneration policies, which are subject to public employee policy restrictions, do not promote adequate incentives for career development. Safety is ultimately compromised, thereby affecting the adequate development and integration of air transport markets in these economies.

I. Private Sector Participation in the ANS Subsector

The Government of Canada has privatized the provision of its air navigation services. On November 1, 1996 Canada's Air Navigation System was sold to a not-for-profit corporation, NavCanada for Can \$ 1.5 billion. An independent Board of Directors com-

posed of independent members — not government related— and end-users representatives, heads the corporation. After four years of operation Nav Canada has reduced overhead by 20%, increased investments by C\$ 500 million and maintained a three year average of approximately 2 operating irregularities per 100,000 aircraft movements.

The private sector's involvement in air transport infrastructure (airlines, airports and air navigation systems) somewhat resembles a product life cycle from

■ *The development and efficient management of Air Navigation Services (ANS) in emerging economies is facing difficulties due to the limitations imposed by a centralized public administration process* ■

the government ownership and management perspective. Privatization of the airline sector (currently 80% of carriers are privately owned), has recently led to an increased interest in private sector involvement in the provision of airport infrastructure (this is currently evidenced by the numerous privatization transactions taking place all over the globe).³ On the basis of recent events taking place in the air navigation sector, it would seem that governments would next seek to involve the private sector in the provision of ANS infrastructure.

II. A New Model

For purposes of this document, the term "privatization of ANS" refers to any institutional arrangement that incorporates private sector type governance in the provision of services. It does not refer to the more traditional definition of the term (i.e., sale of equity, long term leases or concessions). In this context, the term "privatization" encompasses arrangements such as "commercialization" and "corporatization" of the provision of ANS services.⁴

A Proposed ANS Privatization Model

Developing countries pursuing ANS privatization usually have weak institutional and legal frameworks within which to develop a successful private sector model. Thus, these countries are very much in need of new investments to upgrade and modernize their ANS systems. However, investors tend to perceive the political and contractual risk as high.⁵ A first priority should be to separate the provision of ANS from the government's central budgeting (i.e., corporatize) while at the same time allowing for investments to take place in order to further compromise air safety. The following is a proposed concept, among different options, for an ANS privatization model for emerging economies that addresses the need for private business practices and immediate investments in ANS infrastructure.

► Phase A. Create an ANS corporation with financial autonomy (initially



Inter-American
Development Bank

Editorial Board

Marcello Antinori, Pietro Masci, Silvia Sagari, Roberto Vellutini, Antonio Vives

Editor for this issue

Jaime Millán

1300 New York Ave, N.W.

Washington, DC 20577

Stop W-0508

Phone: 202-623-2617

Fax: 202-623-2517

Internet: pietrom@iadb.org

Contributions to the Infrastructure and

Financial Markets Review are welcome.

Please send comments to pietrom@iadb.org.

This (and previous issues of the IFM Bulletin) and other publications are available at the IDB

Home Page: <http://www.iadb.org/sds/IFM/>

[2] In emerging economies most of the ANS is provided by a department or division (civil aviation authority) of a centralized ministry (e.g., transport, defense, public works, etc.)

[3] Governments have recently undertaken programs to involve the private sector in the provision of airport infrastructure in numerous countries, including Argentina, Australia, Bolivia, Canada, Chile, Colombia, El Salvador, Guatemala, Honduras, Jamaica, Peru, and Mexico (in addition to programs already undertaken in Austria, Denmark, Great Britain, Germany, Switzerland, Turkey, India, China, etc.).

[4] Commercialization/corporatization is an institutional arrangement in which the responsibilities for the provision of ANS are transferred to a particular corporate structure (the corporation) with the objective of operating on a private commercial basis. The commercial basis is defined as the establishment of full-cost recovery systems for the operation of the corporation (no dependence on the public sector budget), and financial autonomy for business development.

[5] Contractual risks are risks of damages or losses accruing from the nonperformance of governmental contractual obligations such as: (i) maintaining an agreed upon regulatory framework (user fees and charges), (ii) delivering inputs, (iii) paying for outputs, etc.

owned by government but expected to be jointly owned with the private sector in the near future). Transfer, through proper legislation, responsibilities over the provision of ANS to the corporation (excluding safety regulatory functions). Transfer existing assets to the corporation at market value but under a financing scheme that makes payments to the government viable. Technical staff should be transferred from the integrated government departments (CAAs) to the ANS corporation.

- Phase B. Implement a Develop-Maintain-Operate-Transfer concession scheme (or similar type of arrangements) between the ANS corporation and a well-known ANS operator (many ANS corporations are starting to offer their services to other countries with operational difficulties). The concession scheme should include a commitment from the concessionaire to finance the required investments. The concessionaire will operate the entire ANS system and will collect user fees and charges (under adequate economic regulatory mechanisms) to cover operations and maintenance costs, capital costs and a satisfactory rate of return. The ANS corporation will receive a concession fee from the concessionaire (to make asset transfer payments to the government). The length of the concession should be the minimum necessary for initial investment repayment to take place. At the end of the concession, the newly acquired assets (initial investment) will be transferred to the ANS corporation. Special consideration should be given to the technical staff at the newly created ANS corporation. Technical staff would work and be trained by the concessionaire while remaining employees of the ANS corporation.

- Phase C. At the end of the concession period, standard business practices and trained personnel should be in place. The sale of shares in the ANS corporation would then take place under a privatization strategy of

■ After four years of operation Nav Canada has reduced overhead by 20%, increased investments by C\$ 500 million and maintained a three year average of approximately 2 operating irregularities per 100,000 aircraft movements" ■

the government's choosing (trade sale, public offering, etc.).

One limitation facing any proposed model for emerging economies concerns financing of the ANS system's existing and new assets. This applies particularly in countries with relatively limited traffic, where implementation (and increases) in user charges and fees might not generate the level of revenues necessary to compensate for operational and capital costs.

Complete privatization of ANS systems (private ownership, profit incentives and financial autonomy) has not yet taken place. Governmental consideration of changes within the institutional framework governing the provision of ANS is relatively recent and has been mostly limited to developed economies. Governments in developed economies have taken an initial step to corporatize/commercialize the provision of ANS with varying degrees of financial autonomy. In the near future, these governments are likely to move forward and allow greater financial autonomy and increasing private ownership (through the use of capital markets).

The ability of the private and public sectors to come together in mutually beneficial relationships is often determined by the existence of creative financial mechanisms that allow for raising

■ Governments in emerging economies, are having to rely increasingly on private sourcing of funds to bring their air transport infrastructure up to the market's growing demands as deregulation and globalization affect the sector ■

capital, and by the emergence in the marketplace of new products that insure against political and contractual (regulatory risks) risks. Private sector participation in airports has been facilitated by mechanisms such as revenue bonds (based on US\$ airport income), the corporatization of airport operations with a subsequent capitalization through private investors/public markets, and the securitization of airport related fees and charges. Likewise, creative schemes will need to be developed in the air navigation system to allow for a reconciliation of the profit incentives with the public interest in the provision of a public service.

III. Financing ANS in Emerging Markets

Provided some form of privatization of the ANS system has been implemented (as described in section II), the following type of structured finance format could be used in the financing of ANS investments in emerging markets (described here in schematic terms).

SECURITIZATION OF FUTURE FLOW OF RECEIVABLES (I.E., OVER-FLIGHT AND APPROACH FEES)

1. Documentation of future invoicing of over-flight and approach fees by structuring long-term service contracts with domestic and international carriers being serviced by the ANS corporation.
2. Establishment of a fiduciary trust (a dedicated trust) domiciled in an offshore location.
3. Sale of the future flow of receivables to the fiduciary trust domiciled in an offshore location (outside the jurisdiction of the ANS corporation).
4. Payment instructions to domestic and international carriers to deposit the

► p.4

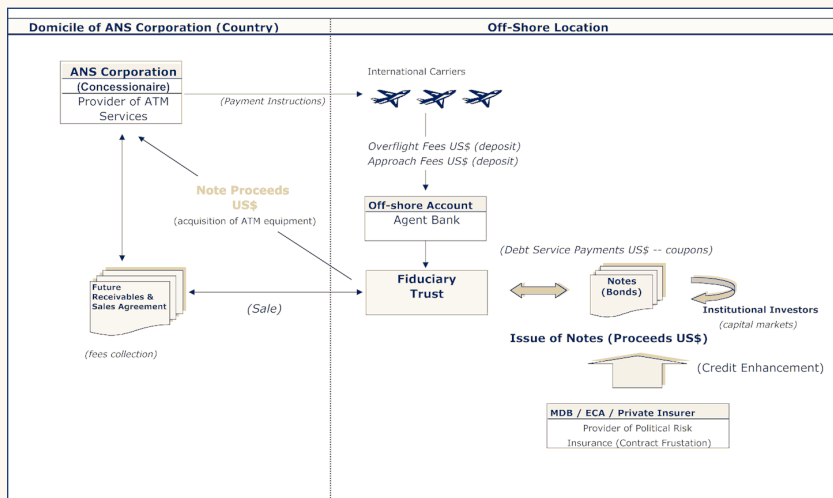


◀ p.3 **Air Navigation Services**

U.S. dollar value of over-flight and approach fees into an offshore bank account pledged to the fiduciary trust (agent bank account).

5. Fiduciary trust issues U.S. dollar-denominated notes collateralized with the future flow of receivables. Notes (bonds) have a pledge on the revenues being deposited by the carriers into the agent bank account (with the standard configuration of structured finance transactions including debt service reserve accounts, maintenance reserve accounts and liquidity reserves , if needed).
6. Notes are placed in the international capital markets via sales and distribution to institutional investors (under-

Diagram 1 : Securitization of Future Flow of Receivables (over-flight & approach fees)



writing arrangements with major financial institutions - investment banks).

7. Subject to the level of credit rating

required by investors in these types of transactions (securities) under market circumstances (at the time of issue) and the underlying country risk of the

Box 1 : Partial Credit Guarantees

Partial credit guarantees that allocate a portion of the credit risks directly to investors may take many forms. For example, products can be structured to guarantee a specific layer of credit risk in order to elevate the credit risk profile of the overall transaction and thereby attract investors. By guaranteeing an intermediate part of the debt (i.e. guaranteeing to pay a portion of the obligation after the transaction's internal cash reserves or sponsor recourse has been exhausted), local investors may be more willing to put their capital at risk for the remaining exposure.

Allocating credit risk to investors may also be possible by applying the partial credit guarantee to bonds that use securitized assets as collateral. For example, if airline XYZ has a future flow of credit card receivables, it may pledge the credit card payment receivables as collateral for its ability to repay a bond issued in its name. Although the collateral enhances the credit quality of XYZ's bond, the information on the collateral in emerging markets may not be standardized (e.g. incomplete records of past performance, higher delinquency rates, etc.). This contrasts with the collateral pledged in developed markets, and as such, XYZ's collateral may not be sufficient to attract local investors to purchase the bond. In this example, if the guarantor were to further enhance XYZ's bond with a partial credit guarantee, the bond could achieve a credit quality sufficient to interest a broader universe of targeted local investors. This example is true for all types of asset-backed securities, whether the collateral is airline credit card receivables, mortgage payments or other obligated future flows of resources. Over the long term, fostering securitization enables investors to gain confidence in the reliability of the asset-backed mechanism as collateral for repayment of debt, as well as the experience and skills to assess the credit quality of the underlying assets. With successful repayment of asset-backed or mortgage-backed bonds or future flow transactions, over time investors should require less financial guarantees to enhance the underlying collateral and instead focus greater attention on the differentiation of underlying assets and their relative credit quality.

Another form the partial credit guarantee that can use to allocate risk to investors is a rolling guarantee product. This refers to a guarantee of a specified number of interest and/or principal payments, on a rolling forward basis (i.e. the guarantee rolls forward to the next installment date upon payment by the issuer of the current installment). The guaranteed payments can be selected to extend the tenor of the bond (maturity guarantee) or a combination of a portion of interest plus a portion of principal installments.

This form of guarantee was originally designed in the cross-border context to calm international investors' fears about a currency crisis, which most investors assumed would not last more than six months to a year, but they could not predict the exact time. This guarantee was the principal instrument used in the Brady Bonds commercial debt restructuring (Brady Bonds included guarantees for two interest installments rolling forward plus full principal).

ANS location, an additional credit enhancement could be needed.

The credit enhancement options to be considered are:

- (a) Partial risk guarantee (political guarantee) covering a portion of the political risk (i.e., expropriation and political violence - transfer and convertibility are mitigated by the securitization structure) and regulatory risk. The latter (regulatory risk) covering contract frustration arising from government's default on selected clauses with the ANS concessionaire (concession contract) or with the ANS corporation (based on proposed privatization scheme).
- (b) Partial credit guarantee (financial guarantee) covering a portion of the credit risk involved in the payment capacities of the domestic and international carriers to the off-shore agent bank (i.e., performance and market risks).

IV. Risk Mitigation Products (Credit Enhancements)

Risk Mitigation Financial Products

Multilateral development banks (MDBs) as well as private financial institutions (i.e., insurance companies, monolins, etc.), are developing structured financial products, such as partial risk and partial credit guaran-

■ The ways in which this challenge [financing the modernization of ANS infrastructure] is met will determine which economies will hold a competitive edge in the air transport industry. ■

tees, that foster public-private sector cooperation. Partial risk guarantees cover specified risks arising from the non-performance of contractual obligations, or certain political risks such as expropriation, political violence and transfer and convertibility.

Partial credit guarantees are defined as instruments that "cover a portion of the financing provided by private financiers." This instrument, commonly referred to as financial guarantee or credit enhancement, enables the guarantor to bear a portion of the credit risk of the borrower (similar to the credit risks it bears when it extends a loan). The portion of the credit risk covered will be a function of the structure of the guarantee (i.e., amount and timing of risk to be covered). In developed markets, partial credit guarantees (financial guaranty insurance) for bond issues is a well-established credit enhancement mechanism for providing third-party support or security for the payment of principal and interest. The

largest market for the product is the U.S. municipal bond market, where over 50% of municipal bond issues carry a financial guaranty.

V. Conclusions

Governments in emerging economies are having to rely increasingly on private sourcing of funds to bring their air transport infrastructure up to the market's growing demands as deregulation and globalization affect the sector. Governments in emerging economies will have larger constraints placed on their budget expenditures as social investment needs become more acute. However, for these economies airport and air navigation infrastructure development is crucial to their efforts to join the global economy.

Governments are faced with the challenge of designing and implementing creative "private sector schemes." Recent experiences indicate that programs should be tailored on a case-by-case basis. Designing programs that reconcile the needs of the state with those of the new private participants will prove crucial in facilitating the flow of private capital and managerial expertise to ANS operations (while economic traffic threshold levels have not yet materialized). The ways in which this challenge is met will determine which economies hold a competitive edge in the air transport industry. ■

The Infrastructure and Financial Markets Division invites you to visit our Web Site

www.iadb.org/sds/ifm/

The site provides access to:

- **Strategies, policies, best practice papers, guidelines and technical studies on financial markets and infrastructure topics.**
- **Our quarterly IFM review.**
- **News on upcoming events: Conferences, Workshops and Seminars.**
- **Proceedings of past events.**
- **Links to related sites.**



◀ p.1 **Natural Disasters**

the economic and social development of the affected regions. The sources of catastrophic risk are natural phenomena, although human intervention or negligence can influence the impact of natural disasters. The most common natural phenomena include earthquakes, slides, drought, volcanic activity, wild fires, hurricanes, windstorms, and cyclones. The economic impact of natural catastrophes is determined by the frequency of events and the loss severity associated with the calamitous events. These characteristics define the total loss exposures that require insurance coverage, which in turn are constrained by assessability of losses, adverse selection and moral hazard issues.

Over the past 100 years, the countries of Latin America and the Caribbean have been affected by close to 1300 registered natural disasters, 74% of which have occurred within the last 10 years. The frequency of disasters in the region has increased by 100% over the period 1970-1980 and by 20% in the decades of the 1980s and 1990s. Similar tendencies are observed worldwide. The losses caused by natural disasters are not confined to the destruction of physical infrastructure and subsequent loss of revenues, but also to the long-term loss of market access as well as transaction costs related to needed reconstruction efforts. The total economic losses from natural disasters in Latin America and the Caribbean during the period 1970-1999 is estimated around US\$50 billion (constant 1998 US dollars). The direct and indirect damages related to natural disasters have increased over the last 30 years raising from about US\$8 billion in the 1970s to US\$16 billion in the 1980s and reaching the peak of US\$18 billion in the 1990s. These numbers illustrate the significant and increasingly adverse economic effects of natural disasters in the region. In this

context, we should keep in mind that poor countries are more vulnerable to disasters than rich countries. The losses in welfare are bigger for poor households and those who fall into poverty than for the rest of the population: "if a disaster kills off skilled people and wipes out the assets of the survivors, the poor will no longer be able to afford skill acquisition and acquisition of new technologies".¹

The economic vulnerability to natural disasters is exacerbated in Latin America and the Caribbean by weak insurance markets with little capacity to cover catastrophic risks.

Property insurance is limited to a very small segment of corporate enterprises and high net worth individuals. In the period 1985-1999, insured losses in Latin America represented only 3.85% of the losses related to natural disasters. In North America insured losses reach

■ ***The direct and indirect damages related to natural disasters have increased over the last 30 years raising from about US\$8 billion in the 1970s to US\$16 billion in the 1980s and reaching the peak of US\$18 billion in the 1990s. ■***

almost 35%, in Europe they reach 27%, in Africa almost 9% and in Asia about 4.5%. In other words, the existing insurance coverage for catastrophic risk exposures in Latin America and the Caribbean is very low by any comparison. Insurance premiums are expensive for most people in Latin America, and in the absence of formal requirements and incentives there is no urge to establish insurance coverage. As a consequence, the region represents a marginal share of the global reinsurance market.

This article reviews some of the central public policy issues related to natural disasters and focuses on the

possible use of risk transfer instruments available in the international financial markets. We discuss different ways to utilize these instruments and provide a road map for the Bank's role in managing the region's catastrophic risk exposures.

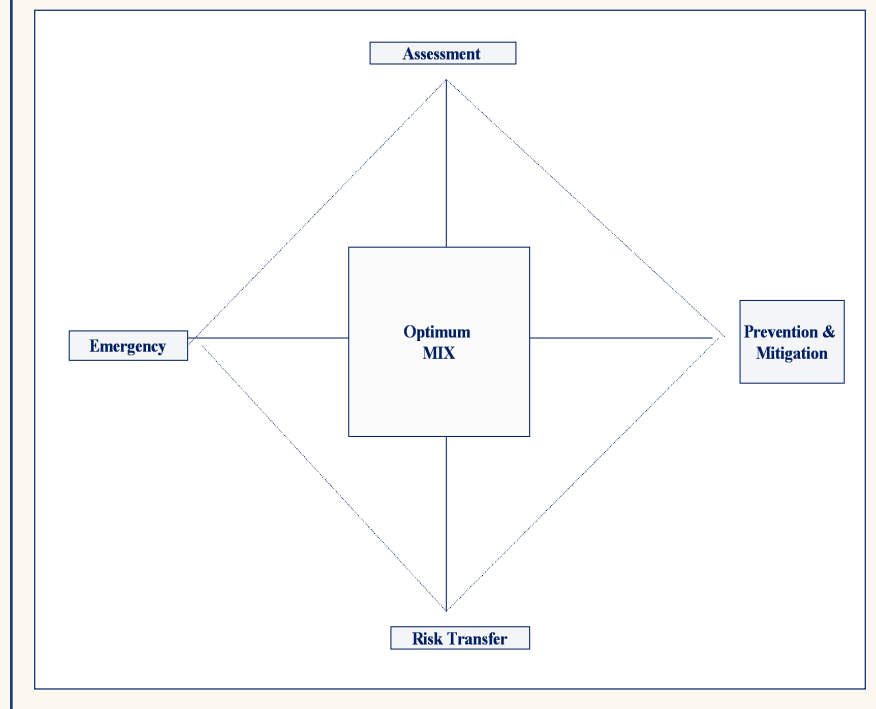
2. Public Policy towards Natural Disasters

Compared to other insurance risks, natural catastrophe exposures are characterized by relatively low and highly variable frequencies (for example the frequency of "El Nino") and potentially devastating economic impacts. Under these circumstances, the individual and public policy reactions to natural disaster risks tend to be irrational and depend greatly on the perception of what represents a significant level of risk. Since events are relatively infrequent and highly uncertain, there is a tendency to ignore their adverse economic impacts. However, the definition of natural disaster risk exposure states that the economic exposure is highly dependent on vulnerability. Therefore, four elements can significantly determine the economic impact of natural disasters: (i) assessment, (ii) prevention and mitigation, (iii) risks transfer, and (iv) emergency contingencies can significantly dampen the economic impact of the natural disasters.

The challenge for public policy makers is to understand these components and how they operate in the specific national environment, identify the economic trade-offs, and determine an appropriate mix of policies. For instance, the low frequency of events considerably reduces the incentives of public policy-makers to invest in prevention and mitigation given that the expected benefits of prevention may operate outside their political time horizon. Public provision of insurance and reinsurance may constitute a possible solution, particularly when the insurance market fails to provide adequate private coverage. However, the huge contingent liabilities that the Government undertakes would

[1] William Easterly, *The Elusive Quest for Growth*, MIT Press, 2001, page 199.

Figure 1. The Optimum Mix of Catastrophe Risk Intervention Policies



go against a precautionary fiscal policy and penalize other investment programs. In this respect, numerous studies provide evidence that the cost of mitigation and prevention is much lower than the disaster costs that arise in the absence of these measures. The challenge is to determine the relative effects of risk assessment, prevention and mitigation, risk transfer, and emergency preparedness, and find a balanced mix of policy measures. Figure 1 depicts the choice between the four elemental policy factors. It shows that an optimum solution of the complex resource allocation problem is not found at the extremes, but constitutes a combination of the policy factors (in the middle gray area), determined by the specific circumstances of the region in question.

The social and economic vulnerability to natural catastrophes can be reduced significantly through risk mitigation efforts that seek to dampen the severity at impact (e.g. urban planning, effective building codes, resistant building structures.). In turn, effective risk mitigation is a necessary condition for

the emergence of viable local insurance markets. It is not possible to establish a meaningful insurance industry without enforced building codes and stringent urban planning that reduce the severity of losses and contain some of the uncertainties that surround the catastrophe risk exposures.

The Emergency Reconstruction Facility (ERF) established by the Inter-American Development Bank to provide support to countries when unexpected disaster strikes, helps countries cope with temporary rehabilitation in the wake of natural catastrophes. However, these loans inevitably replace other Bank facilities with a long-term development focus. So, the emergency catastrophe funding policy may inadvertently weaken existing commitments to focused development projects. Social investment funds may provide finance for reconstruction of infrastructure in the wake of disaster, but again the funding is obtained at the expense of existing social programs. This highlights the need to finance risk mitigation efforts through measures such as vulnerability

reduction funds and facilities for innovation in disaster prevention that support structural improvements and new infrastructure to reduce the severity of catastrophic events. Whereas the mitigation efforts can reduce the size of exposures, they cannot eliminate the risks. Consequently, there is a significant residual exposure that must be managed and, more importantly, there is a need to view risk transfer as a fundamental component of the policy mix, whose function would not only include managing and covering the significant exposure, but also to providing the right incentives to undertake assessment, prevention and mitigation measures as well as to define catastrophe emergency programs.

3. Risk Transfer of Natural Disaster Risks

The major catastrophe exposures in Latin America and the Caribbean derive from windstorm, earthquake and El Niño. The occurrence of these natural events in the region is largely uncorrelated with natural events and economic volatility in other parts of the world. Therefore, the exposures can be diversified in large global insurance and investment portfolios. This phenomenon is likely to increase the capacity for risk transfer to the international reinsurance and capital markets for these types of catastrophe risks. Such risk transfer mechanisms may include facultative reinsurance treaties, risk-linked securities (cat-bonds), catastrophe risk swaps and contingent capital instruments.

If the risk-linked instruments apply a parametric formula (i.e., compensation based on the insured exposure and exogenous indicators that can be objectively observed and measured) as a trigger for coverage, they can be placed in the global financial market without major regard to on-going risk mitigation efforts, at least in the short to medium term. This is because investors only are exposed to the risk profile of the financial instruments, which is characterized by clearly defined and objectively deter-



◀ p.7 **Natural Disasters**

mined measures that leave no room for interpretation or manipulation. So, there are immediate market opportunities to use reinsurance contracts, risk swaps and contingent capital instruments that depend on the credit quality of the institutions that back the facilities. In contrast, insurance coverage provided by risk-linked securities is secured by cash collateral held in trust, so there is no concern about the insurers' solvency or counter-party risk.

The effectiveness of economic recuperation after a disaster depends on a country's ability to engage in proactive risk mitigation that reduces the severity of the loss and establishes effective risk transfer mechanisms that quickly provide funds for essential rehabilitation and reconstruction efforts. Therefore, it makes sense to consider the use of new international risk transfer instruments to manage the residual economic exposures associated with catastrophic events prevalent across the region. Both reinsurance contracts and capital market transactions, e.g. cat-bonds and contingent capital, may be viable instruments for countries in the region as they try to manage their catastrophe risk exposures more actively. The gradual development of local insurance markets has a long time horizon, but the countries can already take advantage of the emerging risk transfer opportunities that exist in the international financial markets.

4. Approaches to Catastrophe Risk Exposure Management

Three approaches to catastrophic risk exposure management are of interest in this discussion:

- A. Facilitate the development of country risk management plans and arrange cover for higher catastrophe risk layers
- B. Introduce local insurance pools and stop-loss facilities to cover otherwise uninsurable catastrophe risk exposures
- C. Monitor and manage the Bank's catastrophe risk exposure as de facto lender-of-last-resort to the region.

These approaches do not pretend to exhaustively describe all the possible risk management options. They are not mutually exclusive and can be structured in various ways to accommodate individual country needs and regional characteristics.

A. Country Risk Management Plans

The establishment of government funded calamity funds has been

**■ ...the individual and public
policy reactions to natural
disaster risks tend to be
irrational and depend greatly on
the perception of what
represents a significant level of
risk. ■**

advanced as a potentially effective way to smooth economic activity in connection with natural disasters.² These funds assume that governments as self-insurers should reserve the financial means up-front to better cope with expected future disasters. However, in practice, the funds are often undercapitalized and remain exposed even to the most common risk events. A potential downside to public funds is that they reduce the incentives to engage in commercial

insurance contracts, because the government is expected to cover the brunt of any losses. So, if a government provides subsidies to catastrophe risk coverage schemes it requires that compulsory insurance schemes are imposed on individual households and private businesses and a more stringent up front emphasis on risk mitigation. On the other hand, commercial insurers often have limited appetite for the upper layers of catastrophe risk exposures, so many government funds have been established to provide a cover for these otherwise uninsurable risks. However, many of the funds have not systematically considered the alternatives for structuring insurance coverage for extreme risk events in the financial markets.

One approach could be to work with governments in the region to facilitate analyses of the country's inherent catastrophe risk exposures and develop more detailed country risk management plans. These efforts could help the countries arrange more effective coverage for the identified catastrophe exposures. The lower risk layers, representing the more likely catastrophic events, could be supported by tax-financed calamity funds that would finance short-term rehabilitation and disaster relief. To cover exposures in higher risk layers, representing the less frequent but higher impact natural disaster events, the governments could engage directly in risk transfer on the international financial markets, e.g., in the form of contingent capital, cat-bonds, risk swaps, etc. A catastrophe risk management plan may help structure and arrange the risk capital needed to support various post-disaster reconstruction programs. However, these financial solutions merely establish funding arrangements that allow the government to cope with potential disaster events by providing the liquidity required to support rehabilitation and reconstruction needs.

[2] Fonden in Mexico is an example of this type of calamity fund.

[3] The Turkish Catastrophe Insurance Pool (TCIP) is an example of this. TCIP builds on new laws that make specific earthquake insurance policies compulsory to all households, and imposes laws that enforce risk mitigation and eliminate government subsidized interest-rate free loans to homeowners. The earthquake insurance policies are sold by local insurance companies and brokers, but will be covered directly through the TCIP.

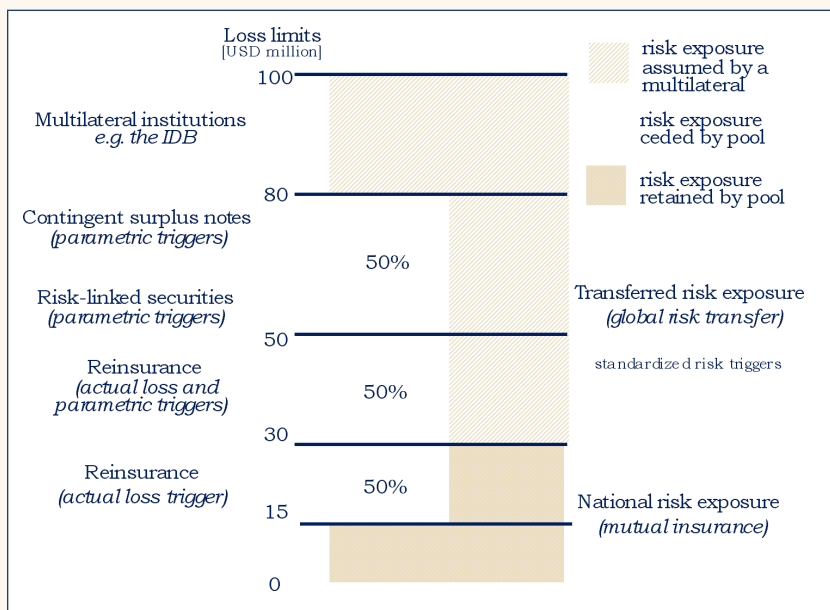
Therefore, the country risk management plans should go hand-in-hand with efforts to address the issues of risk mitigation and post-disaster rehabilitation preparedness.

B. National Insurance Pools

Another approach may introduce mandatory insurance contracts managed by a national insurance pool that extends catastrophe property insurance widely to all segments of the population and thereby provides cover for the otherwise uninsurable catastrophe risks. In this arrangement, the local insurance companies could act as sales agents of the mandatory insurance policies, and could provide insurance coverage for the lowest risk layer on a mutual basis to reduce issues of moral hazard associated with their role as primary insurance agents. The setup would require that the governments take stringent risk mitigation initiatives, such as enforcing effective property registration, building codes, etc.³ Alternatively, the insurance pool could engage local insurance companies on a voluntary basis, and the inclusion of insurance companies could signify recognition of professional competence, e.g. a certification standard. The practical implementation of an insurance pool should be adapted to specific conditions in the country, where national environments represent different types of preliminary groundwork.

The insurance pool could reinsure parts of the higher risk layers of the catastrophe exposures in the international financial markets (Figure 2). In order to reduce the insurance companies' direct commitment a part of the next lowest risk layer, e.g. 50 per cent, could be ceded to the global reinsurance market. The higher risk layers could be covered through issuance of risk-linked securities and contingent surplus notes. The risk-linked securities would maintain a relatively high credit standing due to their collateralized structure, whereas the contingent capital instruments could carry a credit enhancement in the form of a guarantee from the private sector and/or a multilateral institution. Issuance of risk-linked

Figure 2. Insurance Pool with a Layered Risk Transfer Structure - An Example



securities may be most appropriate for the lower end of the higher risk layers, because a higher likelihood of risk event would justify the higher interest rate premium required to place the instruments among investors in the global capital market. Conversely, contingent capital instruments may be most appropriate to cover the upper end of the higher risk layers, because the option premiums ascribed to the implicit put contracts are lower when the options are well out-of-the-money at the time of issuance. Multilateral financial institutions like the Bank could provide committed risk financing, possibly against a government counter-guarantee, for the highest risk level to the extent this is deemed essential to the successful implementation of the insurance pool. To limit the formal exposure covered by the insurance pool, the arrangement could incorporate a maximum exceedance level, e.g. \$100 million, above which there would be no formal cover.

The Multilateral Financial Institutions (MFIs) may in turn cover the risk financing exposures assumed from the highest risk layers ceded by the national insurance pools across the entire region through catastrophe risk

transactions in the global capital market. This may be accomplished in the form of facultative risk treaties, where the assumed catastrophe exposures are aggregated in contracts exposed to the same regional catastrophe risks, e.g. hurricane risk across the Caribbean Isles. It may also be possible to aggregate the risk exposures across several countries in relevant sub-regions, and handle the agglomerated exposures within a regionalized risk management structure. Integrative arrangements of this type would have the benefit of pooling the catastrophe risk exposures locally and thereby provide a natural first line of risk diversification that engage local primary insurance companies in the development of the insurance market. National governments and MFIs could facilitate the exposure management of higher risk layers across the region and thereby possibly create better diversification and economic efficiencies in the risk management process.

C. Regional Risk Exposure Management

The Bank as well as other



◀ p.9 **Natural Disasters**

Multilateral Financial Institutions could also analyze its overall exposure as de facto lender-of-last-resort to countries in the region that are exposed to natural catastrophe risks. The Bank does not have a formal or legal obligation to finance catastrophe rehabilitation in the region, but in reality the economic needs of the region will influence the Bank's eventual loan commitments. Hence, the Bank has an indirect, but real exposure to catastrophe risks in the region. It may be advantageous to identify and map the catastrophe risks that expose countries in the region and think about how to cope with these indirect but real exposures. Given the Bank's moral commitment to the region, it may be worthwhile to assess the potential funding needs associated with catastrophic events and evaluate the disruptive effects from unforeseen risk financing across the region, and how it may affect existing long-term economic development programs. In turn, it would be possible for the Bank to partially cover these indirect catastrophe risk exposures in the international financial mar-

kets. This approach may help the Bank achieve a more effective financial resource utilization and allow it to better serve the mission of sustainable economic development.

5. Conclusions

A central goal for the Multilateral Financial Institutions and the Bank is the establishment of a natural disasters public policy agenda for the countries across the region. To meet that objective effectively, there is a need for a comprehensive approach to assess the crucial elements of a successful strategy, namely risk assessment, prevention and mitigation, risk transfer, and emergency preparedness. These elements cannot be disjointed considerations and operate as separate secluded boxes, but should constitute parts of an integrated policy approach. The Bank has done significant work in the area of natural disasters and has made two critical facilities available, the Disaster Prevention Activity Facility and the Emergency Reconstruction Facility. The Bank has also considered financial risk transfer instruments such as those described in this paper to be integrated into the "policy mix". While continuing to work on detailed studies on the design and use of financing mechanisms and defining operational

guidelines, for infrastructure investments and for financial risk transfer, it is of fundamental importance to involve countries in a dialogue to review the available options and identify the appropriate policy mix. Through the ongoing policy dialogue, which would be extended to finance and line ministers, the Bank should help countries find solutions that balance future economic risks with current programs. These efforts should also deal with the moral hazards, motivations, and economic incentives of different groups and individuals to reach an optimum policy mix. This can be effectively accomplished by forging relationships with private and public sectors entities, e.g. International Community and donors that normally provide financial assistance in case of disaster so that they can become part of a comprehensive approach rather than incremental elements in the disaster-reconstruction-disaster spiral. There is wide room for a public-private sector partnership involving governments, insurers, banks and multilateral financial institutions to put in place the right incentives that allow prevention and mitigation measures to be fully effective and achieve higher welfare gains. ■

Recommended Reading

Torben Andersen, "Managing Economic Exposures of Natural Disasters", Working Paper, Inter-American Development Bank, Washington DC, May 2001.

Celine Charveriat, "Natural Disasters in Latin America and the Caribbean an Overview of Risk", Working Paper, Inter-American Development Bank, Washington DC, May 2001.

William Easterly, "The Elusive Quest for Growth", MIT Press, 2001.

Paul K. Freeman and Leslie A. Martin, "National Systems and Institutional Mechanisms for the Comprehensive Management of Disaster Risk", Working Paper, Inter-American Development Bank, 2001.

Paul R. Kleindorfer and Howard Kunreuther, "Managing Catastrophe Risk", Regulation Vol. 3, #4, 2001.

Howard Kunreuther and Richard J. Roth, "Paying the Price. The Status and Role of Insurance against Natural Disasters in the United States", Joseph Henry Press, Washington DC 1998.

Inter-American Committee on Natural Disaster Reduction (IACNDR), Working Group on Financing, "Preparatory Group Meeting on Natural Disasters: Disaster Prevention and Risk Reduction", Working Paper, Washington DC, May 2001.

Book Reviews, Articles & Papers:

2001 Crucial Year for Electricity Markets Three Must-read Papers

This has been a most remarkable year for electricity markets around the world. We saw the collapse of the California market, the rationing in Brazil, the intervention of the wholesale market in Colombia and other events. On the upside, these developments have spurred unprecedented academic activity to focus research on the crucial issues that affect market performance. We recommend to our readers that they focus in three papers by leading authorities the field. The first paper "Architecture of Power Markets", http://faculty-gsb.stanford.edu/wilson/pdf%20files/Architecture_Market010730.doc, by Stanford University Professor Robert Wilson, was posted on his Web page in June 2001. It is an updated and expanded version of his 1999 Presidential Address to the Econometric Society. The paper contains the most lucid discussion of wholesale electricity markets available today, including a section on the lessons from the California experience and an appendix on the mitigation of market power. Our second recommendation, "California's Electricity Crisis," <http://web.mit.edu/afs/athena.mit.edu/org/c/ceepr/www/workingpapers.htm> is by Paul Joskow, Professor of Economics and Management and Director of the MIT Center for Energy and Environmental Policy Research (CEEPR). The article contains a thorough analysis of the reasons behind the California debacle and the lessons that can be drawn from it. The third recommendation is "Electricity: Regulatory Developments Around the World," a Beesley Lecture on Regulation Series XI, delivered on October 9 by Professor Stephen Littlechild, the former U.K. Electricity

Regulator. This is an excellent summary of the new developments. The paper is not available in the Web but we can mail copies of it to interested readers.

Pension Reform in Small Emerging Economies: Issues and Challenges, by *Kenroy Dowers, Stefano Fassina, and Stefano Pettinato*. Inter-American Development Bank, December 2001, IFM-130 (available at http://www.iadb.org/sds/ifm/main-publication_151_e.htm).

During the last decade, a consensus has been reached about the need to devise solutions for the looming old-age crisis. This situation is driven by two sets of phenomena: on one side is the gradual decrease in the share of the working population, which is caused by a mix of declining fertility rates and increasing life expectancy; on the other, is the widespread mismanagement and/or structural weakness of existing pension systems. Both developed and emerging economies are paying increased attention to the type of pension reform that should be embraced. While intensive research work has been directed at pension reform issues for emerging economies, significantly less attention has been paid to the specific situation of small emerging economies.

In this paper the authors examine the crucial issues that shape the types of pension fund reform and the fully funded elements that could be instituted in small emerging economies (SEEs). In particular, the constraints generated by the size and economic characteristics of many of these countries are discussed. Critical aspects in SEE's that play a role when defining a sustainable pension system are: high international labor mobility and domestic informality; macroeconomic volatility; asset polarization; single-good export-oriented development model; limited and poor financial markets regulation; political volatility and institutional weakness that can promote corruption and bureaucratic inefficiencies. All these features limit the applicability and success of the pension

reform alternatives that have been and are currently being proposed.

The paper forwards an alternative model that would maximize the efficiency of a pension program that includes fully funded principles, while reducing the costs that such a system would engender, given the features of SEEs. In particular, the paper proposes the centralized collection of pension contributions, new investment management rules, the introduction of a specific regulatory framework, and the regional integration of institutions and arrangements critical to the management of the pension system.

Second-Generation Reforms in Infrastructure Services, edited by *Federico Basañes and Robert Willig*. Inter-American Development Bank, 2002.

Throughout the past two decades, some Latin American countries have made pioneering efforts in the design and implementation of reform schemes in infrastructure services. The "first generation of reforms" encompassed widespread privatization, deregulation and restructuring of the provision of energy, water, telecommunications and transport services. These reforms have proven generally successful as a way of creating an attractive environment for private investment. Outcomes have been mixed, however, in terms of increased efficiency, coverage and consumer welfare.

Second-Generation Reforms in Infrastructure Services evaluates the current challenges, the "second-generation issues" leading to the consolidation of the initial reforms. Experts from academia, industry, regulatory agencies and international organizations deal with post-privatization dispute settlement mechanisms, access arrangements in network industries, and inroads to effective competition in



the reformed industries.

Several authors evaluate a set of contractual adjustments resulting from renegotiations and disputes that have taken

place since the beginning of the reform process. In an effort to promote competition in the provision of public services, the authors suggest some practical rules for

pricing access in network industries. The book presents a dynamic, global vision of second-generation reforms underway in energy markets around the world.

Index 2001 IFM Review Articles

Financial Markets

* *Economic Exposures to Natural Disasters Public Policy and Alternative Risk Management Approaches*. By Torben Andersen and Pietro Masci, Vol. 7 No. 4, December 2001.

* *Guidance for Developing Deposit Insurance Systems*. By Edgardo Demaestri, Vol. 7 No. 3, September 2001.

* *The New Basel Capital Accord Proposals*. By Gabriela Basurto and Luis

Alberto Giorgio, Vol. 7 No. 2, June 2001.

* *Financial Market Development in Latin America and the Caribbean. Support from the IDB Group (1990-2000)*. By Edgardo Demaestri and Paul Moreno, Vol. 7 No. 1, March 2001.

* *The Role of the Private Sector Department in the IDB's Capital Market Development Activities*. Vol. 7 No. 1, March 2001.

* *Strategic Alliances Among Securities Exchanges*. By Antonio Zoido, Vol. 6 No. 4.

Infrastructure

* *Air Navigation Services: Financing Air*

Traffic Infrastructure in Emerging Markets. By Ellis J. Juan, Vol. 7 No. 4, December 2001.

* *Subnational and Transnational Infrastructure Projects: The New Challenges to Attracting Private Participation*. By Paulina Beato and Antonio Vives, Vol. 7 No. 3, September 2001.

* *Reform in Small Electricity Markets: A Single Model?* By Jaime Millán and Antonio Vives, Vol. 7 No. 2, June 2001.

* *Comments on the Manifesto on the California Electricity Crisis*. By Juan Benavides, Vol. 7 No. 1, March 2001.

The Infrastructure and Financial Markets Division of the Sustainable Development Department provides technical and advisory support, research and dissemination within the IDB group. This mission is accomplished through the development of policies and strategies, training programs, and dissemination of best practices.



Inter-American Development Bank

Sustainable Development Department
Infrastructure and Financial Markets Division