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POLICY FRAMEWORK FOR THE IMPROVEMENT OF FINANCIAL MANAGEMENT STRATEGIES TO COPE WITH LARGE-SCALE CATASTROPHES IN CHILE

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INTRODUCTION

The devastating 8.8 magnitude (Mw) earthquake and ensuing tsunami that struck Chile on 27 February 2010 (“**27F**”) have brought the financial management of catastrophic risks once again in the forefront of the public policy agenda in this country. These dramatic events constituted at the same time a test of the effectiveness and reliability of the existing prevention, protection and compensation mechanisms already in place, and the occasion to evaluate the opportunity to develop a more structured and comprehensive strategy going forward. The government of Chile expressed its interest in setting up appropriate institutional arrangements to cope with the financial consequences of future potential large-scale disasters and, to this end, it turned to the OECD High-Level Advisory Board on the Financial Management of Large-Scale Catastrophes for policy advice.

In this regard, it shall be mentioned that on 16 December 2010, the OECD Council issued a recommendation on Good Practices for Mitigating and Financing Catastrophic Risks, stating that governments should promote the development of efficient strategies for coping with large-scale catastrophes and that such strategies should be anchored in an integrated framework of risk assessment, risk perception, risk management and disaster response (¹).

Based on OECD countries’ experiences and in line with these recommended good practices, this report is aimed at providing an analytical framework for the identification of a possible range of policy options with respect to the design and implementation of a sound strategy to cope with future disaster risks and costs in Chile, with a special focus on the earthquake and tsunami risks.

The first section of this report identifies and reviews the most significant features of the different policy approaches adopted by OECD governments regarding financial coverage against disaster risks, and the respective roles of the public and private sectors in providing compensation and incentives to reduce the risk of catastrophic losses.

The second section addresses the current situation in Chile, discussing the response to 27F, the current insurance coverage of earthquake and tsunami risks and possible areas for improvement.

The third section identifies and discusses key issues and questions, presenting the lessons learned from the experiences of OECD member economies, which provide a rich reservoir of policy options from which Chile could choose. The range of policy options in the field of financial management of large-scale disasters is quite broad, and choices must be made on the basis of country-specific features, including policy objectives, market conditions, available financial resources, and disaster risk exposures.

The fourth section concludes and provides a set of possible recommendations.

The general aim of this report is to discuss why the design and implementation of a sound strategy to manage the increasing financial burden of large-scale disaster costs in Chile require a coordinated and integrated approach, entailing several steps – hazard mapping and risk assessment, risk reduction and mitigation measures, and identification of appropriate coverage mechanisms (including determining the

¹ OECD, *Recommendation of the Council on Good Practices for Mitigating and Financing Catastrophic Risks*, 16 December 2010. Available at: <http://www.oecd.org/daf/fin/catrisks>

role of private insurance and role of government). This report also aims to provide the necessary tools to translate foreign experiences into information that has operational value, with a view to supporting the Chilean authorities in the design of a financial management scheme tailored to the specific needs of this country.

1. POLICY APPROACHES IN THE OECD AREA

OECD countries' policies in the field of financial management of large-scale disaster risks are mainly aimed to reduce the negative impact of disaster losses on the population and the economy, and to facilitate and improve relief, rehabilitation and reconstruction efforts. Shared policy objectives in this area expressly include the enhancement of disaster risk prevention, reduction, mitigation and response strategies, and the reduction of government exposure to catastrophe risk, with the long term goals of minimising the total cost of disasters (i.e. the sum of disaster losses, the cost of preventive/mitigation measures and transaction costs) and building disaster resilient societies.

To implement such policies and to achieve the stated objectives, OECD countries have employed a wide array of different policy tools and have pursued different strategies ⁽²⁾.

In the aftermath of a catastrophe, governments in all OECD countries regularly provide some degree of post-disaster assistance and aid to the population. Emergency rescue and relief efforts are generally acknowledged as part of the responsibilities of the state *vis-à-vis* the citizens. Such efforts are aimed at saving lives and providing temporary assistance to the population hit by a disaster event, and the costs of such measures are usually financed through tax revenues. In certain OECD countries, emergency relief costs and sometimes also government exposures to public assets and infrastructure disaster losses are funded by dedicated catastrophe reserve funds, occasionally supplemented by market-based risk transfer tools. This is the case, for instance, of Mexico ⁽³⁾.

As concerns reconstruction costs and the compensation of property damages and economic losses suffered by those affected by a disaster, the situation differs across OECD member countries. In some states the government directly provides, to a greater or lesser extent, compensation to property owners *ex post* by means of either permanent structural arrangements (such as compensation funds) or *ad hoc* disbursement of public funds on a discretionary basis.

In a number of countries, pursuant to the principle of solidarity - often recognized at the Constitutional level - the mutualisation of losses arising out of disaster events is perceived as a fundamental right of the citizens, and the role of the government in the compensation phase is, therefore, considered essential. This is the case, for instance, of Belgium, France, Italy and Spain. In other countries, instead, the protection of private property against disaster risks is to a large extent left to the initiative of the owners (i.e. businesses and individuals), with a view to highlighting individual responsibilities, minimising moral hazard, and providing incentives to invest in cost-effective risk prevention and mitigation measures. In this respect, private insurance often plays an important role in the coverage of property damages and economic losses caused by large-scale events, but the level of disaster insurance penetration, as well as the actual terms and conditions of coverage, vary significantly across domestic markets.

² See: Monti A. (2008), "Policy Approaches to the Financial Management of Large-Scale Disasters", in *Financial Management of Large-Scale Catastrophes*, Policy Issues in Insurance No. 12, OECD Publishing.

³ See: Michel-Kerjan, E. et al. (2011), "Catastrophe Financing for Governments: Learning from the 2009-2012 MultiCat Program in Mexico", OECD Working Papers on Finance, Insurance and Private Pensions, No. 9, OECD Publishing.

In consideration of the peculiar insurability problems posed by catastrophic risks - such as the geographical and inter-temporal risk spreading issues and the high cost of capital to cover low probability/high consequence risks – and in the context of country-specific disaster risks and other national factors, some OECD governments have entered into partnerships with the private insurance sector with the policy objective of making disaster insurance available to the general public at affordable rates and/or ensuring that private assets exposed to risk are duly covered by insurance. To this end, special institutional arrangements aimed at the explicit coordination of public and private actions have been set up to deal with losses caused, *inter alia*, by natural catastrophes.

Public sector participation in these explicit coordination schemes have often entailed one or more of the following:

- (a) the introduction of a mandatory or quasi-mandatory disaster insurance regime - to provide sufficient risk pooling and reduce the potential impact of adverse selection - and the provision of the necessary supporting legal and regulatory framework;
- (b) the provision of reinsurance arrangements, dedicated lending facilities, or other form of State guarantee - to limit private sector exposure in case of catastrophic losses and reduce the cost of capital to cover low probability/high-consequence events; or
- (c) the creation of the basic preconditions for the private insurance market to work properly (e.g., regulations and measures concerning preventive and mitigation measures, land use, mandatory building codes, and emergency planning).

Coping with issues related to natural catastrophes and man-made disasters has led to the development of different policy approaches and institutional models where preventive and mitigation measures are accompanied by the implementation of specific public or private insurance coverage systems and by other instruments, the trend being indeed to set up ‘mixed’ models where several measures are established both on a public and on a private level, and they coexist and interact with one another.

The design and implementation of a sound strategy to manage the increasing financial burden of large-scale disaster costs at a country or regional level require a coordinated and integrated approach, entailing several steps – hazard mapping and risk assessment, risk reduction and mitigation measures, and assessment of appropriate compensation mechanisms (including determining the role of insurance and role of government in promoting such insurance) – and involving the government, insurance industry, property owners, civil society, and all other relevant stakeholders.

The economic coverage of disaster losses, therefore, constitutes a key policy issue to be addressed by governments. The public sector is directly concerned with this issue for several reasons: the financial impact of a disaster on individuals and businesses may be significant, which could lead to large welfare losses and have broad macroeconomic consequences; the destruction or impairment of public assets exposed to risk, including buildings and infrastructures, may have economic impacts; finally, in the aftermath of a catastrophe, the public authority will likely be under strong political pressure - or sometimes even under a legal duty - to provide some level of compensation to victims. In light of the above, the availability of financial compensation and risk transfer tools *ex ante* may enhance economic efficiency and performance.

The Appendix to this report provides a brief overview of the different institutional schemes set up in a number of OECD and non-member countries with a view to covering, *inter alia*, earthquake risk.

1.1 Risk awareness, prevention and disaster risk reduction education

OECD experience shows that public awareness of natural hazards and disaster risk reduction education constitute a foundation and pre-requisite for effective catastrophic risk management strategies.

Changes in patterns of human behaviour and decision-making at all levels of government and society can lead to a substantial reduction in disaster risks and costs. While increased awareness and education may induce people and local decision makers to adopt risk-wise conducts, it may also contribute to change their perceptions, thereby reinforcing support for and legitimacy of public sector initiatives such as the investment in more resilient infrastructures, the provision of seed capital for the establishment of disaster risk reduction research centres, and the introduction of compulsory measures, such as land-use planning and building codes. Public education campaigns, in other words, can develop support for a national shift in disaster management, build local capacity for disaster risk management and reduction, and build public acceptance for stricter regulations and insurance programs that may be instituted.

While in the past educational efforts in this field have often been based on a rescue and relief-centric approach, the orientation should change to a holistic disaster management approach that includes catastrophic risk prevention and risk reduction education. This reorientation requires an emphasis on disaster risk reduction tools and strategies and a combination of individual and collective actions. Many government-sponsored and civil society programs in the OECD area continue to place heavy emphasis on emergency response and citizen preparedness. While important, this focus often fails to emphasise the individual and collective actions that can be taken prior to a disaster and may even promote a sense of public helplessness. Risk awareness and education efforts should place emphasis on concrete risk reduction tools and strategies that can be adopted; moreover, to be fully effective and efficient, these efforts should take place at, and be targeted to, every level of society – at the individual, business, civil society, and governmental levels.

In this respect, hazard mapping and risk assessments provide the basis for elaborating risk awareness and risk reduction education strategies and for informing their content ⁽⁴⁾. Consistent methods for the collection and dissemination of data on physical damages and economic losses from natural hazards will support risk assessments, encourage a better understanding of the benefits and costs of risk reduction strategies ⁽⁵⁾.

1.2 Financial compensation

In respect of financial compensation, country approaches vary significantly in the OECD area: some countries have devised a framework of contingency measures either by way of establishing special disaster funds or by promoting catastrophe insurance coverage, whereas other countries have decided to deal with the issue of emergency assistance and compensation for disaster losses on a purely *ex post*, *ad hoc* basis, with a minimal or non-existent level of *ex ante* commitment of financial resources.

The level of ***ad hoc ex post* government intervention** for the compensation of losses due to natural and man-made disasters varies significantly across OECD countries. Some countries rely almost exclusively on an *ex post* approach: in Italy, for instance, *ad hoc ex post* compensation of disaster losses by

⁴ See: Muir-Wood, R. (2011), “The Framework for Quantifying Catastrophe Risk Liabilities for the Government of Chile as a Foundation for Identifying Appropriate Risk Mitigation and Risk Transfer Mechanisms”, OECD Report, on file with author.

⁵ A detailed discussion of these issues and a presentation of principles and good practices drawn from the experience of OECD countries can be found in: OECD, *Policy Handbook on Natural Hazard Awareness and Disaster Risk Reduction Education*, 2010. Available at: <http://www.oecd.org/daf/fin/catrisks>

the state is the rule, with limited or no involvement of the private insurance sector: several reform proposals have been advanced in this country, with a view to changing a situation that is considered unsatisfactory. Other countries use *ad hoc ex post* compensation as a complement to other funding mechanisms, such as structural catastrophe funds or disaster insurance.

The opportunity to develop an *ex ante strategy* for the financial management of large-scale catastrophes is generally suggested by the observation that purely *ex post* approaches to the compensation of disaster losses may have several limitations. In many cases, *ex post ad hoc* funding is cost ineffective and untargeted: delivery of compensation is often too slow and, if the hazard risk exposures are significant, the fiscal burden may be unsustainable for the public authorities in the long run. Moreover, *ex post* allocation of public funds to meet critical needs may divert resources from other projects, and critical decisions have to be made under political pressure. Furthermore, *ad hoc* compensation may entail inequalities in treatment and discontent. Finally, *ad hoc, ex post* compensation mechanisms may also give rise to moral hazard concerns, reducing the incentive to take precautions *ex ante* and increasing the total cost of disasters.

In this perspective, special emphasis should be placed on the adoption of **risk prevention and mitigation measures** aimed at reducing the cost of disasters going forward.

Possible *ex ante* solutions include the establishment of dedicated catastrophe funds, market-based or state-sponsored disaster insurance and reinsurance programs, alternative risk transfer (ART) and alternative risk financing (ARF) tools - such as risk securitisation and contingent capital arrangements - allowing broader risk spreading through capital markets (⁶).

In the context of *ex ante* strategies, a first policy option is the establishment of **dedicated catastrophe reserve funds**, with special appropriations in the public budget or prior legislated spending authorities. This option requires some degree of *ex ante* financial planning and a commitment of public money to cover emergency relief costs and sometimes also post-disaster reconstruction costs. Since rules on the use of such funds in case of a disaster are established *ex ante*, money can be disbursed promptly and a relatively consistent treatment of similar situations is ensured across time. Such rules may also limit moral hazard by limiting the scope of government compensation (e.g., strictly defining eligible damages and placing a cap on the level of public assistance) (⁷).

Even if, for the reasons discussed above, *ex ante* financial planning appears to be desirable in many situations, it should be noted that public catastrophe reserve funds may not be economically and/or politically viable to finance the expected costs of extremely low probability disaster events. Moreover, if catastrophe funds are aimed at covering not only emergency relief costs and public infrastructure losses, but also damages to private property owned by businesses and individuals, moral hazard may arise, and the

⁶ See: Michel-Kerjan, E. et al. (2011), "Catastrophe Financing for Governments: Learning from the 2009-2012 MultiCat Program in Mexico", cit.

⁷ In Hungary, for instance, the Fund for Flood and Inland Water Compensation (Wesselényi Miklós) regulates the compensation of flood damages. Individuals, who own real property in risky regions of Hungary, pay contributions to the Fund and, based on these contributions, are entitled to indemnification in the case of loss. The Fund is co-financed by government budgetary support if it lacks enough resources to fulfil its obligations. Along the same lines, in Austria the Catastrophes Fund covers parts of the damages caused by natural disasters and further help is provided by special laws enacted on an ad hoc basis. Similarly, limited ex post compensation is available in Poland through various dedicated funds and budget allocations. In Mexico, the Natural Disasters' Fund (FONDEN), created by the federal government, provides support, in a complementary manner and within the limits of its resources, in case of emergency and natural disasters situations.

incentives to take precautions could decrease, unless the rules governing these funds are properly crafted in order to keep in place appropriate incentives to adopt preventive and mitigation measures.

In many OECD countries, there is uneven or in some cases incomplete coverage of disaster risks by private insurance markets, so that some mixture of private insurance and government compensation is involved in the coverage of individual and business assets. This compensation may be complemented by further government payments for other direct and indirect economic losses arising from disasters.

In other countries, insurance coverage plays a major role in the financial management of large-scale disasters. In Switzerland, for instance, where natural disaster risks are mandatorily included in fire insurance policies, most natural disaster losses incurred by households and businesses are covered *ex ante* by private or cantonal insurance companies. Likewise, flood risks in the United Kingdom are largely covered by the private insurance market.

As specifically concerns financial planning for catastrophes, in the OECD area there is some degree of coordination in many countries (sometimes explicit, for instance in the form of institutional arrangements) among stakeholders for the prevention, mitigation, and coverage of future potential losses caused by large-scale disasters. In the context of such coordination schemes, particularly those institutional in character, insurance and reinsurance sector participants, capital markets, and public authorities have a defined role to play. These solutions are not necessarily public-private partnerships (PPP) arrangements *per se* (a PPP is a voluntary association of both public and private actors to address common goals through shared resources and skills), but are nevertheless based on some level of mutual understanding of disaster risk exposures and broad assumptions regarding the respective roles played by the public and private sectors. This coordination is often broad in scope as it may cover all types of disaster risks, natural and man-made.

The aim of such coordination is mainly to orchestrate the efforts of the various stakeholders involved by setting up a clear framework for action. Coordination may take place spontaneously, when economic actors recognize that a cooperative behaviour serves the interests of all parties involved (⁸). With implicit partnerships, the coordination between public and private sectors (and other stakeholders for that matter) is subject to a degree of uncertainty and may lead to opportunistic behaviour. Explicit partnerships in the form of institutional arrangements where risks, duties and responsibilities are clearly allocated among the various participants may facilitate more stable and reliable coordination efforts. With explicit institutional arrangements – such as those illustrated in the Appendix - there is a basic understanding among all stakeholders regarding the allocation of responsibilities for the taking of precautions, as well as responsibilities for the assumption of risks and losses (⁹).

In the context of an implicit or explicit coordination scheme involving the public and private sectors, the insurance and reinsurance industry can contribute significant technical expertise, operational

⁸ Spontaneous coordination between the private and the public sectors generates an implicit partnership. In the United Kingdom, for instance, insurance coverage against flood damage has been a standard feature of household policies since the early 1960s and the British insurance industry was able to make this commitment to its customers on the understanding that the UK government would provide effective flood defences.

⁹ It should be noted that this does not necessarily entail that the state has to take charge of the compensation of disaster losses or provide a financial commitment in support of private insurance; what is important is that mutualisation options for protecting against catastrophic losses are clearly understood and debated before a major disaster. Individuals, businesses, central and local authorities will then be aware of the expected roles played by different stakeholders in dealing with large-scale disasters and of their expected financial exposures. See: Monti A. (2008), “Policy Approaches to the Financial Management of Large-Scale Disasters”, cit.

capabilities and financial capacity in various phases of the disaster risk management process, such as: risk assessment, risk spreading, investment and management of assets covering technical provisions, claims handling and loss adjustment.

The availability of accurate disaster risk models, and the ability of the insurance industry to process claims arising out of a catastrophic event in an expedite manner, often turn out to be crucial elements (¹⁰). The efficiency of a system providing voluntary or compulsory insurance coverage against disasters, in fact, largely depends on the professional expertise of insurance companies both in the underwriting and in the claims handling phases.

The experience of OECD countries shows that disaster insurance solutions present several challenges and opportunities. The operation of the insurance market is normally based on the ability to pool homogeneous but uncorrelated risks faced by a large number of policyholders. When a large number of uncorrelated risks are pooled, insurance companies can predict with considerably greater certainty the average occurrence of a particular insured event, and thus can efficiently provide financial coverage based on the reduction of uncertainty. The ability of pooled risks to reduce uncertainty diminishes when the risks of policyholders are correlated, such as in the case of disaster risks.

A related problem with disaster insurance concerns the ability of the traditional insurance mechanism to properly manage low probability and high consequence (LPHC) events, such as major natural and man-made catastrophes. The insurance and reinsurance capacity for large-scale risks is ultimately limited and the financial management of such risks may be quite costly for the industry, mainly because of:

- the sheer magnitude of potential insured losses (i.e. the size of aggregate claims in case of a disaster); and
- the inter-temporal mismatch between the size of annual premiums and the size of the annual expected losses.

The risks of losses from catastrophes are correlated both temporally and spatially and this creates the above mentioned geographical and inter-temporal risk spreading problems. The accumulation risk can quite high in the primary market, since the same catastrophic event can cause losses involving many different insured properties and infrastructures at the same time, giving rise to potentially immense claims burdens in a single policy period. International reinsurance and possible bundling of different perils may address this issue.

A further problem concerns the lower level of predictability of certain catastrophic risks relative to other insurance risks: until recent years, for instance, there has been a general lack of reliable data and objective information concerning the economic effects of natural disasters. Considerable uncertainty is associated with the estimation of the probability of disasters of different magnitudes occurring and the size of the resulting losses. Technology and computer modelling of natural perils have only recently reached the point where the risks can be clarified.

Finally, on the demand side, it has been demonstrated that the bounded rationality of most individuals may lead them to underestimate or ignore LPHC risks: even a reasonably priced catastrophe insurance coverage, therefore, may often be perceived by prospective policyholders as too costly. The relatively low level of earthquake insurance take-up rates in many countries, as discussed *below* in this report, constitutes evidence of this problem.

¹⁰ See: Muir-Wood, R. (2011), “The Framework for Quantifying Catastrophe Risk Liabilities for the Government of Chile as a Foundation for Identifying Appropriate Risk Mitigation and Risk Transfer Mechanisms”, cit.

Having said that, the opportunity to involve the insurance industry in the financial management of disaster risks stems from the observation that, in several OECD countries, the private insurance sector has developed the requisite technical expertise for providing proper risk assessment and risk allocation mechanisms, expedite loss adjustment services, and effective incentives to reduce risk exposure. The compensation of disaster losses through risk-based insurance policies is self-funded from premiums received: this mechanism makes insurance a reliable financial tool for managing and funding risk, because the insurance industry specializes in reserving and investing collected funds for the purpose of claims payment. With respect to natural catastrophe risk, a private insurance-based mechanism is more likely to have funds to cover losses over time than an *ex post* governmental aid disaster program, which may have to compete for funding with other programs that are subject to changes in the political climate. The experience of the private insurance sector in assessing risks and adjusting losses, moreover, may offer great advantages. Efficient and expedited claims settlements practices may lead to socially beneficial results. Risk-based insurance, finally, may be able to provide additional precautionary incentives for policyholders, through the mechanism of private surrogate regulation.

Section three of this report addresses different ways in which OECD governments have encouraged the use of private-sector insurance capacity, stimulating both the demand and the supply side of this market. More information about some of the alternative institutional models is available in the Appendix, where the schemes implemented in California, France, Japan, New Zealand, Spain, Turkey and Chinese Taipei are briefly described.

2. THE FINANCIAL MANAGEMENT OF EARTHQUAKE AND TSUNAMI RISKS IN CHILE

The second part of this report addresses the current situation in Chile, by looking at the way in which earthquake and tsunami risks and their economic and financial implications are dealt with in this country. The experience gained from the management of 27F shows some of the strengths and weaknesses of the current institutional arrangements. This part also reviews and discusses certain key issues and proposed changes to the present situation.

2.1 Current situation and policy objectives

2.1.1 The difficult task of assessing the costs of 27F

Shortly after 27F, President Piñera announced the Government Program, Financing and Reconstruction Plan 2010-2013. In this document, economic damages caused by the earthquake and resulting tsunami were officially estimated at approximately USD 30bn, equal to about 18% of Chile's GDP (¹¹). The President expressly acknowledged that the reconstruction constituted a major challenge, but also an opportunity for Chile to make the step from emerging to developed economy.

The Central Bank of Chile further elaborated the government's estimates of the damages caused by 27F, focusing on the distinction between gross value and net value of the destroyed capital stock (¹²). In this perspective, according to the data provided by the Central Bank, the net value of the capital stock destroyed amounts to USD13.20bn (approximately 63% of the gross value, based on the *ratio* between gross and net capital stock in the last decade), equal to about 3% of the net value of the total capital stock in 2009 (¹³).

Three main phases were identified by the government of Chile in the analysis of the costs of 27F:

¹¹ "Las pérdidas totales del terremoto se estiman en torno a US\$30 mil MM, de los cuales unos US\$21 mil MM corresponden a pérdidas de infraestructura. Aproximadamente US\$10.600 MM del daño en infraestructura corresponde al sector público, los cuales descontando los seguros arrojan un valor cercano a los US\$9.300 MM, que se enfrentarán en 4 años. Las ganancias de eficiencia estimadas reducirán el costo fiscal a una cifra cercana a US\$8.431 MM." Plan de Reconstrucción, Programa de Gobierno y Financiamiento 2010-2013, 16 April 2010.

¹²"(...) gross capital stock stands for the value of assets used in the productive process, valued "as if they were new". In other words, the nominal gross value of the capital stock can be approximated to the replacement cost. (...) the net capital stock equals the gross capital stock minus asset depreciation. The latter is the reduction in value of fixed assets used in production, because of physical deterioration, normal obsolescence or damage from accidents. If assets are not fully renewed as time passes, the gap between gross and net capital stock value widens. The distinction between gross and net capital value is a relevant one, because net capital stock is what counts when measuring an economy's productive capacity and, therefore, trend output, the output gap and inflationary pressures." Monetary Policy Report, Central Bank of Chile, March 2010, p.38

¹³ "In 2009 the gross value of the capital stock was USD 675 billion, while the net value USD 435 billion. The breakdown, in both gross and net terms, shows that nearly 35% was accounted for by housing construction, 17% by machinery and equipment, and 48% by other types of construction." Monetary Policy Report, Central Bank of Chile, March 2010, p.38

- First phase: Immediate emergency and response (1 month)
- Second phase: Winter emergency (6 months)
- Third phase: Reconstruction (4 years)

During the first two phases, DIPRES - the Budget Division of the Ministry of Finance – coordinated the identification of the most urgent needs and the redefinition of priorities. The focus has been on supporting the victims and, at least during the first phase, all resources were devoted to current expenses (not investments). The total amount spent during emergency phases is estimated at about USD 200mn, of which 50% were granted to the National Emergency Office (*ONEMI - Oficina Nacional de Emergencia*) and the rest to the various other government entities and Ministries (¹⁴).

Concerning the third phase, in the assessment of reconstruction costs it is extremely difficult to separate the cost of reconstruction (i.e., return to the situation prior to 27F) from the cost of improvement. In the course of the reconstruction phase, in fact, the government has been and will be implementing planned improvements, new technologies, better quality of buildings and, more generally, a rationalization of the public building stock.

With regard to the fiscal impact of 27F, it proves to be very complicated to separate the effects of the catastrophe from other economic effects. Reportedly, after 27F there has not been any discussion in Chile on possible fiscal incentives to invest in retrofitting or to relocate houses or business activities in less hazard prone areas.

2.1.2 The subsidies administered by the Ministry of Housing and Urbanism

A central role in the reconstruction phase is played by the Ministry of Housing and Urbanism (*Ministerio de Vivienda y Urbanismo* or “MinVU”), which is in charge of different tasks, from risk analysis, to zoning and planning, to the administration of a complex system of public subsidies for housing. From the perspective of MinVU, the reconstruction is seen as an opportunity to improve the processes, norms and standards that should guide the construction, urban planning, and territorial developments of the next years, but also to incorporate the lessons of the difficulties recently experienced by Chile.

MinVU recognized that involving local authorities and communities in the reconstruction efforts is key for the success of the process. The reconstruction plan articulates instruments and tools for subsidies and urban planning that are made available to Mayors, communities, civil organizations, institutions, construction companies, and citizens in general, ensuring that the different relevant actors can take an active role. The reconstruction plan integrates three different lines of action: (i) private housing reconstruction; (ii) emergency housing “Aldeas”, informal housing, and social housing condos; (iii) territorial, urban, and patrimonial reconstruction.

The housing reconstruction program includes more than USD 2.5bn in subsidies that join the existent programs that are routinely administered by MinVU. Approximately 220,000 exceptional subsidies were made available in the aftermath of 27F, divided in:

- subsidies for the reparation or reconstruction of the house on the own site of the beneficiary;
- subsidies to purchase or build a house in a new site;

¹⁴ 27F occurred at the beginning of the year, when all Ministries still had most of their budget, so they were requested by the Ministry of Finance to start spending the money they were already assigned.

- special subsidies for housing in rural areas and patrimonial ones, dedicated to families belonging to the lower income levels of the population (¹⁵).

According to data provided by MinVU, approximately 370,000 residential houses were damaged by 27F. The owners were divided into five income brackets and subsidies were granted only to those, more in need of assistance, falling in the three lower categories. In this way, subsidies were targeted to the repair or replacement of about 220,000 houses, each of which was mapped and geocoded. Subsidies for the poorest cover the entire cost of repair or replacement (¹⁶), while for middle-income beneficiaries public assistance is limited to a contribution that was often used to cover the down-payment required by mortgage lenders for the purchase or reconstruction of a new house. 27F also affected an important group of residents in the social housing buildings, placed under the responsibility of MinVU. New constructions have to comply with the general building code, including the seismic standards, recently modified by MinVU to take into account the special features of 27F (a double event with strong oscillation).

While this is a fundamental contribution to the reconstruction efforts, it is worth noting that such approach is likely to generate the expectation to be compensated for disaster losses also in the future, raising moral hazard concerns.

In this regard, it shall be also mentioned that during the course of 2010 MinVU began to conduct risk studies on the 239 municipalities affected by the earthquake and tsunami, both on the coastline and inland, with a view to updating the zoning and urbanisation plans, as well as the required preventive and mitigation measures to be adopted in those areas exposed to risk. Concerning tsunami risk, MinVU is reportedly identifying zones with different degrees of exposure (green, yellow and red), which could lead to improved risk prevention and mitigation in the areas affected by 27F (¹⁷). Master Plans are elaborated by MinVU but since they must be implemented at local level, coordination problems often arise; in consideration of the above, the implementation procedure as well as the allocation of zoning powers between central and local authorities are currently under review.

2.1.3 The National Fund for Reconstruction

In addition to the subsidy program run by the MinVU, Chilean Law N° 20.444 established the National Fund for Reconstruction (*Fondo Nacional para la Reconstrucción*) whose purpose is to channel and administer contributions and donations aimed at sustaining the reconstruction efforts. The Fund is managed by the MinFIN and fiscal incentives are envisaged for those who decide to donate.

The law, in force since 28 May 2010, introduces a permanent regime – i.e., not limited to 27F - and allows parties to finance also specific works, and even to perform certain reconstruction activities directly or through third parties acting under their responsibility, with the consent of MinFIN. The donors' contributions are acknowledged by means of special mentions.

¹⁵ For a detailed account of all different types and amounts of subsidies made available for the post 27F reconstruction phase, see: *Programa de reconstrucción de vivienda: guía de alternativas de solución y pasos a seguir para obtener un subsidio habitacional (Housing reconstruction plan: a guide to the alternative solutions and steps to be made to obtain a housing subsidy)*, Ministerio de Vivienda y Urbanismo, http://www.minvu.cl/opensite_20110523162911.aspx

¹⁶ To preserve national heritage, adobe houses destroyed by 27F will be rebuilt in certain areas. It is not clear whether they are going to be somehow retrofitted to prevent or mitigate future earthquake losses.

¹⁷ The exercise conducted by MinVU is noteworthy and such risk studies should actually be conducted by the Government of Chile on the entire national territory.

2.1.4 Earthquake and tsunami insurance coverage in Chile

In Chile, standard fire insurance policies (¹⁸) do not cover damages caused by earthquake and tsunami. Earthquake and tsunami insurance is arranged as optional riders to such policies (¹⁹) that can be issued upon request and in consideration of an additional premium. Fire following is covered under the earthquake extension. Commercial and industrial risks are usually covered on an all-risk basis. Earthquake insurance premiums are VAT exempt and coverage is normally subject to the following deductibles:

- residential property risks: 1% of the total insured value with a minimum of UF 25 (²⁰);
- commercial/industrial risks: 2% of the total insured value with a minimum of UF 50.

According to the applicable insurance regulation, terms and conditions of insurance must be filed by the insurers with the Regulatory and Supervisory Authority (*Superintendencia de Valores y Seguros* - “SVS”). The Authority, in fact, keeps a Registry of model policies and model clauses that insurance companies authorized to transact business in Chile are required to use. Such requirement does not apply to non-life insurance contracts where the policyholder, the insured and the beneficiary are all legal entities and the annual premium exceeds UF 200 (or USD 8,000).

Based on information provided by the Chilean Insurance Industry Association (AACH), the cost of 27F for the Chilean insurance market (currently composed of 57 companies, of which 31 writing life insurance, 5 credit insurance and 21 general insurance) is estimated at approximately USD 8bn, equal to 1.8 times the amount of premiums for earthquake and catastrophe insurance coverage collected in Chile during the past 30 years.

The need to handle a massive amount of claims received in a short timeframe (reportedly a total of more than 230,000 in just a few months) was one of the biggest operational challenges that the Chilean insurers had to face in the aftermath of 27F. The insurers belonging to multinational groups had contingency plans in place and were able to successfully handle the crisis with the aid of dedicated teams of experts promptly sent from abroad. The shortage of loss adjusters was another major issue that companies had to deal with, with mixed results. In any event, the SVS confirmed that by August 2010 almost all residential properties damaged by the earthquake and covered by insurance were inspected and by the end of December 2010 approximately 99.8% of the residential property insurance claims were settled, with indemnity payments (for residential and commercial/industrial risks) totalling USD 4bn. A large proportion of indemnity payments outstanding as of 31 December 2010 concerns business interruption (BI) losses of major commercial/industrial risks, still in the process of being adjusted.

The SVS took an active role in monitoring and supervising the claims handling procedures established by Chilean insurers to adjust and indemnify the damages sustained by households. Following 27F, the

¹⁸ POLIZA DE INCENDIO - Inscrita en el Registro de Pólizas bajo el código POL 1 90 006 (FIRE INSURANCE POLICY – registered in the Registry of Policies with code POL 1 90 006)

¹⁹ CLAUSULA ADICIONAL DE DAÑOS MATERIALES CAUSADOS POR SISMO - Inscrita en el Registro de Pólizas bajo el código CAD 1 90 019 (EARTHQUAKE PROPERTY DAMAGE EXTENSION – registered in the Registry of Policies with code POL 1 90 019); CLAUSULA ADICIONAL DE DAÑOS MATERIALES CAUSADOS POR SALIDA DE MAR - Inscrita en el Registro de Pólizas bajo el código CAD 1 90 016 (TSUNAMI PROPERTY DAMAGE EXTENSION – registered in the Registry of Policies with code POL 1 90 016).

²⁰ UF (*Unidad de Fomento*) is a unit of account created in 1967 and designed so that the value of the UF remains constant, requiring continuous adjustment in value relative to the Chilean peso to take account of inflation. The UF to USD conversion rate used in this report is that which applied on 26 February 2010 when 1UF = 39.8797 (rounded to USD 40).

deadline for filing claims for earthquake losses was extended to 30 April 2010 and a simplified loss adjusting procedure was introduced by the SVS (*Oficio Circular* n.591 dated 30 March 2010). Notwithstanding the above, in 2011 the SVS sanctioned certain insurance companies and loss adjuster for having failed to settle residential property claims within the required timeframe ⁽²¹⁾ or for having provided incorrect information to the supervisory authority.

For the purposes of the present report, the following legal and regulatory requirements are of particular importance and shall be highlighted:

1. Pursuant to the applicable banking regulations, as a condition for Chilean banks to issue mortgage loans, the property held as collateral must be **insured against the risk of fire** up to the appraised value of such property and for the entire duration of the loan ⁽²²⁾. The cost of such insurance is borne by the borrower ⁽²³⁾ and banks are required to provide detailed information concerning insurance coverage requirements ⁽²⁴⁾, scope of coverage and cost structure ⁽²⁵⁾.
2. The Chilean Condominium Law (Law .19.537) states that, except otherwise provided by the condominium rules (opt-out mechanism), all units must be **insured against the risk of fire**, including the coverage of co-owned portions of the building in proportion to the size of the respective units. Fire insurance must cover the reconstruction costs, excluding the value of the land. Each owner must insure and, if necessary, the condominium administrator/manager will contract insurance on behalf of those co-owners who fail to do so, adding the premium to the

²¹ i.e., 90 days starting for the notice of loss (with certain extensions allowed), as per Article 22 of the DECRETO SUPREMO N.863 de 1989 - Reglamento de los auxiliares del comercio de seguros: “*El liquidador y la compañía en su caso, deberán emitir dentro del más breve plazo el informe de liquidación, no pudiendo éste exceder de 90 días corridos, contado desde la fecha del denuncia del siniestro (...) Estos plazos podrán, en casos fundados, prorrogarse sucesivamente por iguales períodos, circunstancia que deberá comunicarse al asegurado y a esta Superintendencia, la que podrá dejar sin efecto la ampliación por causas calificadas por el Servicio, y fijar un plazo para entregar el informe.*”

²² Superintendencia de Bancos e Instituciones Financieras (SBIF) - RECOPIACION ACTUALIZADA DE NORMAS - CAPÍTULO 8-4 Mutuos hipotecarios endosables – Título I, Número 1.: “*Los bancos están facultados para otorgar préstamos endosables con garantía hipotecaria, sujetos a las disposiciones contenidas en el N° 7 del artículo 69 de la Ley General de Bancos y en el presente Capítulo. Los referidos préstamos deberán cumplir con los siguientes requisitos: (...) e) **La propiedad entregada en garantía deberá contar con seguro de incendio por el valor de tasación del inmueble, el que se mantendrá hasta la extinción del importe total de la deuda.***”

²³ Superintendencia de Bancos e Instituciones Financieras (SBIF) - RECOPIACION ACTUALIZADA DE NORMAS - CAPÍTULO 8-4 Mutuos hipotecarios endosables – Título I, Número 10.

²⁴ Superintendencia de Bancos e Instituciones Financieras (SBIF) - RECOPIACION ACTUALIZADA DE NORMAS - CAPÍTULO 8-4 Mutuos hipotecarios endosables - Título III, Número 2: “*Los bancos deberán entregar a los deudores la siguiente información relativa a los seguros que se contraten para estos créditos: a) **Seguros contratados directamente por el deudor:** En el evento que el deudor desee contratar directamente los seguros correspondientes, el banco deberá entregarle un documento que especifique las condiciones que debe contener la correspondiente póliza. b) **Seguros contratados por la entidad financiera:** Si los seguros son contratados por la institución acreedora, por cuenta de sus clientes, se deberá cumplir con lo establecido en el último párrafo de la letra c) del número 1 de la Circular Conjunta N° 3.321 de esta Superintendencia y N° 1.758 de la Superintendencia de Valores y Seguros.*”

²⁵ SBIF Circular n.3.321 / SVS Circular n.1.758 of 6 July 2005 (NORMAS DE TRANSPARENCIA SOBRE CONTRATACION DE SEGUROS COLECTIVOS).

general condominium expenses charged to them ⁽²⁶⁾. If the unit is insured against fire in compliance with the banking regulations' requirement for mortgage loans mentioned above, additional coverage must be purchased to protect the respective share of the co-owned portion of the building, if such coverage is not already provided under the other policy.

3. The Regulation on Public Works Concessions (*Reglamento de Concesiones de Obras Públicas - Ministerio De Obras Públicas*) establishes a duty for the private concessionaire in a public-private partnership ("PPP") to purchase **catastrophic risk insurance** to cover the cost of reconstruction of the property or infrastructure. The specific terms and conditions of coverage required for each project are expressly indicated in the respective tender documents ⁽²⁷⁾. Several important infrastructure projects in Chile are granted in concession to private companies, including major transportation networks, airports, ports and bridges. The insurance requirements in PPP generally cover the two main phases of the project: construction and operation. Reportedly, coverage is normally purchased not only for property damages, but also for business interruption.

While the earthquake and tsunami extensions are not mandated by the applicable banking laws and regulations (only fire insurance is obligatory), Chilean banks routinely required their debtors to insure against such additional risks as a condition to the issuance of a mortgage loan. As a result, approximately 95% of mortgaged residential properties in Chile were insured to some extent against earthquake and tsunami at the time of 27F. Adobe (clay) houses, however, are expressly excluded from the earthquake coverage extension ⁽²⁸⁾.

Reportedly, the voluntary take-up rate of fire insurance for mortgage-free households is relatively low in Chile (less than 20%) and the percentage of those who spontaneously add the earthquake and tsunami extensions even lower (around 5-10% of the total). It follows that a large number of residential properties, including those located in high risk areas, is currently not covered by insurance.

For instance, based on estimates supplied by the SVS, in the areas affected by 27F approximately 36% of the households were covered by a fire insurance policy and only 24% were covered against the risks of fire and earthquake. Residential properties with a mortgage represent 23% of the total households affected and were all covered against fire in compliance with the mandatory provisions of law quoted

²⁶ Artículo 36, Título III, Ley N° 19.537 sobre Copropiedad Inmobiliaria: "*Salvo que el reglamento de copropiedad establezca lo contrario, todas las unidades de un condominio deberán ser aseguradas contra riesgo de incendio, incluyéndose en el seguro los bienes de dominio común en la proporción que le corresponda a la respectiva unidad. Cada copropietario deberá contratar este seguro y, en caso de no hacerlo, lo contratará el administrador por cuenta y cargo de aquél, formulándole el cobro de la prima correspondiente conjuntamente con el de los gastos comunes, indicando su monto en forma desglosada de éstos.*".

²⁷ Reglamento de Concesiones de Obras Públicas (Ministerio De Obras Públicas): Artículo 36° - SEGUROS: "1.- La sociedad concesionaria deberá tomar pólizas de seguro que cubran la responsabilidad civil por daños a terceros y los riesgos catastróficos que puedan ocurrir durante el periodo de concesión. Las sumas percibidas producto de los seguros por catástrofes serán destinadas a la reconstrucción de la obra, salvo que las partes acuerden destinarlas a otros fines u obras propias del contrato de concesión. 2.- Las bases de licitación determinarán los plazos, forma, condiciones, modalidades y las demás cláusulas que deberán contener dichas pólizas, así como el procedimiento de aprobación de éstas. 3.- Las bases de licitación podrán exigir otro tipo de pólizas de seguro".

²⁸ CLAUSULA ADICIONAL DE DAÑOS MATERIALES CAUSADOS POR SISMO - Inscrita en el Registro de Pólizas bajo el código CAD 1 90 019 (EARTHQUAKE PROPERTY DAMAGE EXTENSION – registered in the Registry of Policies with code POL 1 90 019).

above. As discussed, even if it is not mandated by the law, banks generally required mortgage holders to purchase the earthquake extension, so that about 96% of those properties were also covered to some extent against the risk of earthquake. On the other hand, only 17% of the households without a mortgage were covered against fire and only 3% had fire and earthquake coverage (see Table 1 below).

Table 1 (*)

	With a mortgage loan			Without a mortgage loan			Total	
	Number of houses	%	%	Number of houses	%	%	N. houses	%
Total (**)	901.098	100	23	3.098.902	100	77	4.000.000	100
With fire insurance	901.098	100	63	523.711	17	37	1.424.809	36
With fire and EQ insurance	862.980	96	90	101.080	3	10	964.060	24

(*) Source: SVS – data provided in a presentation made on 21 April 2010 at the annual ASSAL meeting.

(**) Approximate number of houses located in areas affected by 27F, assuming that the fire insurance coverage requirements were fully complied with.

A comparative look on earthquake insurance take-up rates shows that at present:

- In California, only about 12% of those with homeowners insurance elect to buy also earthquake coverage ⁽²⁹⁾.
- In Japan, earthquake insurance take-up rate remains relatively low: according to data provided in 2010 by the Japan Earthquake Reinsurance Co., Ltd. (JER), the penetration last year reached 25%, reflecting an upward trend that begun in the mid-nineties ⁽³⁰⁾.
- In New Zealand it is estimated that about 90% of homeowners are covered by earthquake insurance through the Earthquake Commission (EQC) ⁽³¹⁾.
- In Turkey, notwithstanding the mandatory nature of the residential earthquake insurance regime established with the Turkish Catastrophe Insurance Pool (TCIP), the take-up rate of TCIP policies is only around 25% ⁽³²⁾.

²⁹ Insurers that sell residential property insurance in California are mandated by the law to offer earthquake coverage to their policyholders. To this purpose, insurance companies can join the California Earthquake Authority (“CEA”) and offer the CEA’s residential earthquake policies or they can manage the risk themselves. See Appendix below and: <http://www.earthquakeauthority.com>

³⁰ Under the Japanese earthquake reinsurance program, primary carriers are obliged to offer an optional earthquake insurance rider with all residential fire insurance policies and then fully reinsure their risk with JER, which, in turn, retrocedes part of the risk to the Japanese government, and part of it to the private insurance market. Under this state-led system of earthquake insurance, policyholders can obtain earthquake coverage of residential buildings and household property in the amount of 30 to 50% of the sum insured under the fire policy. See Appendix below and: <http://nihonjishin.co.jp/>

³¹ EQC is a Crown entity, wholly owned by the government of New Zealand, in charge of the administration of the Natural Disaster Fund. In this country all residential property owners who voluntarily buy fire insurance from private insurance companies automatically acquire EQCover, EQC's seismic disaster insurance cover. EQCover premiums are added to the cost of the fire insurance and passed on to EQC by the insurance company. See Appendix below and: <http://www.eqc.govt.nz>. For a detailed account of the role played by EQC in the aftermath of the Canterbury earthquake see also: <http://canterbury.eqc.govt.nz/>

³² TCIP was set up following the massive Marmara earthquake that occurred on 17 August 1999. The pool provides earthquake coverage up to certain limits for a premium which varies across the country depending upon seismicity, local soil conditions, and the type and quality of construction. The compulsory scheme, in force

- According to data provided by the Residential Earthquake Insurance Pool (TREIP), as of 31 August 2010 earthquake insurance take-up rate in Chinese Taipei equaled approximately 28% of a total estimated 8 million households in this country ⁽³³⁾.

In order to better understand the relevance of the data presented above concerning the current situation in Chile, it shall be noted that **earthquake coverage required by lenders on mortgaged properties may contain severe limitations**, thus offering only limited protection to property owners.

The indemnity, for instance, is often limited by contract to the outstanding amount of the loan. As a consequence, if the loan is almost completely repaid by the borrower at the time of occurrence of the damaging event and the house is destroyed by the earthquake, the debtor is basically left without any financial protection, notwithstanding the insurance policy. Also, the quantification of the indemnity may take into account depreciation of the insured building, instead of being based on its replacement value. The costs associated with the inhabitability of the house (i.e., living expenses) are seldom covered and can be a significant burden for the debtor.

The reason for the above mentioned shortcomings and coverage gaps is that lenders have an obvious interest in protecting their own exposure to earthquake risk and such exposure is limited to the outstanding portion of the loan secured by the mortgage on the house. A system fully relying on earthquake insurance mandated by banks or other credit institutions, therefore, may prove to be unable to provide a sufficient degree of protection to householders.

With respect to major industrial and commercial risks in Chile, reportedly they are currently covered on a voluntary basis against earthquake damages and ensuing business interruption losses, often in the context of multinational insurance programs.

State-owned enterprises also appear to have insurance against such risks in this country. The above quoted legal requirement for private concessionaries to purchase catastrophic risk insurance, moreover, entails that also the most important public infrastructures and projects are covered against earthquake and tsunami risks. On the other hand, small commercial risks and public buildings (including government buildings, schools, hospitals) appear to be mostly uninsured.

2.1.5 Regulatory changes already envisaged by the Chilean authorities

Fire and earthquake insurance for mortgaged properties is normally issued in the form of a collective insurance policy contracted by the bank on behalf of the debtors and covering the whole portfolio of mortgages. The cost of the premium is included in the amount of the loan and paid by the customer. According to the law, borrowers are allowed to contract the required insurance coverage individually and they must be informed of their right to do so, but this often proves to be burdensome. The marketing practices employed by Chilean lenders in this field recently came under the scrutiny of the SVS, because of alleged lack of transparency concerning the commissions and fees structure. The main issue is that the economic advantages of covering at the same time all properties in the portfolio of mortgages, instead of each mortgaged property individually, appear to be captured in their entirety by the lenders by means of

since 27 September 2000, covers only residential buildings that fall within municipality boundaries. See Appendix below and: <http://www.tcip.gov.tr>

³³ Prior to the creation of TREIP, earthquake insurance was provided in Chinese Taipei as an optional endorsement to long-term residential fire policies. Since 1 April 2002, new residential fire policies have been issued on an annual basis, and they automatically include earthquake risk coverage. See Appendix below and: <http://www.treif.org.tw/eindex.aspx>

premium payment fees and very high brokerage commissions charged by insurance intermediaries belonging to the same group of the bank or other credit institution. Sometimes even the chosen insurance company belongs to the same group, making the cost structure extremely opaque.

A draft amendment to the Chilean Insurance Law (DFL 251 of 1931), currently pending in Parliament, would introduce the obligation for credit institutions to run a transparent and competitive bidding process for the selection of the insurance company that will cover fire (and earthquake/tsunami) risks associated with the mortgage loans portfolio, with a view to ensuring that the lenders transfer the benefit of collective bargaining to the borrowers who ultimately bear the burden of payment of the insurance premium. Brokerage commissions must be specified and included in the bid price and the lending institutions must choose the insurance company that offers the lowest overall price, unless the lenders' board of directors motivate a different choice based on solid grounds and in the best interest of the customers. Moreover, the banks would not be allowed to charge any commission or fee in connection to this insurance. The bidding process will be governed by a joint regulation to be issued by the SVS and the *Superintendencia de Bancos e Instituciones Financieras* ("SBIF") and the right of the borrowers to contract the required insurance coverage independently will be maintained.

While increased transparency on the costs and fees structure as well as on the scope of coverage provided is certainly beneficial and desirable, there might be a risk that the incentives for the lenders to require earthquake coverage in addition to the mandatory fire coverage may be reduced by the enactment of the projected legal framework.

As a complement to the new draft legislation, the SVS is considering certain regulatory changes concerning the norms applicable to fire, earthquake and tsunami insurance related to mortgaged residential property, including:

- the establishment of minimum standard conditions of coverage to ensure an adequate level of financial protection of the borrower and to facilitate comparison of alternative offers available on the market. Concerning earthquake and tsunami, the standard coverage would not envisage any minimum intensity (e.g., earthquake magnitude) threshold, the indemnity would equal the appraisal value of the building excluding the land, and no reductions will be allowed for depreciation of the property; moreover, the amount of indemnity in excess of the outstanding balance of the loan shall be paid directly to the owner and the maximum deductible shall be clearly indicated in the general conditions of coverage, among other things.
- the introduction of certain periodic information duties concerning such insurances in a pre-determined simplified format.
- the enhancement of other transparency requirements;

Concerning earthquake and tsunami insurance, the SVS is also considering:

- a revision of the rules applicable to loss adjustment (introducing simplified procedures in case of major events, requirements for contingency plans and master coordination plans, etc.);
- a revision of the rules applicable to reinsurance (reflecting the progressive shift towards a risk-based supervisory approach in Chile);
- the development of a seismic risk map and an earthquake and tsunami risk assessment model (a joint effort with the AACH – the insurance industry association) to increase the quality of underwriting and pricing of these risks and facilitate the relationship between local insurers and

foreign reinsurers; the relevant information will also be used by the SVS to review the current solvency requirements, and in particular the Earthquake Catastrophe Reserve in order to be able to calculate it on the basis of the actual risk exposure of each regulated entity.

The SVS currently requires that insurance and reinsurance carriers (non-life) set up earthquake technical reserves. Premium equalization reserves must be set up to meet obligations for risks whose level of potential disaster is unknown, or varies irregularly, is cyclical or catastrophic. IFRS (International Financial Reporting Standards) will be introduced in parallel with current reporting standards from 2012 and independently from the following year. The current earthquake reserves' calculation method is based on the actual exposure of the in-force contracts and business structure and it is not a long term aggregated reserve. Once the exposures expire, therefore, the reserve is released (see box *below*).

Earthquake Catastrophe Reserve

Reserva Catastrófica de Terremoto (RCT)
(SVS Circular n.1126 of 11 June 1993)

$$RCT = \{ P + \text{MAX} [(PML * MTE - CXL), 0] \} * 1.10$$

where:

RCT: Earthquake Catastrophe Reserve

P: Retention

PML: 10% Building and Contents / 15% Other Risks (BI and Engineering)

MTE: Total Exposure (largest accumulation zone)

PML: Probable Maximum Loss

CXL: XOL Reinsurance Contract

The current earthquake reserving regime is very conservative and it provides incentives to local insurers to purchase excess-of-loss reinsurance, otherwise the amount of reserves would approximate PML. As a result, the international reinsurance market makes the price and local insurance companies simply establish a mark up to determine the premium as they are basically fronting the risk. Of the estimated USD 8bn of indemnity payments following 27F, only USD 10mn will reportedly be borne by Chilean direct insurance companies. The envisaged study for a seismic risk map and catastrophe risk assessment model should improve technical underwriting and strengthen the position of local risk carriers *vis-à-vis* international reinsurers.

The fact that most if not all catastrophe risk is transferred by local insurance companies to foreign reinsurers – with the consequence that only a very limited amount of catastrophic risk is retained in Chile – is certainly beneficial to the solvency position of the Chilean primary carriers, but it generates a high volatility of earthquake and tsunami coverage prices. After 27F, for instance, reinsurance rates for Chile have reportedly increased, with catastrophe rates up by as much as 80%. This affects pricing levels for buyers in exposed earthquake regions (³⁴).

³⁴ Reinsurance treaties are normally renewed by Chilean insurers in January and July, with a corresponding influence on rate cycles in this country.

2.2 The need for a coordinated governmental plan going forward

In line with the recommended OECD good practices, it is advisable for Chile to set up a coordinated governmental plan to reduce catastrophe risks and costs going forward. A sound financial management strategy, in fact, requires the involvement of different Ministries, agencies and other public sector bodies, each of which may have different, but not necessarily incompatible, policy objectives: it is crucial, therefore, to make this goal a priority for Presidential action.

At a general level, it is important to stress that financial management strategies in Chile should be closely coordinated with the implementation of disaster risk prevention, reduction and mitigation measures, public awareness and education campaigns, housing subsidisation programs, and private insurance market efforts.

In this perspective, it is highly desirable for Chile to start by performing a comprehensive risk analysis to quantify the value of the whole inventory of structures and infrastructures located in the territory, including residential, commercial, public buildings, schools and hospitals. The Ministry of Finance (“MinFIN”) reportedly did not perform a quantitative assessment of exposures yet and a comprehensive catalogue of public assets is still lacking, since different public institutions own different assets. As a result, it is still very difficult to properly evaluate the exposure to catastrophic risks from a governmental perspective in this country. The earthquake and tsunami risk studies recently initiated by MinVU and the SVS should be carefully coordinated and expanded in order to enhance catastrophe risk management capabilities at governmental level.

Concerning financial compensation, *prima facie* the insurance coverage of approximately one third of the losses caused by 27F does not appear to be the result of a defined centralised policy of the Chilean government, but rather the positive outcome of an unplanned combination of several different factors outlined above in § 2.1.4.

Going forward, the Chilean government should carefully consider how best to take advantage of the solutions already available on the private insurance market, and to stimulate the development of risk transfer and risk spreading tools aimed at covering those assets that are presently not insured.

In particular, special attention should be devoted to the following critical areas:

- **Coverage of public buildings and infrastructures** – reportedly, the public building stock is largely uninsured; similarly uninsured are those public infrastructures not managed by a private concessionaire in the context of a PPP.
- **Coverage of social houses condos and adobe houses** – some efficiency concerns are raised by the current system of housing subsidies administered by MinVU: a revision of such system could be considered with a view to incorporating stronger risk prevention, mitigation and financial coverage incentives. More generally, the revision should concern the way in which economic support is currently provided to the housing needs of the poorest part of the population.
- **Coverage of residential buildings** – this area deserves special attention since the take-up rate of earthquake and tsunami insurance appears to be relatively low in the voluntary market, and several issues have recently arisen with regard to the marketing of such optional coverage by credit institutions in the context of mortgage loan transactions.
- **Reduction of the volatility of catastrophe insurance prices** – while the fact that most if not all catastrophe risk is currently transferred by Chilean insurance companies to foreign reinsurers

positively affects the solvency position of the domestic undertakings (as acknowledged by the SVS), it also generates a high volatility of earthquake and tsunami coverage prices in this country. This may become an issue going forward if the private insurance market is called upon to play an important role in the context of a comprehensive governmental strategy to cope with future earthquake and tsunami risks and costs.

A sizeable opportunity to introduce a coordinated governmental plan appears to be currently provided by the pending reform project centred around the new National Civil Protection Agency (*Agencia Nacional de Proteccion Civil*), replacing the National Emergency Office (*ONEMI - Oficina Nacional de Emergencia*). The project envisages the establishment of a National Civil Protection Council (*Consejo Nacional de Proteccion Civil*) - in charge of advising the Ministry of the Interior, local Civil Protection Committees (*Comités de Proteccion Civil*), and National Civil Protection Fund (*Fondo Nacional de Proteccion Civil*) – to be administered by the National Civil Protection Agency and aimed at providing resources to invest in prevention measures.

More generally, OECD experience tells that major reform processes are often prompted by critical events. 27F offers the chance to review and possibly improve the general policy towards the financial management of future catastrophes in Chile.

It is important, therefore, to seize the political momentum.

3. KEY ISSUES, QUESTIONS AND LESSONS LEARNED FROM OECD EXPERIENCE

This section of the report addresses certain key issues and questions and presents the main lessons learned from the experiences of OECD member economies, which provide a rich reservoir of policy options from which Chile could choose. The discussion in this section is aimed at supporting the Chilean authorities in the design of a financial management scheme tailored to the specific needs of this country.

3.1 Public sector participation in the insurance coverage of catastrophe losses

In the context of explicit coordination schemes with the insurance industry, some OECD governments have decided to offer special reinsurance arrangements, dedicated lending facilities or other form of backstop or guarantees to limit private sector exposure in case of catastrophic losses.

Where OECD governments have elected to make a financial commitment, they have acted, directly or through a special purpose entity, as:

- (i) **Primary insurer** (such as in Spain, New Zealand for earthquake risks and Iceland): The government acts as an insurer by providing insurance and responding to claims either to the fullest or up to a certain limit. Sometimes the private insurance sector contributes to the scheme by providing some operational capabilities (such as marketing and premium collection).
- (ii) **Reinsurer of last resort** (such as in France for all catastrophic risks and in Japan for seismic risks): The government protects the insurance sector by offering special reinsurance arrangements. Government sponsored reinsurance programs may be mandatory or optional for primary carriers.
- (iii) **Backstop liquidity provider** (such as in Australia and in the UK for terrorism risks): The government provides liquidity to the insurers incurring pay-out burdens or losses due to a catastrophic event by means of a pre-arranged contingent loan facility.
- (iv) **Guarantor** (such as in Spain and New Zealand for earthquake risks, France for terrorism and nuclear risks and Iceland): The government guarantees that any special purpose entity, pool or fund created to cover catastrophic risks will meet all its obligations.

Special risk-sharing agreements between the private and public sectors, mixing the above features, have also been implemented in Belgium for natural catastrophes and terrorism (through the *Caisse nationale des calamites* and the *Terrorism Insurance & Reinsurance Pool*), in Germany (Extremus AG) and in the United States (under TRIA and its extensions) for terrorism risks.

The key features of some explicit coordination schemes entailing public sector participation in disaster risk transfer are outlined in the Appendix to this report. Concerning the different types of public sector *ex ante* financial commitments in disaster risk transfer, it shall be noted that:

- The policy choice to provide **primary insurance coverage** against disaster risks may be dictated by the fact that the private insurance sector is unwilling and/or unable to provide any coverage.

Private-sector operational capacity, if available and cost-convenient, may be used to perform such functions as marketing, premium collection and claims handling. This option, however, may crowd out competition from the private-sector and in the long run discourage adaptation in insurance markets or limits the attractiveness of insurance markets for new investment: periodic assessments of market conditions may help avoiding or limiting this potential negative effect.

- The option to provide special **reinsurance arrangements** is aimed at limiting private sector exposure to peak risks. This solution may be justified if the primary insurance carriers are able to retain a portion of the risk, but there is not enough reinsurance capacity on the private market to provide the required stop loss arrangements. The provision of such a limitation to private-sector exposure may also be part of an institutional arrangement in which mandatory offer, purchase, or extension of disaster risk coverage was introduced by law. In this respect, this option may be aimed at protecting the insurers' solvency and, therefore, the effectiveness of the whole system. Depending on the extent of compulsion, pricing, terms, and conditions of the reinsurance arrangements provided by the government, this policy option may crowd out private-sector reinsurance capacity, limit the scope for innovation, and inhibit the development of alternative risk transfer (ART) solutions to cover peak risks: periodic assessments of market conditions may help avoiding or limiting this potential negative effect.
- The choice to act as **backstop liquidity provider**, for instance by offering a pre-arranged contingent loan facility to insurance companies writing disaster risks, is aimed at helping insurers to smooth catastrophe losses over time. In other words, in this scenario private insurance and reinsurance companies retain the ultimate risk, but they benefit from a more convenient inter-temporal flow of funds. This allows private-sector participants to gradually adjust the pricing of coverage over time and alleviates the financial problems associated with the inter-temporal mismatch between the size of annual premiums and the size of the annual expected losses. Again, depending on the pricing, terms, and conditions of the backstop liquidity arrangements provided by the government, this option may crowd out capital market solutions, limit the scope for innovation, and hinder the development of private-market alternative risk financing (ARF) tools: periodic assessments of market conditions may help avoiding or limiting this potential negative effect.

The government's decision to play an active role in disaster risk transfer schemes by making an *ex ante* commitment of financial resources is often linked with the resolution to introduce a mandatory or quasi-mandatory catastrophe insurance regime.

3.2 Compulsory or quasi-compulsory insurance schemes

The mandatory nature of the disaster insurance scheme is often cited as a key component of several institutional arrangements implemented in the OECD area, where different forms of compulsory or quasi-compulsory catastrophe insurance schemes have been set up. However, one must clarify the meaning of "mandatory" under a scheme.

Some countries have made the purchase of catastrophe insurance coverage mandatory: this is the case, for instance, of Turkey (earthquake) and Iceland. The purchase of fire and natural disaster insurance is also mandatory in the Swiss cantons of Schwyz, Uri and Obwalden. Others have simply required insurance companies to make catastrophe insurance available, by introducing a mandatory offer of coverage that can be declined by the policyholder: this is how the Japanese and the Californian earthquake schemes work.

In a number of countries, moreover, fire or other first party insurance policies are marketed on a voluntary basis, but insurance companies are required by law to include coverage for catastrophic risks in

such policies: this is the case, for instance, in Australia (terrorism), Belgium, France (natural catastrophes, terrorism and technological disasters), New Zealand (earthquake), Norway, Spain and Switzerland (with the exception of the cantons of Schwyz, Uri and Obwalden, where fire and natural perils coverage is mandatory). Finally, the mandatory component of the scheme may concern the participation of private insurance companies in special pooling and/or reinsurance arrangements, such as the Natural Perils Pool in Norway. In this respect, it is important to note that different levels of compulsion reflect different policy objectives and market conditions, and have different advantages and disadvantages:

- The **mandatory offer of catastrophe insurance** is consistent with the goal to ensure that disaster coverage is available on the market, so that businesses and individuals who are willing to purchase financial protection can do so. However, low risk awareness or cognitive biases that may affect the demand side could lead to sub-optimal take-up rates, since prospective policyholders, who are not obliged to purchase catastrophe coverage, would not be able to make rational decisions. As a result, there could be several individuals who realize too late that they made the “wrong” decision when they elected not to purchase coverage; moreover, if the penetration rate remains very low, this may generate insufficient risk pooling.
- The **mandatory purchase of catastrophe insurance** is consistent with the objective of making sure that all those exposed to disaster risks, willing or unwilling, are covered by insurance, at least up to a certain extent. While this option - assuming that an effective enforcement mechanism is in place - ensures widespread diffusion of catastrophic risk coverage, it may be unpopular; it is, in fact, paternalistic, in the sense that it limits private autonomy, forcing everyone to purchase coverage. Such a choice may be justified by the above mentioned constraints to rational decision making that may affect the demand side, but also by the risk of negative externalities (i.e., situations when individual’s actions impose costs on others which are not reflected in the private cost function of the agent) and/or opportunistic behaviours: it may be argued, for instance, that the individual decision not to purchase financial protection against catastrophes *ex ante* imposes costs on the society as a whole (i.e., social costs), in terms of required post-disaster aid and/or negative macroeconomic consequences. More generally, this policy choice becomes less unpopular if the government is able to explain how, under the circumstances, a mandatory disaster insurance scheme can save taxpayers’ money as compared to other mechanisms to compensate for disaster losses. To facilitate public acceptance of this option, it could also be explained that risk-based disaster insurance - when correctly priced, affordable, and linked to actionable measures by policyholders - provides financial incentives to encourage investment in cost-effective mitigation measures to reduce vulnerability and, as a consequence, it contributes to the reduction of the social costs of disasters.
- The **mandatory inclusion of catastrophe coverage in basic property insurance policies** (e.g., fire, homeowners, motor) marketed on a voluntary basis can be effective if the penetration rate of such basic policies is relatively high, so that they are used as a “vehicle” to spread catastrophe insurance coverage among businesses and individuals; compared to the mandatory purchase of catastrophe insurance, this option entails a lower extent of compulsion and may, therefore, be less unpopular. However, it may have negative effects on the market for the basic property policy to which the mandatory catastrophe extension applies. First, there is a risk that those who do not perceive the benefits of disaster insurance, or are rationally unwilling to purchase it, may decide to drop the basic property coverage due to the increased cost of the “package”; it shall nevertheless be noted that in some countries the widespread diffusion of basic property policies is due to a requirement imposed by mortgage lenders, so that the decision to drop all insurance coverage would be inhibited by such private commitment. Second, tying different insurance products together (e.g., fire insurance and flood insurance) may distort competition, since policyholders would be forced to choose the same insurance company for the coverage of both

risks: this, of course, becomes problematic only if the price, terms and conditions of the compulsory extension of coverage are not mandated by the law.

3.3 Scope of coverage: perils and losses

3.3.1 Perils

The institutional arrangements set up in OECD countries cover different types of perils. Some of them have a broad scope of application, encompassing coverage for a wide range catastrophic risks - the Spanish *Consorcio de Compensación de Seguros* offers a good example of this approach, covering both natural catastrophes and socio-political events, including terrorist acts - others focus instead on single perils or categories of perils (such as: natural calamities, earthquake, terrorist acts, technological accidents, etc.).

In France there are three different schemes covering natural catastrophes, terrorist incidents and industrial accidents respectively. In Belgium two schemes were recently set up to cover certain natural perils (i.e. earthquake, flood, storm, landslide and ground subsidence) and terrorism risks respectively. In Iceland, insurance coverage is mandatory for earthquake, volcanic eruption, snow avalanches, landslides and floods. In Japan the coordination scheme covers earthquakes, volcanic eruptions and resulting tsunami. The Mexican FONDEN covers geological risks (earthquake; volcanic eruption; avalanche; tidal wave; landslide), hydro meteorological risks (atypical drought; cyclone; extreme rains; snowfall and hailstorm; atypical floods; tornado) and forest fires. In New Zealand the scheme covers: earthquake, natural landslip, volcanic eruption, hydrothermal activity, tsunami; in the case of residential land, a storm or flood; fire caused by any of these. The Norwegian pool covers losses caused by landslide, storm, flood, earthquake and volcanic eruption. In Switzerland the coverage of flood, inundation, windstorm, hail, avalanche, snow pressure, rock and stone fall, and landslide (but not earthquake) has been included by operation of law in fire insurance for buildings and chattels. In Turkey, although the original design of TCIP envisaged a multi-peril coverage, it currently provides only compulsory earthquake insurance coverage.

A number of schemes, moreover, requires an “official declaration” to trigger coverage: this is the case under the schemes implemented in the Netherlands (Royal Decree) and in Denmark (Danish Storm Council), the Mexican FONDEN and the French CAT NAT scheme. This has also been the case in Spain until 1986, when the requirement for an official declaration was removed. While the official declaration requirement has the advantage of making incontestable that a certain event is covered by the scheme, the decision making process may be time consuming and politically biased.

While multi-peril disaster insurance allows for broader coverage, it also raises complex issues related to underwriting and pricing. Setting premium rates adequate to cover all the expected costs of disaster losses caused by different perils, in fact, requires sophisticated determinations. The rate-setting process for setting flood insurance rates, for instance, is different from what is needed for the coverage of other perils. In some countries, multi-peril coverage has been introduced to achieve a higher level of risk pooling and some degree of cross-subsidization. However, countries with very high exposures to one main peril (such as earthquake) have often chosen to focus on a single-peril type of scheme.

3.3.2 Losses

The various OECD institutional solutions, furthermore, differ in terms of type of losses covered. Most of the schemes provide compensation for property damage, but the nature of the property covered may vary (commercial vs. residential properties; private properties vs. public properties and infrastructures, etc.). In France, the CAT NAT scheme covers commercial and residential property damages as well as business interruption losses (but not damages to public property owned by the State). The earthquake

scheme in Turkey is also limited to registered residential properties. The coverage offered by the Spanish *Consortio*, on the other hand, includes residential and industrial property damages, business interruption losses, as well as personal injuries and death. The scheme implemented in New Zealand covers direct losses to residential dwellings (self-contained premises used as a home, including apartments), most personal property (excluding some types e.g. motor vehicles and art) and the land immediately around the dwelling. The scope of application of the Japanese earthquake insurance scheme is also limited to residential buildings and household property.

There has been movement towards the inclusion of business interruption losses, as witnessed by the experience of *Consortio* in Spain. Nevertheless, in some countries, including Iceland, the coverage is still limited to property damages.

3.4 Pricing mechanisms

The pricing of catastrophe coverage is yet another feature of the various public-sector schemes and within private insurance markets. While some coordination schemes apply a risk-based pricing mechanism, others have opted for flat pricing, invoking the principle of solidarity. It is important to recognize the impact of risk differentials across the territory of a country or region and to incorporate such risk differentials in the pricing mechanism, with a view to providing proper incentives for risk prevention and mitigation to those most exposed to risk, while keeping coverage affordable and pricing manageable.

Risk zoning is used for pricing purposes by private insurers in the Czech Republic, Germany, Japan, Mexico, Turkey and the United States, and its use is now also considered in Austria, Belgium and Poland. In the United States, moreover, premiums are heavily based on the prior claims experience of the insured and discounts are available for installing specified equipment such as storm shutters, wind resistant glass and fire suppression systems. Similarly, in other countries premiums are linked to the level of prevention measures; with regard to premiums of earthquake insurance in Japan, the application of different rates depends on the location the material used in the building (wood or non-wood) and special discounts are applied according to construction age and the installation of specific quake-resistance structures. In Turkey, premiums vary across the country depending upon seismicity, local soil conditions, and the type and quality of construction. Risk-based pricing is also adopted by British insurers to cover flood risks.

In France, on the other hand, pursuant to the applicable legislative provisions, pricing of insurance against natural catastrophes is based on a fixed percentage of the basic premium charged for the underlying property insurance policy, without specific risk differentials. In New Zealand, according to the applicable Earthquake Commission Regulation, the earthquake insurance premium is also calculated as a percentage of the amount to which the property is insured, without further differentiations. As a result of a change in the Spanish scheme, for property and business interruption coverage (with the exception of property coverage for motor vehicles, whose price is set at a fixed amount per vehicle) the *Consortio*'s surcharge is now calculated as percentage of the sum insured, instead of being a fixed percentage of the base premium.

Flat rates are easy to administer and, if coupled with mandatory insurance, may be an effective mechanism to cross-subsidise the cost of insurance across the insured pool, which is consistent with the principle of solidarity. However, this option entails moral hazard and reduces the incentives to adopt cost-effective risk prevention and mitigation measures. Deductibles and coinsurance may help coping with moral hazard, but may not be sufficient. Risk-based deductibles, nevertheless, may be a possible alternative to risk-based premiums, even if the incentive mechanism is different insofar as the reward for the adoption of risk-reduction measures (i.e., a lower deductible in case of future potential losses, instead of a lower premium at renewal) may be perceived as too distant (time wise) and/or uncertain by the policyholder.

Risk-based disaster insurance, if correctly priced, affordable, and linked to actionable measures by policyholders, can provide not only coverage against damage - permitting more rapid economic and social recovery - but also signals to individuals as to the hazards they face, as well as financial incentives to encourage investment in cost-effective mitigation measures to reduce vulnerability, thereby contributing to the risk communication and education efforts.

Approaches to pricing may need to be more pragmatic in disaster insurance schemes than would normally be the case if the schemes are to be sustainable in the long run and be effective. Nevertheless, risk management incentives should be encouraged.

3.5 Lessons learned

The following lessons can be learned from OECD experience in this field:

- In the design of a sound financial management strategy to cope with disaster risks, it is important to consider the following variables:
 - The vulnerability and exposure of the country to natural and man-made hazards and the risk differentials across the country;
 - The extent of public sector financial resources available for the coverage of emergency relief costs and disaster losses;
 - The policy objectives to be pursued by the strategy (e.g., obtaining liquidity to cover emergency relief costs; protecting public assets and infrastructure exposed to risk; providing full protection to private assets exposed to risk; making coverage available to individuals and businesses, leaving the decision to them; introducing incentives to invest in cost-effective disaster risk prevention and mitigation measures);
 - The financial capacity of the insurance industry (capitalization, access to reinsurance, access to capital market instruments, etc.);
 - The operational capacity of the insurance industry (marketing, premium collection, claims management and payment services, business continuity plans, etc.).
- While governments are often expected to play an important role in the financial management of large-scale disasters, especially for mega-risks, crowding out of private sector initiatives and moral hazard should be avoided or at least limited.
- Public and private stakeholders should be made aware of their respective roles and responsibilities. The clear and transparent allocation of risks and responsibilities among public authorities, firms and individuals is a key component of effective coordination schemes, and a driver to the success of any catastrophe risk management program.
- Another critical element is the ability to link policy tools (i.e. the technical features of a coordination scheme) with the underlying policy objectives pursued by the government, such as providing adequate financial protection to all individuals and entities, or simply making coverage available.
- There are great advantages to having an operational private insurance industry: first, the insurance market may be able to absorb some catastrophe risk that would otherwise fall on the government; second, even if there is no sufficient financial capacity in the market to provide meaningful protection, the administrative resources of the private insurance industry can provide

a platform for establishing a government funded and directed program. In this respect, insurance companies can perform key services such as marketing of the policies, premium collection, loss adjustment and claim payment.

- In theory, once those who are exposed to disaster risks have been granted access to, or have utilised, financial management tools such as disaster insurance, the public authority should refrain from making *ex post* compensation payments to the victims of catastrophes in a manner that would undermine *ex ante* solutions. It is, however, extremely difficult for the government to make a credible commitment that it will not provide compensation once a catastrophe occurred (this is usually referred to as the Samaritan's Dilemma). In this context, structural catastrophe funds may provide greater transparency and credibility regarding government compensation and may reduce, if not eliminate, the need and demand for *ad hoc* programs.
- Financial management strategies should primarily focus on promotion techniques of prevention, adaptation and mitigation.
- A disaster insurance program should collect sufficient premium income to build reserves to meet the long-term future expected disaster losses.
- Risk-based premiums lower moral hazard and encourage risk prevention, but coverage can be expensive. In the context of a national or regional risk pool, some degree of cross subsidisation may be needed to make the system acceptable and workable. In any case, it is important to recognize the impact of risk differentials across the territory of a country or region and to incorporate such risk differentials in the pricing mechanism, with a view to providing proper incentives to those most exposed to risk, while keeping coverage affordable and pricing manageable.
- Compulsion of catastrophic risk insurance is viewed in several countries as an approach to develop more comprehensive insurance coverage and build national insurance capacity. Insurance penetration (take-up rates) remains an issue in several countries, even if the purchase of coverage is mandatory. This may depend on the insurance culture of the population, on the level of disaster risk awareness and on the "credibility" of the *ex ante* arrangements. If government aid is provided *ex post* to those who have not purchased insurance, then the incentives to purchase coverage are severely reduced. If businesses and individuals exposed to risk perceive that they receive government aid regardless of their purchase of insurance, the resistance to purchasing the insurance will increase. It is advisable to introduce checks on compliance with mandatory insurance requirements.
- Public and private investments in disaster risk reduction and mitigation measures, by limiting exposure and vulnerability to disaster risks, facilitate the development of new risk financing, risk sharing and risk transfer tools. Disaster risk reduction, mitigation and financing efforts, therefore, are closely linked to one another, and should be carefully coordinated by policymakers.

4. CONCLUSIONS AND RECOMMENDATIONS

The analysis conducted in this report indicates that the present time is especially appropriate for the Chilean government to review and improve its financial management strategies to cope with catastrophe risks going forward. It is now the time to assess the economic impacts of 27F as well as the efficiency and effectiveness of disaster prevention and response mechanisms, seizing the political momentum to introduce key reforms.

Several positive aspects of the current situation in this country deserve to be highlighted:

- The development and enforcement of strict building codes and high quality seismic construction standards and the periodic revision of such technical codes and standards.
- The existence of a healthy and well-functioning private insurance industry, which actively participates in the on-going policy debate on how best to improve the diffusion of earthquake and tsunami insurance coverage across the Chilean territory; industry participants learned from 27F the crucial importance of crisis management plans and emergency response procedures, to ensure the prompt delivery of service at an operational level notwithstanding the occurrence of a disaster event.
- The existence of a sophisticated mechanism of government subsidies administered by MinVU to cover the cost of repair, reconstruction or replacement of damaged residential houses; such operational platform can be used as a basis to implement a new system of public subsidies for catastrophe insurance or otherwise revised to incorporate a system of incentives for beneficiaries to invest in disaster prevention or mitigation measures;
- The pending comprehensive reform of the national Civil Protection system, with the introduction of a new National Civil Protection Agency (*Agencia Nacional de Proteccion Civil*), replacing the National Emergency Office (*ONEMI - Oficina Nacional de Emergencia*). The project envisages the establishment of a National Civil Protection Council (*Consejo Nacional de Proteccion Civil*) - in charge of advising the Ministry of the Interior, local Civil Protection Committees (*Comités de Proteccion Civil*), and National Civil Protection Fund (*Fondo Nacional de Proteccion Civil*) – to be administered by the National Civil Protection Agency and aimed at providing the necessary resources to invest in prevention measures.
- The current availability of sufficient liquid resources to cover the immediate emergency and response costs - in the case of 27F, such costs amounted to USD 200mn. It is advisable, however, for the Chilean government to reassess periodically this condition, since the situation may change in this respect due to a wide variety of macro-economic factors. Moreover, a more sophisticated earthquake risk analysis could indicate that the emergency management costs required by a future potential catastrophe are much higher than those triggered by 27F.

Based on our analysis, we have also identified a number of key areas for action and possible recommendations for the improvement of the present situation:

1. A coordinated governmental plan for the financial management of catastrophic risks should be clearly established at the highest political level – Different branches of government often have different, yet complementary, policy goals with regard to the management of catastrophic risk. This requires a coordinated plan at the highest political level and a unitary and coherent vision. Such integrated approach should entail several steps:

- a comprehensive hazard mapping and disaster risk assessment exercise across the whole national territory.
- the identification - and subsequent implementation - of the most appropriate and cost-convenient earthquake and tsunami risk reduction and mitigation measures in those areas exposed to risks. For instance, fiscal incentives may be introduced to stimulate the adoption of earthquake risk mitigation measures, including retrofitting of adobe houses in heritage areas.
- the implementation of communication tools to increase natural hazard awareness and disaster risk reduction education at all levels of government and society, following the principles and good practices outlined in the *OECD Policy Handbook on Natural Hazard Awareness and Disaster Risk Reduction Education*.
- the identification and implementation of appropriate financial coverage mechanisms to protect public and private assets at risk.

MinFIN could take the leadership in this endeavour, coordinating its efforts with those of all the other relevant public and private stakeholders, including the Ministry of Interior, MinVU, the new National Civil Protection Agency (*Agencia Nacional de Proteccion Civil*) the SVS, the SBIF and the private insurance sector.

2. A comprehensive risk analysis to quantify the value of the whole inventory of structures and infrastructures located in the territory, including residential, commercial, public buildings, schools and hospitals should be performed - The availability, accuracy and reliability of data and information on the social and economic impact of catastrophic events is a precondition to the design and implementation of efficient financial management strategies to cope with large-scale disaster risks.

3. A more technical approach to catastrophe risk underwriting should be required from the local insurance companies – The SVS, in collaboration with the AACH, the insurance industry association, has already started this process. A seismic risk map and an earthquake and tsunami risk assessment model is in the course of being developed with a view to increasing the quality of underwriting and pricing of these risks and facilitate the relationship between local insurers and foreign reinsurers. The relevant information shall also be used by the SVS to review the current solvency requirements, and in particular the Earthquake Catastrophe Reserve in order to be able to calculate it on the basis of the actual risk exposure of each regulated entity. Moving towards a risk-based approach and in line with the Solvency II framework, for the purpose of assessing compliance with applicable solvency requirements the SVS should then allow local insurance companies to use their own internal risk models, subject to prior approval and validation. Earthquake and tsunami risk analyses are also being conducted in the areas affected by 27F, for zonation purposes, by the Ministry of Housing and Urbanism. These efforts should be coordinated, promoted, sustained and expanded.

- 4. The development of a stand-alone earthquake insurance product for public buildings could be encouraged** - The various branches of the Chilean government that own public buildings could be able to spread the risk of fire and may decide to transfer only earthquake risk to the private insurance market. One minor technical issue with the insurance coverage of certain public buildings may be posed by the need to identify appropriate criteria for their economic appraisal, especially for those buildings that have an artistic and/or historic value.
- 5. A mandatory (or quasi-mandatory) earthquake and tsunami insurance system should be considered** – To this end, the existing provisions in the banking regulations concerning mortgage loans ⁽³⁵⁾ and in the Condominium Law (Law .19.537) could be amended to include the obligation to purchase earthquake and tsunami insurance, in addition to fire insurance. It is important to stress that – in order to achieve desired level of protection – the scope of earthquake and tsunami insurance coverage of properties granted as collateral in mortgage loan transactions should be wide enough to protect the interests of both the lender and the borrower. In the long run, an increased level of risk and insurance awareness may lead to a higher take-up rate in the voluntary market. Meanwhile, the introduction of additional mandatory rules should also be considered with a view to ensuring adequate coverage of those buildings at risk that fall outside the scope of application of the above mentioned legislative and regulatory provisions.
- 6. Public subsidies to cover part of the cost of catastrophe insurance for the poorest population sectors should be considered** – Public subsidies could be granted to low-income householders for the purchase of basic earthquake and tsunami coverage to be provided by the private insurance sector. A good example is offered by the agricultural insurance program introduced in Chile in 2000 to subsidize up to 75% of the premium to cover crop growers against climatic risks ⁽³⁶⁾. The existing system of reconstruction subsidies administered by MinVU could be used as an operational platform to distribute such catastrophe insurance subsidies.
- 7. An earthquake and tsunami micro-insurance program for low-income householders may also be considered** – As an alternative to the subsidisation of the cost of private insurance, a state-sponsored simplified micro-insurance system (e.g., on a “total loss / partial loss” basis) may be considered to protect the lowest levels of the population against the risk of losing their house in an earthquake or due to a tsunami. Examples in this field may be offered, inter alia, by the solutions implemented in the Indian state of Gujarat ⁽³⁷⁾ and in Colombia ⁽³⁸⁾.

³⁵ *Superintendencia de Bancos e Instituciones Financieras (SBIF) - RECOPIACION ACTUALIZADA DE NORMAS - CAPÍTULO 8-4 Mutuos hipotecarios endosables – Título I, Número 1.*

³⁶ The subsidies are managed by COMSA (*Comité de Seguro Agrícola*) and financed each year by the Budget Law. See: <http://www.seguroagricola.com>

³⁷ The Gujarat State Disaster Management Authority (GSDMA - <http://www.gsdma.org/>) was established shortly after the earthquake that took place on 26 January 2001. Nearly 1.1mn houses were damaged or destroyed by the earthquake and the GSDMA introduced a reconstruction programme to help individuals rebuild their homes. In line with long-term disaster management planning goals, GSDMA also implemented a compulsory housing micro-insurance scheme for those beneficiaries whose houses had been completely destroyed and reconstructed. The micro-insurance program, financed by the Government of Gujarat in partnership with private insurance companies, offers basic coverage over a period of 10 years. As the premium is automatically deducted from the housing subsidy, there are no transaction costs for the beneficiary. See: Pandya, M., Mitchell, T. and Shah, A. (2006), *Transferring Risk Through Microinsurance, Microcredit and Livelihood Relief: Best Practice Case Studies*, All India Disaster Mitigation Institute; Walker, G.R. (2008), *A Proposed Framework and Approach to Earthquake Micro-Insurance*, Proceedings, 14th World Conference on Earthquake Engineering, October 12-17, 2008, Beijing, China, <http://www.14wcee.org/>

8. A public-private risk sharing arrangement aimed at encouraging a higher level of risk retention by Chilean insurance companies and at expanding insurance coverage of catastrophic risks could be considered – At present Chilean insurance companies are fronting the risks of earthquake and tsunami. As a result, the price, terms and conditions of catastrophe insurance in Chile are dictated by the international insurance market players, with little or no bargaining power for Chilean direct insurers. While the diversification benefits of global catastrophe reinsurance must be fully acknowledged, price fluctuations can be very significant and they can reflect changes in the supply of catastrophe reinsurance following a disaster occurred elsewhere in the world. This may raise political concerns if the Chilean government decides to rely substantially on the private insurance sector for the coverage of catastrophic risks going forward. A policy aimed at encouraging more responsible underwriting and a higher level of risk retention by local insurers could take the form of a public-private partnership in which the government could provide some degree of financial support to the local private insurance sector in the form of pre-arranged liquidity and credit enhancement facilities. Along the same lines, the promotion of a catastrophe insurance pool or the establishment of disaster fund backed by financial resources provided by the government may also be considered. The creation of such public-private risk-sharing institutional scheme could facilitate a higher retention of risk in the country, thereby reducing price volatility⁽³⁹⁾, without raising solvency concerns. This may also allow the insurance coverage of currently uninsured assets (e.g., public building stock). In consideration of the diversification benefits offered by private sector solutions, the government could then utilise traditional reinsurance/retrocession arrangements, as well as CAT-linked securities⁽⁴⁰⁾, to cover part of the exposures under the scheme. A proper coordination with the National Civil Protection Fund (Fondo Nacional de Protección Civil) must be ensured in order to maximize the combined effects of prevention, mitigation and financial coverage measures.

³⁸ Reportedly, an interesting low-cost multi-peril (including earthquake) property micro-insurance product has been developed for the inhabitants of the city of Bucaramanga in Colombia, at risk from earthquakes from the “Bucaramanga nest”. See Smolka A., et al. (2008), *Microinsurance Schemes for Property: Examples from Latin America*, Proceedings, 14th World Conference on Earthquake Engineering, October 12-17, 2008, Beijing, China, <http://www.14wcee.org/>

³⁹ Earthquake and tsunami reinsurance premiums not only may be lower but also become less volatile thanks to the retention capacity of a local government-backed catastrophe insurance pool or fund.

⁴⁰ See: Michel-Kerjan, E. et al. (2011), “Catastrophe Financing for Governments: Learning from the 2009-2012 MultiCat Program in Mexico”, cit.; see also: OECD, *Catastrophe-linked securities and capital markets*, 2009 – report presented at the 2nd Conference organized under the auspices of the OECD International Network on Financial Management on Large-Scale Catastrophes, Bangkok, Thailand, 24-25 September 2009.

APPENDIX

The California Earthquake Authority (CEA)

In California, insurers that sell residential property insurance – including coverage for homeowners, condominium owners, mobile-home owners, and renters – are mandated by the law to offer earthquake coverage to their policyholders. To this purpose, insurance companies can join the California Earthquake Authority (“CEA”) and offer the CEA’s residential earthquake policies or they can manage the risk themselves. At present, most of the companies that sell residential property insurance in California decided to become CEA participating companies.

An act of the California Legislature issued in 1996 introduced a form of reduced-coverage, catastrophic earthquake-insurance policy - the so-called "mini-policy" -, which is intended to provide basic protection to a policyholder’s dwelling while excluding coverage for costly items such as swimming pools, patios, and detached structures. The state offers no guarantee: therefore, if losses from an earthquake drain the established fund, the CEA may run out of business and claims will be paid out on a pro-rated basis.

The French Natural Disaster Compensation Scheme (CAT NAT)

In France, the compensation of victims of catastrophic events (natural or man-made) is widely understood as the enforcement of the Constitutional principle of national solidarity. The Preamble to the 1946 Constitution - quoted in the Preamble to the 1958 Constitution - in fact expressly refers to “*the solidarity and equality of all French people as to the charge resulting from national calamities*”.

While personal injuries due to a disaster often fall under the national health and social security system, damages to property are, in most instances, covered by first party insurance. As a result of a series of legislative interventions, private insurance companies may not exclude from first party coverage losses arising out of: (a) natural catastrophes, (b) technological disasters, or (c) terrorism.

While the market for first party policies (such as fire policies) is, as a general rule, voluntary in France, most people do in fact take up insurance, especially if they own or rent premises (household insurance coverage is mandatory for tenants under French law, while most lenders require home owners to show proof of adequate insurance in order to obtain a loan).

Concerning natural perils, pursuant to applicable provisions of the French Insurance Code, insurance contracts, issued to any natural or legal persons other than the State in order to insure against damage caused by fire or any other damage to property located in France as well as damage to hulls of motor vehicles, must also cover against the effects of natural disasters and subsidence of land due to underground cavities or due to Marl-pits on property covered by the insurance contracts. In addition, when the insured is covered for business interruption, the cover must be extended to the effects of natural disasters in accordance with the terms of the corresponding contract.

This regime, established by Law in 1982 and forming the basis of the French National Disaster Insurance Scheme (CAT NAT), does not refer to an exhaustive list of natural perils covered, nor does it contain a complete list of exclusions. The 1982 Law merely refers to the notion of “uninsurable damage”; in particular, the Insurance Code states that uninsurable direct material damage, caused by the abnormal

intensity of a natural agent, when normal measures have been taken to avoid such damage have been unable to prevent the occurrence thereof or could not be taken, shall be deemed to be a natural disaster.

In any event, the existence of natural disaster must be expressly declared by inter-ministerial decree which shall determine the areas and the periods of the occurrence of the disaster and the nature of the damage. The decree shall state, for each Municipality that has requested the recognition of the existence of a natural disaster, the decision of the Ministers.

According to the law, a clause in the contract must explicitly state that natural disasters are covered and that coverage cannot be excluded or limited for any of the properties mentioned in the contract. All the insurance contracts mentioned above are deemed to contain such a clause, and any exclusion is considered null and void. Notwithstanding any provision to the contrary, moreover, the coverage offered includes the reimbursement of the cost of geotechnical studies rendered necessary prior to repairing constructions affected by a natural disaster.

The Insurance Code specifies that some categories of damages are excluded from this mandatory extension of coverage. The following are, in particular, excluded from the CAT NAT regime: damage caused to non-harvested crops, cultivation, soil and livestock outside premises (the compensation for such losses is governed by a Law of 1964 which established the National Guarantee Fund for Agricultural Disasters); damage sustained by the hulls of air, marine, lake and inland waterway vehicles as well as goods in transit. The regime does not, moreover, apply to damages caused to real property built and to activities carried out in breach of administrative regulations in force intended to prevent the damage caused by a natural disaster.

Compulsory coverage was extended in 1990 to damage caused by wind during storms, hurricanes and cyclones. This additional coverage applies when no declaration of natural disaster has been issued. However, in the case of wind attributable to a cyclone in respect of which the maximum surface winds recorded or estimated on the damaged area have reached or exceeded 145 kilometres an hour on average over ten minutes or 215 kilometres an hour in gusts, coverage is provided under the CAT NAT scheme, implying that a state of natural disaster has to be declared by inter-ministerial decree.

In summary, the French natural disaster compensation scheme provides for a compulsory extension on all property damage policies purchased on the voluntary market. It is important to note that, as mentioned, coverage under the catastrophe extension is triggered only when the state of natural disaster is declared by inter-ministerial decree. Moreover, the damaged property must be covered by a "property damage" insurance policy and a causal link must be established between the catastrophe declared in the decree and the damage suffered by the insured property.

The payment of compensation under the French CAT NAT scheme, therefore, is subject to the following two conditions: (a) an official declaration of the state of natural disaster must be issued by inter-ministerial decree; (b) the damaged property must be covered by an insurance policy against fire or any other type of damage (e.g., theft, water damage). The natural disaster cover follows the terms and conditions of the underlying first party insurance policy, with the exception of the premium rate and deductibles.

According to the rules of the scheme, the insured parties must retain a portion of the risk, by means of a statutory deductible that cannot be bought back even by means of another policy. Deductibles are compulsory – i.e., they apply even when the basic policy does not include them – and their amount is determined and updated by means of decrees issued periodically by the competent authority.

Since 2001, a sliding scale has been introduced to vary these deductibles so as to encourage loss prevention measures. This scale applies to those districts which do not yet have a prevention plan for foreseeable natural risks (PPR). A multiplicative coefficient is applied to eligible natural disaster claims located in districts without a PPR for the given peril.

The coefficient is based on the number of declarations (an inter-ministerial decree can contain several declarations) issued in respect of this same peril during the first five years preceding the new decree declaring a state of natural disaster. These coefficients shift, in step-wise fashion, the risk of natural disasters to policyholders as the frequency of natural disasters increases. This sliding scale does not apply when a PPR is set up for the peril in question, but it is reactivated if the PPR is not approved within four years. This scale does not apply to motor vehicles. The deductibles are compulsory, i.e. they apply even when the basic policy does not include them.

The additional premium rates linked to the compulsory catastrophe extension in policies are set by decree. Since 1 September 1999, the rate of catastrophe premiums for property other than motor vehicles has been 12% of the premium or contribution paid for the basic property coverage.

This complex scheme is able to work effectively due to the fact that *Caisse Centrale de Réassurance* (CCR), a state-owned company established in 1946, entered into an agreement with the authorities that allows it to offer reinsurance cover with a government guarantee in the field of natural disasters. CCR does not have a monopoly in natural disaster reinsurance: primary carriers, therefore, are free to seek coverage from the reinsurer of their choice, and may even take the risk of not purchasing reinsurance. In any event, CCR remains the only company within its sector of activity that offers a whole range of reinsurance solutions with unlimited cover. CCR thus provides a guarantee of solvency and security for insured parties within the French natural disaster compensation scheme.

According to current practice, CCR usually offers two types of reinsurance solutions, which are combined to provide two-fold reinsurance cover to primary catastrophe risk carriers. Under the first solution, known as "quota-share", the insurer cedes a certain proportion of the premiums collected to the reinsurer and the latter, in return, undertakes to pay the same proportion of losses. Quota-share reinsurance ensures that the reinsurer follows the fortunes of the insurer, since the latter has to cede a percentage of each of the accounts in its portfolio to the reinsurer. Thus, the risk of anti-selection is avoided. The second solution, known as "stop-loss", covers the portion not ceded on a quota-share basis by the insurer - in other words, the insurer's retention. This is a non-proportional form of reinsurance because, contrary to the "quota-share" system, the reinsurer only intervenes if the total annual losses exceed an agreed figure, expressed as a percentage of the premiums retained. This type of reinsurance enables the insurer to protect itself against the frequency or accumulation risk, i.e. the risk of many claims occurring at the same time. Although most "stop-loss" reinsurance treaties contain a limit of indemnity, CCR's cover in the field of natural disasters is unlimited thanks to the State guarantee from which it benefits. The deductible under the CCR treaty therefore represents the maximum amount which an insurer will have to bear in the course of a single underwriting year, however many losses occur.

Under the Insurance Code, the Natural Disaster Central Rating Bureau (*Bureau Central de Tarification des Catastrophes Naturelles*) is entrusted with several regulatory powers with respect to the governance of the CAT NAT scheme.

The Japanese system of earthquake insurance (JER)

The Japan Earthquake Reinsurance Co., Ltd. ("JER") was founded in 1966 as the only company in Japan permitted to exclusively handle reinsurance for earthquake insurance on dwelling risks. For about 45

years since then, JER has been underwriting the dwelling risk of earthquakes in Japan in partnership with the Japanese government and non-life insurance companies.

In this country, earthquake insurance is arranged as an optional rider to fire insurance which covers buildings for residential use and/or personal property. Earthquake insurance cannot be purchased as a stand-alone policy. Since earthquake coverage is relatively expensive and its purchase is not mandatory, the penetration level remains quite low. According to data provided in 2010 by JER, the penetration last year exceeded 25%, reflecting an upward trend that begun in the mid-nineties.

The scope of earthquake coverage provided by JER includes loss of or damage to buildings for residential use and/or personal property through fire, destruction, burial or flooding caused directly or indirectly by any earthquake or volcanic eruption, or resulting tsunami. Under this system, since 1 April 2009 the aggregate limit of indemnity for earthquake insurance liabilities (JPY 5,500bn) is shared by the private and public sectors as follows: for earthquake insurance liabilities up to JPY 115bn: the JER is liable for 100% of insurance claims; over JPY 115bn and up to JPY 1,925bn, the government is liable for 50% while the JER and private insurers (due to retroceded risk from the JER) are liable for 50%; and from JPY 1,925bn to JPY 5,500bn, the government is liable for 95% and private insurers (including the JER) are liable for 5%. Under the Earthquake Insurance Act, where earthquake insurance liabilities for one event exceed the indemnity cap of JPY5,500bn, residential policyholders' claims are reduced proportionately.

Under the Japanese earthquake reinsurance program, therefore, primary carriers sell earthquake coverage with large deductibles on the voluntary market (insurers are obliged to offer the optional earthquake extension with all residential fire insurance policies, but policyholders may decide not to purchase it) and then fully reinsure their risk with JER, which, in turn, retrocedes part of the risk to the Japanese government, and part of it to the private insurance market. Under this state-led system of earthquake insurance, policyholders can obtain earthquake coverage of residential buildings and household property in the amount of 30 to 50% of the sum insured under the fire policy. The amount insured for earthquakes is limited to a maximum of JPY 50mn for a building and JPY 10mn for household property. Policy conditions are identical for all non-life companies. The insurance premiums collected by insurers do not remain with the insurers but are managed and operated by the JER and the government.

Under the Law concerning the Non-Life Insurance Rating Organization of Japan, risk premium rates are calculated by the Non-Life Insurance Rating Organization of Japan (NLIRO). The NLIRO computes earthquake risk premium rates by computing the estimated insurance claims to be paid per year using the data from damage estimation simulation taking into consideration approximately 400 destructive earthquakes that have occurred in the past 500 years. Premiums are linked to the level of prevention measures. For example, the application of different rates depends on the material used in the building (wood or non-wood). Special discounts are also applied according to construction age and the installation of particular quake-resistance structures. Premium rates include a "loading rate" for non-life insurance company expenses and agency commissions.

A new premium tax deduction system for earthquake insurance has been introduced as a means to promote self-reliant efforts of individuals to prepare for earthquakes. Under this scheme, individuals can deduct the amount of premiums paid from their income. The maximum deductible amount is JPY 50,000 under the Income Tax Law and JPY 25,000 under the Local Tax Law.

The New Zealand Earthquake Commission (EQC)

The Earthquake Commission (EQC) is New Zealand's primary provider of seismic disaster insurance to residential property owners. The EQC is a Crown Entity, wholly owned by the government of New Zealand and controlled by a board of commissioners. Crown Entities are not government departments or state-owned enterprises but nevertheless belong to the government and are subject to public sector finance and reporting rules.

EQC administers the Natural Disaster Fund. The government guarantees that this fund will meet all its obligations. It does this by securing New Zealand residential property owners against the cost of these disasters and by helping organize repair and replacement after the event. The main mechanism for this is the provision of seismic disaster insurance to property owners who insure against fire. All residential property owners who voluntarily buy fire insurance from private insurance companies automatically acquire EQCover, the Commission's seismic disaster insurance cover. Perils insured by the EQC catastrophe coverage are: earthquake, natural landslip, volcanic eruption, hydrothermal activity, tsunami and, in the case of residential land, also storm or flood. EQCover premiums are added to the cost of the fire insurance and passed on to EQC by the insurance company.

EQC's administration of the natural disaster insurance scheme involves: collecting premiums via insurance companies; processing and meeting claims by insured people; administering a disaster fund; investing the fund in accordance with government directions; organizing reinsurance as a potential supplement to the fund; accounting to its shareholder (the government). EQC also encourages and funds research about matters relevant to natural disaster damage and it educates and otherwise informs people about what can be done to prevent and mitigate damage caused by natural disasters.

Home and contents insurance policies in New Zealand usually cover floods and storms as well as fire. EQC is in effect a first loss insurer and provides cover on a replacement value basis for NZD 100,000 plus taxes on the dwelling, NZD 20,000 plus taxes on contents and unlimited cover for land within certain constraints in the perils [e.g. floods, hurricanes, earthquakes, storms, landslides, tsunamis, hailstorm, dryness, fire (not man-made) of catastrophic consequences, volcanic eruptions, etc.] and lines [e.g. commercial/personal property, business interruption, worker's compensation, life, crops, grounds, livestock, public infrastructure etc.] covered under the Earthquake Commission Act 1993.

Coverage is triggered by the occurrence of any of the events noted above. If an owner of a dwelling or contents insures the dwelling or contents against fire damage, EQC cover is compulsory and is collected on EQC's behalf by the Fire Insurer. A standard premium has been charged since 1945 of 5 cents per NZD 100 sum insured. Deductibles are imposed according to the following scale:

- Dwelling: NZD 200 or 1% of the amount payable per dwelling;
- Contents: NZD 200;
- Land: the greater of NZD 500 or 10% of the amount payable to a maximum of NZD 5,000.

The minimum sum insured is NZD 1,000 per square meter of the dwelling. The maximum compensation is NZD 100,000 plus tax for a dwelling, NZD 20,000 plus tax for contents and unlimited on land. The private sector can provide cover above the EQC limits. The system is managed by the EQC and it is funded by premiums income and investment income on a fund of approximately NZD 5,000mn.

The Spanish Consorcio de Compensación de Seguros

Catastrophic risks coverage is carried out in Spain by the *Consorcio de Compensación de Seguros*, a public non-profit institution attached to the Ministry of Economy and Finance. Set up in 1941 as a provisional body to face the needs for indemnities resulting from the Civil War (1936-1939), the Spanish *Consorcio de Compensación de Seguros* was given its permanent status from 1954. After that date, the activity of the *Consorcio* focused on the coverage of the so-called extraordinary risks and it began to play a central role in the related indemnity system. Since the approval of its Charter in 1990, which came into force in 1991, the *Consorcio* lost its legal monopoly for covering extraordinary risks in Spain and it is no longer a self-running body of the Ministry of Economy and Finance, but a state-owned company - currently a public business entity - with full powers to act.

The *Consorcio* has its own assets and liabilities, separate from those of the state, and its activity is governed by private law. This means that the new company, when doing insurance business, apart from being governed by the terms of its own Charter, is subject, like any other private insurance company, to the legal rules laid down in the Private Insurance Ordering and Supervision Act and its enacting regulations, and to the Insurance Contract Act. Just like any other insurance company, therefore, the *Consorcio* is subject to prudential rules for the solvency margin and for setting up technical reserves. The equalization reserves to be created by the *Consorcio* for the catastrophic risks coverage enjoy favourable fiscal treatment.

The aim of the *Consorcio* is to indemnify claims made as a result of extraordinary events, such as natural disasters or other events with heavy social repercussion, that occur in Spain and cause injuries and damage to people and assets in Spain, whenever any of the following conditions are met: a) the extraordinary risk is not specifically and explicitly covered by another insurance policy; b) the extraordinary risk is covered by another insurance policy but the company that issued this policy cannot meet its obligations. The risks included in the Spanish system for the coverage of extraordinary risks in practice are not assumed by insurance companies, even if the system legal rules permit insurance companies to cover these types of risks. The *Consorcio*, in a subsidiary manner, assumes these risks; the insurance companies underwrite and manage the policies (with the compulsorily coverage attached) and the *Consorcio* collects surcharges. The *Consorcio* manages claims, losses adjustment, and indemnifications. The *Consorcio* does not reinsure its risks, and thus retains all the extraordinary risks covered. This state-sponsored system for the coverage of extraordinary risks is backed by an unlimited State guarantee. This guarantee has never been used.

The perils covered under the Spanish system for the coverage of “extraordinary risks” are listed in the applicable Regulation and include: extraordinary floods, earthquakes, seaquakes, volcanic eruptions, atypical cyclonic storms (tornadoes and gusts of wind above 135 km/h included) and fall of sidereal bodies and meteorites. The lines of insurance that must include coverage for extraordinary risk are the following: fire and natural events; land vehicles (vehicle damage, not civil liability); railways vehicles; other damages produced to goods (robbery, plate glass, machinery breakdown, electronics equipment and computers); business interruption; and life. Accident insurance is also included, even if contracted additionally to another type of insurance, as life or motor vehicles, or within the framework of a pension plan.

The purchase of insurance is generally optional, but in certain lines of insurance (see the lines of insurance mentioned in the preceding paragraph) it is compulsory to include in the policy base an extraordinary risks coverage clause. These lines mainly refer to losses on properties (material damages and business interruption) and personal accidents. It should be noted that protection against extraordinary risks is entirely separate from protection against other risks provided for in the policy. In other words, the coverage of extraordinary risks protects the same property or persons for at least the same amount insured.

Coverage is triggered by any loss from any 'extraordinary risk'. This coverage is qualitative, not quantitative (there are no minimum or maximum damage amount requirements). The maximum amount of compensation depends on the amount insured in the policy base. With respect to property damage, the indemnity paid by the *Consortio* covers material losses, regarded as being the destruction or deterioration of the property insured, and direct losses, so damage caused directly by the event. The coverage includes business interruption. In respect to the cover for natural catastrophes, a change was made in 1986 from a system of indemnities based on a prior official declaration of a disaster area which took the geographical area of the loss and the volume of losses into account to a system of automatic indemnity, which provides cover subject only to the prerequisite that the policies, the damage and the events giving rise to the loss meet the legally established parameters.

In recent times, the deductibles applied in the system have been reduced. Currently, concerning direct damages to goods, a deductible of 7% of compensable loss is retained by the insured. This deductible is not applied to vehicles insured through motor car insurance policy, to buildings, or to communities of dwelling owners. Concerning insurance covering persons, no deductible applies. For business interruption cover, the deductible is the same provided by the base policy.

As mentioned, the coverage provided by the *Consortio* for extraordinary risks is financed by surcharges applied to the policies in the lines cited above and which are paid by policyholders. The surcharges rates are applied nationally, and are fixed depending on type of the exposures covered (offices, housing, industrial, commercial, etc.). In 1986, a change was made regarding the surcharge used to fund the *Consortio*; instead of charging a percentage on the base premium, a system of own rates is now applied on the sums insured in the policies. The *Consortio*'s surcharge must be compulsorily incorporated into the premium charged for every policy of insurance in the above-mentioned classes, irrespective of whether said policy provides for the coverage of extraordinary risks to be effected by the private company, or whether this is excluded (in which case the *Consortio* shall be responsible).

The *Consortio* is governed by a board of directors with members from government and the private insurance market. The chairman, a government official, is the General Director of the Directorate-General for Insurance and Pensions Funds.

The Turkish Catastrophe Insurance Pool (TCIP)

The impact of recent natural disasters and the low level of insurance penetration led the government to initiate studies to promote disaster insurance and to establish a widespread and effective earthquake insurance system. Following the 1999 earthquake disasters that occurred in the Marmara Region and Duzce, earthquake insurance was made compulsory primarily for dwellings through an Earthquake Insurance Program. The Turkish Catastrophe Insurance Pool (TCIP) was launched by the Turkish government in cooperation with the World Bank in September 2000. In addition to the legal framework of TCIP, a new code on building inspection was enacted by the Parliament. Earthquake insurance premiums are ceded to the TCIP, which is managed by the Natural Disasters Insurance Council, DASK in the Turkish abbreviation.

The TCIP was set up in fulfilment of the government decree-law as a separate state-owned legal entity to provide compulsory earthquake insurance to all registered residential dwellings that fall within municipality boundaries in Turkey. The pool provides earthquake coverage up to certain limits for a premium which varies across the country depending upon seismicity, local soil conditions, and the type and quality of construction. The TCIP is managed through the TCIP Management Board consisting of members from public and private sectors and academic community. The Management Board consists of representatives of Prime Ministry, Undersecretariat of the Treasury, Ministry of Public Works, Capital Market Board, Insurers Association, Operational Manager, and an earthquake scientist.

The compulsory scheme covers only residential buildings that fall within municipality boundaries. Under Decree No. 587, the taking out of earthquake insurance was made compulsory for all residential buildings that fall within municipality boundaries starting from September 27, 2000. Industrial and commercial risks as well as residential buildings in small villages (with no municipality established) can be insured on a voluntary basis. Eligible policyholders are owners or usufructuaries of dwellings that fall within municipality boundaries. Before September 2000, earthquake insurance in Turkey was mostly provided as an allied peril to the fire policy and engineering policy.

The compulsory earthquake insurance is a stand-alone product sold separately from fire (or homeowner's) insurance. It covers building damages for the following risks: earthquake; fire related to earthquake; explosion related to earthquake; and landslide related to earthquake. As an enforcement mechanism, homeowners have to present their insurance policy to the land register office every time they want to start an administrative procedure concerning the building subject to mandatory insurance coverage. Recently, a proposal was made to extend such a requirement to other public services and to create some new checkpoints.

The aim of the TCIP is to provide an adequate level of protection with affordable premiums. Therefore, the maximum coverage limit of compulsory insurance is currently NTL 110,000. This limit is adjusted annually according to changes in the construction price index. Policyholders are free to buy additional coverage in excess of this limit from insurance companies if the value of their dwelling is more than this amount. When assessing claims, the TCIP takes into account market reconstruction prices at the date of the event for each type of building. Any loss payment is limited to the sum insured. In the case of masonry type of buildings or small dwellings, the sum insured is usually below the maximum coverage limit. The sum insured is calculated by multiplying the gross square meter of dwelling by the relevant unit reconstruction cost. There is also a 2% deductible applied on the sum insured.

Local insurance companies act as distributors of the TCIP policies. Coverage in excess of the TCIP coverage can be obtained on a voluntary basis from private insurance providers. To issue policies, the pool agents and insurance companies can, in addition to insurance company underwriting systems, use an internet-based underwriting platform that enable the TCIP to control its risk accumulations in real time and maintain the quality of underwriting. The TCIP operates as a catastrophe risk transfer and risk financing facility.

Established under the supervision of Undersecretariat of the Treasury as the national sole-source provider of earthquake insurance, it is expected that the TCIP will raise the financial preparedness of Turkey for future disasters, reduce government fiscal exposure to major catastrophic events, and will make liquidity readily available to insured homeowners affected by such future events. The TCIP is modelled after the California Earthquake Authority and New Zealand EQC programs, which provide similar earthquake coverage for homeowners and rely mainly on international reinsurance and capital markets for their risk capital capacity. The TCIP in fact cedes, and will cede, a large amount of its risk to international reinsurance markets until sufficient financial resources are accumulated within the TCIP.

The compulsory earthquake insurance scheme aims to alleviate the financial burden of earthquakes on the government budget, to ensure risk sharing by residents, to encourage standard building practices, and to establish long-term reserves in financing future earthquake losses. Although the original design of TCIP envisaged a multi-peril coverage, it currently provides only compulsory earthquake insurance coverage. New products for other natural disasters such as flood and landslide may be offered in the future.

Most of the functions and operations of TCIP are outsourced to minimize cost and create an efficient operational structure. For example, operational management has been contracted out to leading reinsurance companies of Turkey (Milli Reinsurance Company from 2000 to 2005 and Garanti Insurance Company

since August 2005). Likewise, insurance companies and their agencies are carrying out distribution of policies and marketing functions, and independent loss adjusters are carrying out loss assessment. Currently, more than twenty insurance companies are entitled to distribute TCIP policies.

The TCIP has a simple pricing matrix as show below. Pricing accounts for seismicity and construction type. Prices range from 0.4 per mille at the lowest to 5 per mille at the highest. The earthquake map used by TCIP divides Turkey into five different categories of land according to the vulnerability factors whereas the tariff divides buildings into three categories according to their construction types. As the result of two groupings, fifteen different rates (per mille) are applicable for buildings according to location and the type of the construction. The TCIP has accumulated premium revenue since the beginning of the program. The TCIP uses this financial resource to pay claims and buy reinsurance coverage. As a result, building damages because of earthquake can be compensated quickly without reverting to government budget.

Enforcement problems have been reported, and penetration rate remains relatively low. To improve the current enforcement level, for instance, homeowners could be obliged to present their insurance policy when opening an account for such services as gas, water, electricity and telecommunications. Increasing the level of insurance penetration, in fact, remains the key challenge of the TCIP.

The Undersecretariat of the Treasury is responsible for overseeing of the program, and auditing of all operations and accounts of the TCIP. Annual accounts are also audited by an independent auditing firm. The TCIP and its revenues are exempt from all kinds of taxes, levies and charges and accumulated funds are kept in segregated accounts. Funds are being managed by the Operational Manager and invested in diversified financial instruments following the TCIP Board's investment guidelines.

The Residential Earthquake Insurance Pool of Chinese Taipei (TREIP)

Chinese Taipei is located in an active seismic area and it is also exposed to *windstorm* and *typhoon* risks. Due to intense collision between the Philippine Sea and Eurasian plates, Chinese Taipei has experienced many large-scale *earthquakes* over the years. The September 1999 Chi-Chi earthquake was by far the largest earthquake to hit Chinese Taipei in over 100 years, with a magnitude of 7.6 (Mw). As part of the implementation of a comprehensive disaster prevention and risk management program, the Ministry of Finance (MOF) of the government of Chinese Taipei introduced the Residential Earthquake Insurance Pool (TREIP), originally managed by Central Reinsurance Corporation (Central Re), a government owned reinsurance company. Since 2006, after privatization of Central Re, the management of the scheme has been entrusted to TREIF (Residential Earthquake Insurance Fund), a governmental entity.

TREIP was created according to Article 138-1 of the Chinese Taipei Insurance Act, in July 2001. Regulations and directives followed in November 2001, TREIF was established on 17 January 2002 and TREIP policies became effective from 1 April 2002. The pool was designed to share earthquake risk between private insurance companies and the government and to diversify such risk through a combination of local co-insurance, a non-profit fund (TREIF), international reinsurance, capital markets and government funds.

In the original structure, private insurers retained the first TWD 2bn of risk, and the government acted as a backstop, assuming the risk above that level and up to a total limit of TWD 50bn, then raised in 2007 to TWD 60bn. Since 2007, the limit was raised to TWD 70bn.

TREIP's Layers of Coverage

Since 2009 TREIP has five layers totaling TWD 70bn in capacity as follows:

1st layer of TWD 2.8bn - domestically licensed insurers (private sector coinsurance pool).

2nd layer of TWD 17.2bn - TREIF.

3rd layer of TWD 20bn - domestic and overseas reinsurance market and/or capital market [during the first three years of operation (2002-2005) part of this risk layer was ceded to capital markets by means of an indemnity based cat bond].

4th layer of TWD 16bn – TREIF.

5th layer of TWD 14bn – Government.

The scheme caps losses at TWD 70bn. In the event that losses exceed the capped amount, the losses paid to policyholders will be proportionally reduced (proration).

Prior to the creation of TREIP, earthquake insurance was provided as an endorsement to a long-term residential fire policy. Since 1 April 2002, new residential fire policies have been issued on an annual (rather than long-term) basis, and have been changed to automatically cover earthquake risk. Existing long-term policies can also be voluntarily endorsed at any time to provide annual cover for the earthquake peril. As of 31 August 2010, the take-up rate equals 27.94% of total estimated 8 million households in Chinese Taipei.

The new policies provide indemnity on a replacement cost basis for buildings, with a maximum insured amount of TWD 1.2mn. In addition, a further TWD 180,000 of reimbursement is provided per household for Contingent Living Expenses. No deductible applies. TREIP coverage is provided for an annual flat premium per household (starting from 1 April 2009 the annual flat premium was reduced from TWD 1,459 to TWD 1,350). For the small number of houses valued at less than TWD 1.2mn, the premium is calculated on a pro-rata basis. Pricing, therefore, is not risk-based.

Insurers will pay the indemnity to insured parties only for: (a) a damaged building that a government agency or civilian authority has declared no longer fit for habitation or (b) the repair cost for a damaged building, where said cost is more than 50% of the replacement cost. TREIP's portfolios are written by domestic and foreign insurers in Chinese Taipei.

Perils covered include: earthquake shock, fire or explosion caused by earthquake, landslide, land subsidence, earth movement and rupture caused by earthquake and, since 2006, tidal wave, surge and flood caused by earthquake.