

AqabaConf 2023
NASCO RE SPECIAL SUPPLEMENT

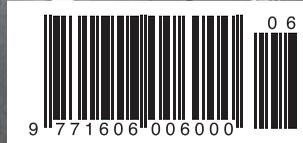
BUSINESS LIFE

June 2023



Understanding Earthquakes

Seismic motions, earthquake modeling, market solutions and initiatives



- Lebanon.....LBP5,000
- U.A.E.....Drhm12
- Jordan.....JD2
- Egypt.....EP5
- Algeria.....DZD200
- Tunisia.....TND4
- Saudi Arabia.....SR12
- Bahrain.....BD1
- Oman.....OR1
- Europe.....Euro4
- Libya.....L.D4
- Yemen.....YR10
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- 2 | Understanding Earthquakes
- 6 | Earthquakes 9th AqabaConf Aqaba-Jordan /June 2023
- 8 || Understanding Earthquakes 9th AqabaConf Aqaba-Jordan /June 2023
- 10 | Understanding Earthquakes 9th AqabaConf Aqaba-Jordan /June 2023
- 12 | Understanding Earthquakes

- 14 | Understanding Earthquakes
- 16 | Understanding Earthquakes- Slides



Understanding Earthquakes - 9th AqabaConf Aqaba-Jordan /June 2023: Joe Azar, CEO of Nasco Re - France



Joe Azar, CEO of Nasco Re - France receiving an award from Engineer Majed Smeirat, Chairman of JOIF



Hassan Nasser, Vice President - Treaty at Nasco and Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF) during a panel discussion on "Understanding Earthquakes"

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Understanding Earthquakes

Seismic motions, Earthquake modeling, Market solutions and initiatives

Since 1976, Nasco France is committed to providing the highest level of Reinsurance services to its clients. NASCO Re, is the leading reinsurance broker in the MENA region with over 45 years of industry experience and amongst the top three largest reinsurance brokers in France.

Nasco Group operations cover Reinsurance Broking, Direct Broking, Underwriting & TPA.

Joe Azar, CEO Nasco Re (the reinsurance broking arm of Nasco Insurance Group) is based in France and has over 41 years' experience in the industry. He started his career with SNA Allianz in 1977 where he spent 13 years as Head of the International department. In 1990 he moved to Arab Insurance Group as Treaty Underwriter, before taking responsibility for the Business development Division. He joined Nasco in 1992 as Director for Treaty and became Chief operating officer in 2013 and member of the Nasco Group Board.

Joe looks after all the Nasco Reinsurance broking offices.

Joe Azar is outspoken on many insurance and reinsurance issues. His dynamism and vibrant personality made him one of the key figures of the industry and a leading force in the NASCO Insurance Group.

Nasco Insurance Group was Founded in Lebanon in 1969. NASCO currently operates in Lebanon, the UAE, Saudi Arabia, Qatar, Turkey, Iraq, Tunisia, Nigeria, Egypt and France.

NASCO France is the leading reinsurance broker of the MENA region and is one of the Top 3 reinsurance Brokers in France. The company was founded in 1976 in France. NASCO Re manages a large reinsurance book with a turnover of \$1 billion in transacted premiums and serves clients in more than 60 countries. The company enjoys a strong reputation and image with recognized skills and abilities.

Nasco France also operates as a direct insurance broker, offering highly dedicated and personalized consultative services.

Joe Azar talked with BUSINESS LIFE'S reporter on earthquakes and their impact on



Interview: Joe Azar is the Chief Executive Officer of Nasco Re

insurance and reinsurance industry and the challenges and opportunities for the Arab insurance market especially that earthquakes are the deadliest natural hazard and cause devastating damage. As they are impossible to predict, better protection is crucial.

Joe Azar added that The 9th AqabaCon 2023 is a great insurers and reinsurers

gathering.

BL: What was the most recent earthquake in 2023?

JOE AZAR: Every day, a number of earthquakes occur worldwide, but only "significant earthquakes," with high magnitude are being reported by EQ monitoring



Interview: Joe Azar, CEO of Nasco Re - France with his spouse and a VIP insurer

systems.

In 2023, 66 significant earthquakes were recorded across various countries, including the United States, Turkey, Australia, Japan, Indonesia, Russia, Chile and Iran.

The three earthquakes with the highest magnitudes in 2023 were:

Pulau Tanimbar, Indonesia: in January 2023, an earthquake of magnitude 7.6 occurred at a depth of 105 kilometers. Due to the epicenter being in the Banda Sea, there was luckily limited number of casualties and modest damage.

Pazarcik & Kahramanmaraş earthquakes in Turkey: in February 2023, with a magnitude of respectively 7.8, followed on the same date, by another earthquake of 7.5 magnitude.

The First earthquake caused extensive landslides and significant liquefaction which triggered the second earthquake.

BL: How many earthquakes in Turkey 2023? Earthquake damage in Turkey set to exceed \$100bn, what are your remarks and its impact on your industry?

JOE AZAR: In Turkey, thousands of earthquakes of various magnitudes happen each year.

In 2023, Turkey faced a series of devastating earthquakes. The above 2 earthquakes have occurred on February 6th, followed by a 3rd on February 20th, with a magnitude of 6.3 striking the Turkey-Syria border. These events resulted in extensive damage across southern Turkey and northern Syria.

The cumulative effect of these earthquakes is expected to exceed \$100 billion in terms of total economic losses.

According to the data provided by a catastrophe modeling company, these earthquakes triggered significant insurable losses.

The projected insurable loss for the Feb 6th two earthquakes ranges from \$4 billion to \$7 billion USD. This estimate covers damage to residential, commercial, industrial, and agricultural properties, without accounting for losses related to infrastructure or business interruption

The estimated insurable loss for the February 20 earthquake alone is projected to reach up to \$1 billion USD.

The impact of these earthquakes underscores the importance of the insurance industry's resilience. Insurers and reinsurers must have robust catastrophe modeling capabilities and a comprehensive understanding of earthquake risks.

Given the substantial financial exposure resulting from these earthquakes, reinsurers play a key role in spreading the risk across the global reinsurance markets.

However the insurance Gap remains an area of concern, which needs to be addressed with the view of enhancing protection across the country.

BL: Was there an earthquake in Jordan in 2023?

JOE AZAR: Jordan is prone to earthquakes due to its geographical position in a seismically active region along the boundary between the Arabian and African tectonic plates.

One notable seismic event in recent history occurred on December 13, 2018, when a 4.5 magnitude earthquake was reported in the Dead Sea region, causing widespread panic and resulting in few casualties.

The establishment of the Jordan Seismological Observatory (JSO) has played a crucial role in monitoring seismic events in the country. The JSO, in collaboration with international seismic experts, works towards improving earthquake forecasting and providing early warning systems.

In terms of infrastructure and building codes, Jordan is implementing regulations that aim to enhance earthquake resistance. These measures include incorporating



Interview: Joe Azar, CEO of Nasco Re - France and Joelle Semaan - Regional Technical Manager - Nasco Re

seismic design in the construction of critical facilities, such as hospitals, schools, and high-rise buildings.

In the past 10 years 56 earthquakes, with a magnitude of four or higher, occurred within a 300 kilometer range from Jordan. This translates in an average of 6 earthquakes yearly, or one earthquake every 65 days.

In 2023 a total of 14 earthquakes were detected within the same distance from Jordanian Border.

BL: The strongest recent earthquake of the past 10 years near Lebanon occurred on Feb 20, 2023 19:04 local time (Asia/Beirut timezone). It had a magnitude of 6.3 and struck 257 kilometers (160 mi) north of Ra's Beirut, at a depth of 16 km, is Lebanon prone to earthquakes? What is the risk of a major earthquake in Lebanon?

JOE AZAR: Lebanon is located in a seismically prone region known as the Eastern Mediterranean. This region, situated at the convergence of several tectonic plates, is known for its geological instability and the potential vulnerability to earthquakes.

The risk of a major earthquake in Lebanon should be taken seriously. While it is challenging to predict the timing and magnitude of future earthquakes, experts

confirm the likelihood of the occurrence of a major seismic event.

The seismic risk in Lebanon is influenced by the strain accumulation along active faults, namely Roum, Yammouneh, Serghaya and Rachaya Faults. Other factors include historical earthquake records, and geological Landscape.

In particular, the Beirut area, situated near the active Roum and the Dead Sea faults, faces intense seismic risk. The densely

populated city and surrounding regions are exposed to the potential impact of a major earthquake.

Mitigating the risk of a major earthquake in Lebanon requires implementing stringent construction standards, promoting adherence to robust building codes, enhancing awareness, taking proactive Risk management and preparing measures for necessary response.

Insurance with adequate Reinsurance

Nasco Re is focusing further on providing its clients with solutions. Modeling exposures, structuring covers, advice for re claims adjustment and recovery, commutations of portfolios and other services are on our list.

Joe Azar,
CEO of Nasco Re - France



Joe Azar, CEO of Nasco Re - France and Dr. Manal Jarrar, General Manager of National Insurance Co.-Watania

protection supports the rebuilding efforts following a seismic event, and the economic recovery.

By enhancing all mitigation measures and promoting more recourse to insurance, Lebanon can work towards reducing the impact of seismic events and securing more resilience.

BL: What damage can earthquakes do? What are the losses of earthquakes? What are the risks of an earthquake?

JOE AZAR: Earthquakes are natural disasters that could cause immense devastation. The severity of damage depends on various factors, including magnitude, depth, distance from the epicenter to populated areas, and the infrastructure resilience.

Potential damage could be segmented into 4 different types of damage as below:

Structural Damage: With the vulnerability of the older structures.

Loss of Life and Injuries: Casualties and injuries may result from collapsing structures, falling debris and panic during evacuation.

Infrastructure Disruption: Earthquakes could disrupt critical infrastructure systems such as utilities and transportation networks. This disruption would imply immediate emergency response

Secondary Hazards: Earthquakes may trigger secondary hazards like landslides, tsunamis, liquefaction, and aftershocks, increasing substantially the damage caused.

Earthquakes result in substantial economic losses. These losses fall under 4 categories as below:

PROPERTY DAMAGE: Representing usually a significant share of losses.

BUSINESS INTERRUPTION: Supply chain disruptions, and reduced productivity with the resulting loss of income and employment impacts the economic growth.

LOSS OF LIFE: The loss of lives represents the most tragic segment of losses. The treatment of injuries is also another significant share of potential costs.

SOCIAL AND PSYCHOLOGICAL IMPACT: Earthquakes can have long-lasting social and psychological effects. The need for rehabilitation adds to the above losses.

THE INSURANCE INDUSTRY PLAYS A CRUCIAL ROLE IN MITIGATING THE FINANCIAL IMPACT OF ABOVE LOSSES, OTHER THAN CATEGORY 4.

EARTHQUAKES POSE SEVERAL RISKS INCLUDING:

HUMAN VULNERABILITY: Populated areas located in seismically active regions face the highest risk. The vulnerability of struc-

tures and infrastructure and the density of population, determine the potential impact.

ECONOMIC DISRUPTION: Earthquakes affect industries, businesses, trade, and employment. Economic repercussions can be felt for an extended period.

SECONDARY HAZARDS: Hazards such as social unrest, public health crisis, and environmental consequences can compound the overall risks.

Understanding the risks of earthquakes and implementing effective risk management strategies, including insurance coverage are key to mitigating impact and improving resilience.

BL: How do you evaluate Nasco Re's recent presentation in Aqaba?

JOE AZAR: Earthquakes was the talk of the industry for the last few months. The recent Turkish/Syrian EQ shed a light on the extent of losses both in human lives and property damages leading to high economic losses. Nasco re presentation aimed at enhancing awareness and providing scientific background to assess exposures. We also discussed the different solutions adopted in few countries and proposed a solution that

would fit our area and consider the specific parameters of our region.

BL: What are your views on the 9th AqabaConf 2023?

JOE AZAR: There is no doubt that AqabaConf 2023 has been a great success. The number of participants including international and regional Reinsurers reveals the importance given to this event. This has provided a very professional and dynamic flavor to the meetings. We should also praise the different papers presented by the speakers which reflects the high expectation from the organizers whom we salute for a job extremely well done.

BL: What are the recent updates on Nasco Re?

JOE AZAR: Nasco Re is focusing further on providing the clients with solutions. Modeling exposures, structuring covers, advice re claims adjustment and recovery, commutations of portfolios and other services are on our list. Our teams are well trained and equipped with the adequate tools to provide such services. This should take the service level Nasco provides to new heights and allow our clients to plan better for the future challenges.



Interview: Joe Azar, CEO of Nasco Re - France



Interview: Joe Azar, CEO of Nasco Re - France and Joelle Semaan - Regional Technical Manager - Nasco Re



Interview: Joe Azar, CEO of Nasco Re - France; Joelle Semaan - Regional Technical Manager - Nasco Re and Robert Habchi, Founder and Chairman of ELAM Solutions



Interview: Hassan Nasser, Vice President - Treaty at Nasco during the panel discussion on 'Understanding Earthquakes'



Joe Azar, CEO of Nasco Re - France during Nasco Re Earthquakes Presentation



Joe Azar, CEO of Nasco Re - France; Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF) and Hassan Nasser, Vice President - Treaty at Nasco



Joe Azar, CEO of Nasco Re - France and Hassan Nasser, Vice President - Treaty at Nasco with a colleague



Hassan Nasser, Vice President - Treaty at Nasco during a panel discussion on "Understanding Earthquakes" and Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF)



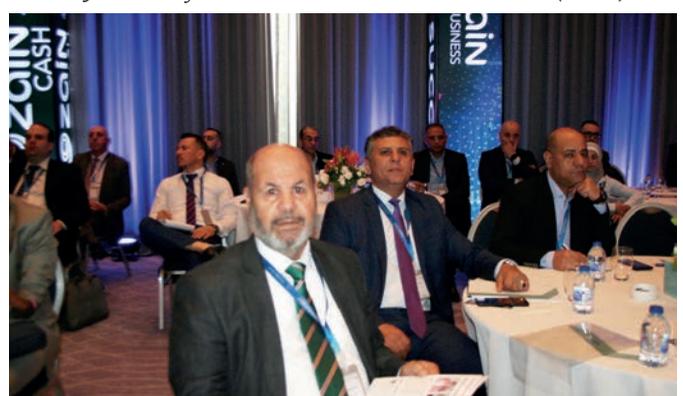
Hassan Nasser, Vice President - Treaty at Nasco during a panel discussion on "Understanding Earthquakes" and Chakib Abouzaid



Hassan Nasser, Vice President - Treaty at Nasco and Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF)



Hassan Nasser, Vice President - Treaty at Nasco during Nasco Re Presentation on "Understanding Earthquakes" and Chakib Abouzaid



Mokhtar Mohamed Daerah, General Manager of Qafela Insurance Co.



Nasco Re at Aqaba: Joe Azar, CEO of Nasco Re - France during a business meeting with Dr. Manal Jarrar, General Manager of National Insurance Co.-Watania



Hassan Nasser, Vice President - Treaty at Nasco during a business meeting with clients



Joe Azar, CEO of Nasco Re - France



Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF) and Hassan Nasser, Vice President - Treaty at Nasco



Hassan Nasser, Vice President - Treaty at Nasco with a colleague



Joelle Semaan - Regional Technical Manager - Nasco Re during a business meeting



Fareed Lutfi, Secretary General of Emirates Insurance Association (EIA) and Hussein Said El Sherbini, Finance Administration Manager



Dr. Lana Bader, JIF Board Member - Organizing Committee Member; Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF) & Youssef Benmicia - Chairman of General Arab Insurance Federation (GAIF)



Hassan Nasser, Vice President - Treaty at Nasco Re



Dr. Waleed Zurub, JOFICO Board Member - Organizing Committee Member



Hassan Nasser, Vice President - Treaty at Nasco Re-France receiving an award from Dr. Moayad Kloub, JIF Director-Organizing Committee Member and Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF)



Mokhtar Mohamed Daera, Ggeneral Manager of Qafela Insurance



Dr. Osama Al Nuaimat, Dean of the Law Faculty - Philadelphia University Jordan



A VIP participant receiving an award from Eng. Majed Smeirat



Hassan Nasser, Vice President - Treaty at Nasco Re and Chakib Abouzaid, Secretary General of the General Arab Insurance Federation (GAIF)

Understanding Earthquakes

The topic of Earthquake (EQ) is hardly new and has been haunting the insurance and reinsurance industry since ever



Interview: Hassan Nasser, Vice President - Treaty at Nasco

The Topic of Earthquake (EQ) is hardly new and has been haunting the insurance and reinsurance industry since ever. That is why Hassan Nasser, Vice President - Treaty at Nasco, was attracted to deliver his presentation on 'Understanding Earthquakes.' The following information shed light on his remarkable presentation which he delivered during AqabaConf 2023.

BL: Why did you select the presentation topic on earthquakes?

HASSAN NASSER: The Topic of Earthquake (EQ) is hardly new and has been haunting the insurance and reinsurance industry since ever. However, it is clear that there has been some recent activities in terms of frequency and severity of Earthquakes which merit a closer look to really understanding this topic. The recent unfortunate event in Turkey and Syria left many industries including the insurance industry wondering about the post effects of such events in their region. Many countries/cities in the MENA region share the same risks in terms of possible exposure to EQ. I thought shedding more light to the topic from both the

scientific and technical perspectives should add to the recent awareness of the possible dramatic consequences of EQs. I also believe that providing a solution would generate the needed dynamics and the right context to discuss earthquakes protections with the different stakeholders.

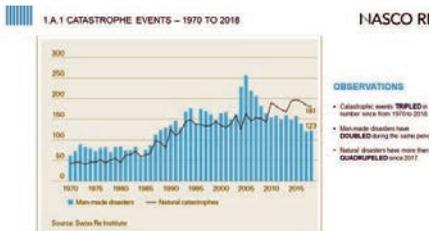
BL: Could you elaborate on catastrophe events- 1970 TO 2018?

HASSAN NASSER: In the last few decades, we witnessed an increase in catastrophic events. From 1970 to 2018 the catastrophic events tripled with Man-made disasters doubling and Natural Perils disaster quadrupling. This might be due partially to Climate change. However, it is worth mentioning that Natural perils have generally claimed more victims and higher damage costs than man-made disasters. Many natural perils have claimed over 100,000 lives with some reaching up to 500,000 victims (Bangladesh Storms of 1970). Another worrying factor is the widening gap between economic losses and insured losses. The gap is consistently increasing reaching more than 5 times what it used to be in 1970. This may be the result of many factors but partially due to

increasing values of assets coupled with lower insurance penetration especially in countries where insurance culture is relatively less developed.

BL: Do you have any figures related to earthquakes to compare insured and on insured losses? How to increase this number substantially?

HASSAN NASSER: If we analyze the 5 largest Earthquakes in the world, the insured losses were only about 14% of the economic loss. These EQs took place in Japan, USA and China, countries with high insurance penetration relative to our region and still the insured loss was very low relative to the economic loss. The 1999 Turkey EQ in Izmit had an insured loss of around 10% of the economic loss. The recent Turkish/Syrian EQ seems to have an estimated insured loss of about 5% of the economic loss though the figures are yet to be confirmed when finally paid. This is of course very low and it is the duty of the private and public sectors to raise awareness in order to increase the



protection and eventually provide more insured losses for natural perils in general and EQ in specific. The protection can be either by efforts to increase awareness or by making it mandatory to have EQ insurance. Many countries adopted the mandatory path as it would ensure that the population is adequately protected in case of dramatic events. Many countries developed systems to ensure EQs in a mandatory cover, either separately or in combination with property insurance, and pooled the exposures in order to have one comprehensive protection for the whole population.

BL: What are your opinion on secondary perils?

HASSAN NASSER: EQ remains one of the main events causing drastic damages. However, there are some other perils, which could be one of the consequences of an EQ, and have an equally devastating outcome. One such secondary peril is Tsunamis. An EQ hitting a fault in the sea might generate

1.A.4 FOCUS ON EARTHQUAKE LOSSES (Bn)

TOP 5 EARTHQUAKES	LOSSES		INSURED %
	ECONOMIC	INSURED	
2011 - JAPAN	\$ 210	\$ 40	19%
1995 - JAPAN	\$ 100	\$ 3	3%
2008 - CHINA	\$ 85	\$ -	0%
1994 - USA	\$ 44	\$ 15	34%
2016 - JAPAN	\$ 32	\$ 7	22%
Total	\$ 471	\$ 66	14%



TOTAL LOSSES OF THE TOP 5 EARTHQUAKES WERE ONLY

14% INSURED

huge waves hitting the land and leaving considerable damages. On the record, the highest Tsunami waves were recorded in the Gulf of Alaska following an EQ. The force of the waves removed all trees and vegetation from elevations as high as 524 meters. Of course, there is also the infamous Tsunami of 2004 in the Indian Ocean which hit the costs about 2 hours after an EQ in the Andaman sea and claimed the lives of an estimated 228,000 people in 14 countries. The United Nations redacted a list of cities that are exposed to Tsunamis and many of the MENA region cities appear on this list including Beirut, Aqaba, Muscat and Jeddah.

1.C.1 SECONDARY PERILS - TSUNAMIS

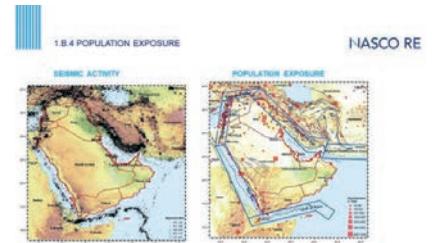
CITY	COUNTRY	SEA
Istanbul	Turkey	Black Sea
Marmaris	Turkey	Mediterranean Sea
Samsun	Turkey	Black Sea
Antalya	Turkey	Mediterranean Sea
Bodrum	Turkey	Mediterranean Sea
Alanya	Turkey	Mediterranean Sea
Haifa	Israel	Mediterranean Sea
Beirut	Lebanon	Mediterranean Sea
Agadé	Morocco	Atlantic Ocean
Port Said	Egypt	Red Sea
Marsa Alam	Egypt	Red Sea
Beirut	Lebanon	Mediterranean Sea
Tripoli	Libya	Mediterranean Sea
Jeddah	Saudi Arabia	Red Sea
Limassol	Cyprus	Mediterranean Sea
Larnaca	Cyprus	Mediterranean Sea
Latakia	Syria	Mediterranean Sea
Yamouk	Syria	Mediterranean Sea
Selalah	Oman	Arabian Sea
Muscat	Oman	Arabian Sea
Bandar Abbas	Iran	Arabian Gulf

BL: What are your remarks on Levant Geology?
HASSAN NASSER: NAF - NORTH ANATOLIAN FAULT Travels through northern part of Turkey, with the last Izmit / Kocaeli earthquakes in 1999, east of Istanbul, earthquake activity through the last century suggests that it is slowly ‘unzipping’ from East to West, with the next potentially occurring nearer to Istanbul.
EAF - EAST ANATOLIAN FAULT Source of the February earthquakes, is a strike-slip fault travels down through

south-eastern Turkey, passing the DST/DSF and leading to the Cyprus Arc as it reaches the Mediterranean sea making up the Maras Triple Junction. Prior to the Feb earthquake sequence, the last activity was over 100 years ago.
DSF - DEAD SEA FAULT / DEAD SEA TRANSFORM Made up of a series of faults travelling south through Syria, where we experienced the 1138 Aleppo earthquake, M7.1, considered one of the world’s deadliest quakes to date. Lebanon, Israel and Jordan, and Saudi Arabia in the South where it meets the Gulf of Aqaba, and can affect Haql, in Saudi Arabia. There was a M7.3 in 1995 in this region.
ZARGOS THRUST SYSTEM This is a major fault system in Iran that runs for over 1,500 kilometres from the Turkish border to the Strait of Hormuz. The fault system is responsible for frequent earthquakes in Iran and neighbouring countries, including Iraq and Kuwait. The Zagros Thrust System has the potential to cause significant losses in terms of human lives and infrastructure in the region.
THE ARABIAN PENINSULA The Arabian peninsula is surrounded by plate boundaries, the Red Sea rifting, Gulf of Aden Spreading, Owen Fracture Zone, Makran Subduction Zone, and Zagros Collision Zone, predominantly affecting coastal Saudi Arabia, Yemen, Oman, UAE, Qatar, Bahrain and Kuwait respectively.
RED SEA SHIFT This is a major fault system that runs through the Red Sea and the Gulf of Aden. The fault is responsible for frequent earthquakes in Saudi Arabia, Yemen, and other neighbouring countries. The Red Sea Rift has the potential to cause significant losses in terms of hu-



man lives and infrastructure in the region. If we analyze the faults above, it is clear that civilization in the MENA is flourishing over seismic faults. Earthquakes from these faults could have seriously damaging consequences when the events are of a certain magnitude. In these conditions, it becomes even more urgent for the communities to provide solutions for the imminent danger



over which they build their society.
BL: What are your remarks on recent earthquakes in Turkey and Syria?
HASSAN NASSER: The recent earthquake in Turkey and Syria has been an event which is thought to recur once in over 2000 years. Some believe that it would occur once every 3000 years. The insured damage is expected to be way below 10% of the economic loss. This, of course, should raise an alarm as to the level of insurance penetration and to the protection insurance companies are purchasing for their EQ exposures. Granted, it is not possible that every company would buy protection for the 3000-year event but such events should be alarming enough for decision makers not to underestimate the EQ exposure just because we did not experience it in other countries.
BL: What about earthquake modeling?
HASSAN NASSER: The insurance industry has developed methods to assess the exposures of the portfolios. The deterministic model was used more often and it mainly relied on assessing the Probable Maximum Loss (PML) of an EQ hitting a certain region. To get more reliable results, the idea, put simply, is to analyze a previous EQ which hit a certain region and try to assess what would be the damages should the same EQ hit the same region today. This method is useful to evaluate scenarios of past earthquake occurring again and can benchmark ‘what-if’ scenarios, of different severity. It is a useful tool as well in exposure hot-spots, but it has

a disadvantage as it can lead to neglecting areas outside those spots. For instance, the M7.8 main shock event in February in Turkey didn't occur in a typical 'exposure hot spot', but has proven to be a costly event.

The probabilistic approach, currently more widely used, Combines severity, with frequency. It can model and combine small-but-severe events, large-and-severe events, and any combination in between. It can cater for the shortcoming of the deterministic approach by simulating different earthquake magnitudes in different spots within a region. This could provide for scenarios not considered under the deterministic approach where for example a small, Magnitude 5 shallow earthquake right under a heavy urban area could cause as much damage as a Magnitude 8 earthquake occurring in a remote area. With this method, the tail of the risk affecting reinsurance purchases and capital requirements would be adequately captured.

BL: What are your recommendations for earthquakes market solutions?

HASSAN NASSER: Many markets have opted to provide solutions for the earthquake exposure. Pooling has been a core element in the solutions though with different ways of protections.

A- In France, CCR provides the protection with the state guarantee for some perils (including natural disasters) though it is not mandatory for insurers to reinsure with CCR. The Earthquake cover is not compulsory but it is compulsory to provide Natural perils with all property policies. For natural catastrophes, protection to insurers is made of two treaties (a quota share and a stop-loss). Thanks to the State guarantee, the stop-loss reinsurance treaties offered by CCR are unlimited. The French state intervenes if the claims burden for CCR exceeds an amount called the State Intervention Threshold (SIE) which depends on the amount of the equalization reserve and the special reserve set up for the natural catastrophe risk. To date, the state guarantee has never been requested, as the threshold has never been exceeded.

B- In Turkey, the Turkish Catastrophe Insurance Pool (TCIP) was established in

2000 after the 1999 Izmit EQ. Homeowners (residential) are required by law to purchase earthquake insurance for property damage only (Other perils are currently considered as well). The insurance cover is Compulsory but there is no obligatory implementation which means that many are not insured. The insurance policy is required in some administrative procedures such as Banking services. Currently the penetration ratio is a bit in the north of 50%. In this model, Insurance companies act as agents to the pool. The basic compulsory protection limited to TL 640,000 (ca. USD 33,000). The premium is collected through the insurance companies and the claims are handled by TCIP directly

C- Morocco provides another good model for protection. The Pool covers Natural Perils (Earthquake, Flood and Tsunami) as well as man-made disasters (Terrorism, Riots and Civil Commotion). The event has to be recognised by the state within 3 months of occurrence date to be covered under the pool. The pool has 2 components: Insurance contracts and public fund (Solidarity Fund against Catastrophic Event). It is managed by one insurer Compagnie d'Assurance transport (CAT) working as an aggregator

D- Iran opted to have one reinsurance protection covering all the insurance companies' portfolios for EQ exposures and it is managed by the state owned reinsurer "Bimeh Markazi"

We note that different countries have opted for different solutions but they all provide some kind of pooling in order to reduce the exposures and have a more meaningful international protection.

BL: How are you going to promote earthquake preparedness?

HASSAN NASSER: This is probably one of the most important features of an active pool. The work done pre and post EQ is of utmost importance. It aims at reducing the impact of natural disasters on people and property. The strategy would include (among others) the government for law implementation, architects and engineers for building codes, adequate urban planning and land-use, pre-set communication plan between emergency units, individuals for creating awareness

on how to act and react in EQ situations and insurers and reinsurers to provide the ultimate protection at affordable cost.

BL: What are the major reinsurance companies that support losses of earthquakes in USA, Europe and MENA region?

HASSAN NASSER: Many reinsurers provide protection for earthquake. It is however becoming scarcer to find adequate covers for EQ at affordable prices given the market conditions. This is where thinking of unconventional solutions becomes essential.

In the Levant, we are pioneering efforts for a project providing a solution from which both private and public sectors can benefit. It provides the insurance companies with the classical protection needed and then benefit from an additional market protection for earthquakes beyond the normal probable range such as is the recent Turkish EQ.

BL: What is a Parametric Cover? How do you suggest to introduce it as solution in the MENA region?

HASSAN NASSER: Simply stated, Parametric insurance insures a policyholder against a specific event by paying a set amount based on the magnitude, rather than the losses. In the case of earthquakes, a parametric cover would pay a pre-set amount when an EQ exceeds a certain pre-agreed magnitude. It is simple, transparent as triggers are scientific and payments can be done rather swiftly. This can be a perfect complimentary solution to traditional insurance for policy holders aiming to reduce their risk exposure and bridge the gap between insurable and, so far, uninsurable risks.

This also would provide an excellent solution for the Levant countries as a protection against EQ losses. At this stage, I believe that a Hybrid solution can be very efficient for the region. The idea is to have insurance companies protected for their own portfolios under conventional treaty protections up to a pre-agreed portfolio return period. Then, an umbrella cover would protect to whole market for earthquakes with a Magnitude exceeding the companies' protected return period. So, insurance companies would be protected for say 250 year event and an umbrella cover would protect the whole market for EQs with a pre-set magnitude that would exceed the 250 year event.

This would as well provide the public sector the opportunity to participate in the cover and to have a relief fund when an earthquake exceeding a certain magnitude hit. Governments may purchase a pre-set amount which would be paid swiftly when an EQ triggers the cover. This fund can be used for immediate expenses for humanitarian relief as well as to rebuild the damaged infrastructure.

3.F MARKET SOLUTIONS – Hybrid Structure

MARKET-WIDE SOLUTION XOL PROTECTION UMBRELLA

The XOL Protection Umbrella bridges the gap between the exposure of a 1:250 event and a 1:500 event for all cedants operating within the same country on a Parametric Solution.

The XOL Protection could be for:
- The protection of the Treasuries CCR
- The Full portfolio F&GJ if EQ is protected separately outside the treaties





Dr. Lana Bader, JIF Board Member- Organizing Committee and Chairman. Dr. Fouad Bajjal, Chairman of Euro Arab Insurance Group



Sayyid Nassir Bin Salim Al Busaidi, Chairman of Oman Insurance Association with colleagues



Labib Nasr, LIA Chief Executive Officer



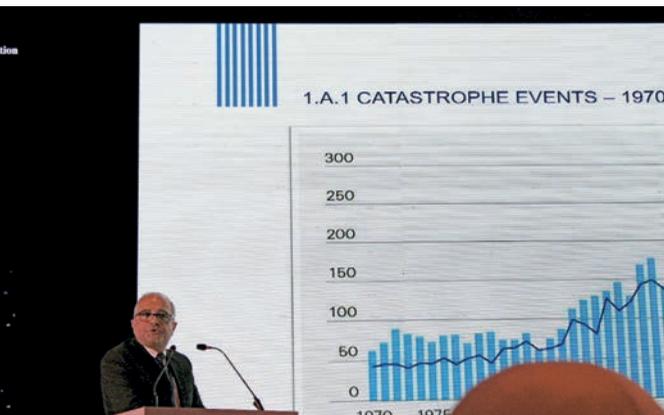
VIP participants during Nasco Re's presentation on Understanding Earthquakes



Hassan Nasser, Vice President - Treaty at Nasco Re during this remarkable presentation on Understanding Earthquakes



Hassan Nasser, Vice President - Treaty at Nasco Re & Chakib Abouzaid, Secretary General - GAIF during the panel discussion on Earthquakes



Hassan Nasser, Vice President - Treaty at Nasco Re



Hassan Nasser, Vice President - Treaty at Nasco Re

UNDERSTANDING EARTHQUAKES



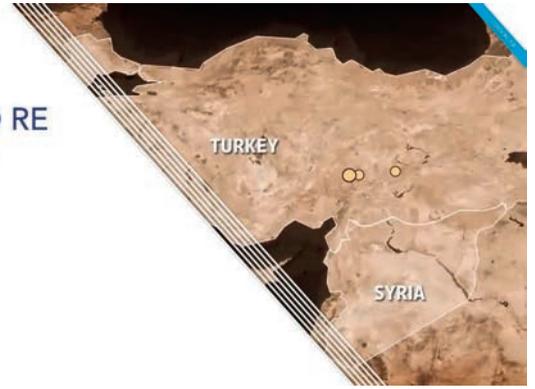
TABLE OF CONTENTS

- 1. EARTHQUAKE 101
- 2. THE MATH OF EARTHQUAKES
- 3. EARTHQUAKE RESPONSE
- 4. MARKET SOLUTIONS

PREPARED BY
HASSAN NASSER
VERSION 1.0

Slide 1

Slide 2



NASCO RE
UNDERSTANDING EARTHQUAKES

TABLE OF CONTENTS

NASCO RE



NASCO RE

- 1. EARTHQUAKE 101
 - A. AN INTRODUCTION
 - B. HISTORICAL SEISMICITY & CONSEQUENCES
 - C. SECONDARY PERILS
- 2. EARTHQUAKE MODELING
 - A. 1 TRIGGER; 2 EARTHQUAKES
 - B. MODELING
 - C. PROBABILISTIC VS. DETERMINISTIC APPROACH
 - D. MODELING PARAMETERS
- 3. MARKET SOLUTIONS
 - A. TURKEY – TCIP
 - B. CALIFORNIA – CEA
 - C. FRANCE – STATE GUARANTEE – CCR
 - D. NEW ZEALAND – TOKA TU AKE EQC
 - E. MOROCCO – COMPAGNIE D'ASSURANCE TRANSPORT (CAT)
 - F. IRAN
- 4. PROPOSED SOLUTIONS

1. EARTHQUAKE 101

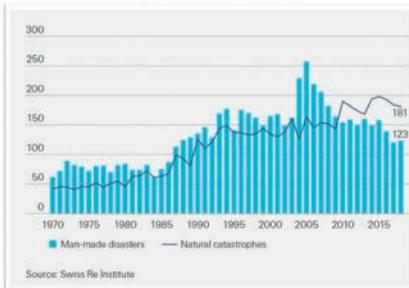
- A. AN INTRODUCTION
- B. HISTORICAL SEISMICITY
- C. SECONDARY PERILS

Slide 3

Slide 4

1.A.1 CATASTROPHE EVENTS – 1970 TO 2018

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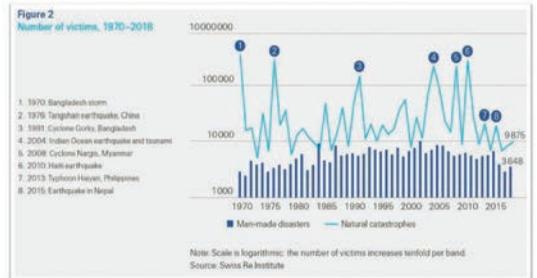


OBSERVATIONS

- Catastrophic events **TRIPLED** in number since from 1970 to 2018.
- Man-made disasters have **DOUBLED** during the same period.
- Natural disasters have more than **QUADRUPLED** since 2017.

1.A.2 CATASTROPHE VICTIMS – 1970 TO 2018

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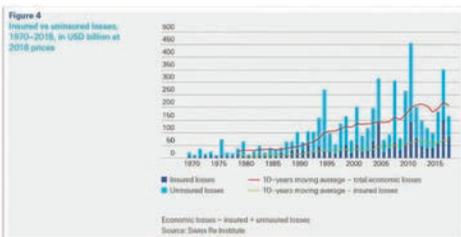


Slide 5

Slide 6

1.A.3 CATASTROPHIC LOSSES – 1970 TO 2018

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OBSERVATIONS

- Catastrophes and disasters have been historically grossly under-insured.
- The gap between the total losses and insured losses has been consistently increasing.

1.A.4 FOCUS ON EARTHQUAKE LOSSES (Bn)

NASCO RE

TOP 5 EARTHQUAKES	ECONOMIC LOSSES	INSURED	INSURED %
2011 - JAPAN	\$ 210	\$ 40	19%
1995 - JAPAN	\$ 100	\$ 3	3%
2008 - CHINA	\$ 85	\$ -	0%
1994 - USA	\$ 44	\$ 15	34%
2015 - JAPAN	\$ 32	\$ 7	22%
Total	\$ 471	\$ 65	14%



TOTAL LOSSES OF THE TOP 5 EARTHQUAKES WERE ONLY
14% INSURED

Slide 7

Slide 8



1.B.1 EARTHQUAKES IN OUR REGION



SINK HOLES

In addition to earthquakes, the Middle East is also home to sinkholes. The Dead Sea is surrounded by sinkholes caused by salt dissolution.



EARTHQUAKES

EQ in the Middle East are caused by the collision between the Arabian and Eurasian plates.



OIL & GAS RESERVES

Extraction has led to increased seismic activity in the region. The injection of wastewater in the ground causes the rock to fracture, leading to earthquakes.

Slide 9



1.B.2 LEVANT GEOLOGY 1 OF 2

NAF - NORTH ANATOLIAN FAULT

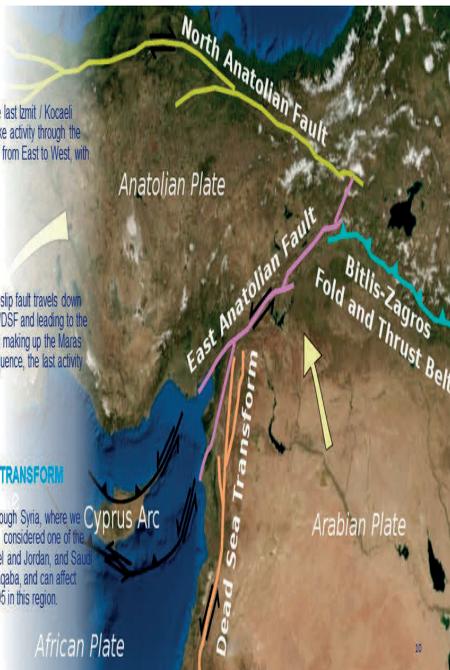
Travels through northern part of Turkey, with the last Izmit / Kocaeli earthquakes in 1999, east of Istanbul, earthquake activity through the last century suggests that it is slowly "unzipping" from East to West, with the next potentially occurring nearer to Istanbul.

EAf - EAST ANATOLIAN FAULT

Source of the February earthquakes, is a strike-slip fault travels down through south-eastern Turkey, passing the DSTDSF and leading to the Cyprus Arc as it reaches the Mediterranean sea making up the Maras Triple Junction. Prior to the Feb earthquake sequence, the last activity was over 100 years ago.

DSF - DEAD SEA FAULT / DEAD SEA TRANSFORM

Made up of a series of faults travelling south through Syria, where we experienced the 1138 Aleppo earthquake, M7.1, considered one of the world's deadliest quakes to date. Lebanon, Israel and Jordan, and Saudi Arabia in the South where it meets the Gulf of Aqaba, and can affect Haqf, in Saudi Arabia. There was a M7.3 in 1995 in this region.



Slide 10



1.B.2 LEVANT GEOLOGY 2 OF 2

ZARGOS THRUST SYSTEM

This is a major fault system in Iran that runs for over 1,500 kilometers from the Turkish border to the Strait of Hormuz. The fault system is responsible for frequent earthquakes in Iran and neighboring countries, including Iraq and Kuwait. The Zagros Thrust System has the potential to cause significant losses in terms of human lives and infrastructure in the region.

THE ARABIAN PENINSULA

The Arabian peninsula is surrounded by plate boundaries, the Red Sea rifting, Gulf of Aden Spreading, Owen Fracture Zone, Makran Subduction Zone, and Zagros Collision Zone, predominantly affecting coastal Saudi Arabia, Yemen, Oman, UAE, Qatar, Bahrain and Kuwait respectively.

RED SEA SHIFT

This is a major fault system that runs through the Red Sea and the Gulf of Aden. The fault is responsible for frequent earthquakes in Saudi Arabia, Yemen, and other neighbouring countries. The Red Sea Rift has the potential to cause significant losses in terms of human lives and infrastructure in the region.



Slide 11

1.B.3 FOCUS ON THE NORTH ANATOLIAN FAULT

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TWO-CENTURIES OF EARTHQUAKES ON THE NORTH ANATOLIAN FAULT

The diagram on the right shows two centuries of very active seismic activity along the north Anatolian fault (NAF) in Northern Turkey.



Slide 12

1.B.5 RECENT ACTIVITIES

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TURKEY AND SYRIA

- Economic Loss estimated
- PERIL insured Loss estimated

US\$100Bn+
US\$3.5 to US\$5Bn

KERMANSHAH – IRAN / IRAQ BORDER

- The earthquake was felt throughout the Middle East and as far away as Palestine, the Arabian Peninsula and Turkey.
- It was noted that older buildings remained standing, while many newer blocks collapsed.
- The Iranian government: At least €5 billion of damage.

US\$20Bn
US\$6.5Bn
US\$2Bn

IZMIT – TURKEY

- Economic Loss estimated
- Property Losses
- PERIL insured Loss estimated

US\$20Bn
US\$6.5Bn
US\$2Bn



Slide 14

2. EARTHQUAKE MODELING

- A. 1 TRIGGER; 2 EARTHQUAKES
- B. MODELING
- C. PROBABILISTICVS. DETERMINISTICAPPROACH
- D. MODELING PARAMETERS

It used to rely on historical events to derive PMLs for Earthquake of a certain return period.

Developed into models simulating different events with different return periods in different locations within one country.

$$X_k = \frac{1}{N} \sum_{n=0}^{N-1} x_n e^{i2\pi k \frac{n}{N}}$$

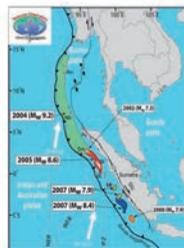
Models mainly divided into deterministic and probabilistic approach.

Slide 16

2.A.2 1 TRIGGER ; 2 EARTHQUAKES

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- Earthquakes, particularly large ones, can trigger other earthquakes in more distant locations
- process known as dynamic stress transfer/triggering.
- Energy from the seismic wave passing through can cause a new earthquake, usually in already vulnerable locations prone to frequent earthquakes
- 2004 M 9.1 Sumatra earthquake ruptured an area ~1300x200 square km, and triggered aftershocks from northern Sumatra to just south of Myanmar (ca. 2,500KM)
- Center Turkey to Center Jordan is ca. 1,300KM



Slide 18

2.A.1 INTRODUCTION

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EARTHQUAKE MODELING



Slide 17

2.A.3 EARTHQUAKE MODELING

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METHODOLOGIES

DETERMINISTIC

- Useful to evaluate scenarios of past earthquake occurring again
- Benchmark 'what-if' scenarios, of different severity
- Useful tool in exposure hot-spots, but can lead to neglecting areas outside of these.

For instance, the M7.8 main shock event in February didn't occur in a typical 'exposure hot spot', but has proven to be a costly event.

PROBABILISTIC

Combines severity, with frequency.
Ex: A small, M5 shallow earthquake right under a heavy urban area could cause as much damage as a M8 occurring in a remote area.

Can combine small-but-severe events, large-and-severe events, and any combination in between.

The tail of the risk affecting reinsurance purchases and capital requirements, ... are adequately captured.

Slide 19



2.A.4 MODELING
PARAMETERS AND FACTORS

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Deductible levels greatly impact simulation outcomes and the illustrated impact on risk carriers.
Examples on the next slides



Portfolio mix, skewness, aggregate data profile, building codes, inflation and other parameters greatly affect modeling and scenario results.
Examples on the next slides



The post catastrophe environment also plays a substantial role in modeling earthquakes.
More details on the next slides.



Event Limits from 1Y to 10Y basis - Relative reduction of Capacity per event - Data quality becomes crucial.
More details on the next slides.

Slide 20

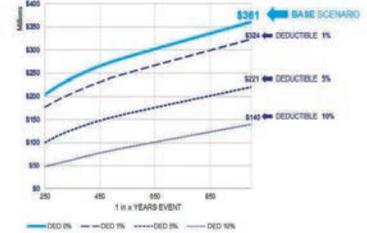


2.A.5 MODELING - DEDUCTIBLES
THE EFFECT OF DEDUCTIBLES

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The graph on the right illustrates an exposure given various levels of deductibles from 0% to 10%.
A slight increase in deductible% significantly decreases exposure.



Slide 21

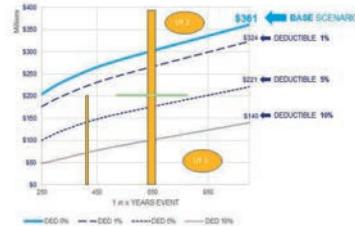


2.A.6 MODELING - DEDUCTIBLES - INTERLOCKING CLAUSE
THE EFFECT OF DEDUCTIBLES

NASCO RE



The graph on the right illustrates an exposure given various levels of deductibles from 0% to 10%.
A slight increase in deductible% significantly decreases exposure.



Slide 22

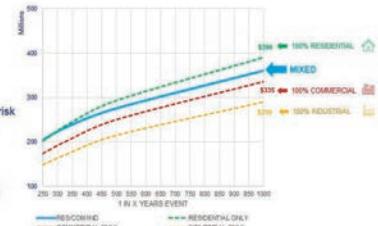


2.A.7 MODELING - DATA QUALITY - COMPOSITION
THE EFFECT OF PORTFOLIO COMPOSITION

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The graph on the right illustrates risk profiles based on the type of properties in addition to a mixed scenario.
Portfolio composition greatly affects simulated sums at risk.



Slide 23

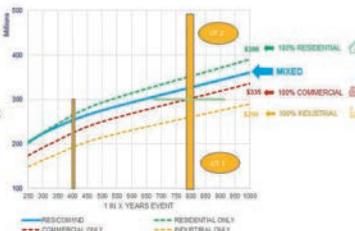


2.A.8 MODELING - DATA QUALITY - COMPOSITION - INTERLOCKING CL
THE EFFECT OF PORTFOLIO COMPOSITION

NASCO RE



The graph on the right illustrates risk profiles based on the type of properties in addition to a mixed scenario.
Portfolio composition greatly affects simulated sums at risk.



Slide 24



2.A.9 MODELING - DATA QUALITY - SKEWNESS
THE EFFECT OF PORTFOLIO SKEWNESS

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As an example Large Industrial /Commercial exposures could skew losses, especially where overall the losses are lower.



ISKENDERUN PORT
Initial Estimated Loss: US\$500M

Going off a US\$3.5Bn total insured loss, a single US\$1Bn facility could make up a third of the overall loss.
We try our best to capture industrial activity damage, but single large losses can be an issue.

Slide 25



2.A.10 MODELING - EARTHQUAKE AFTERMATH
CATASTROPHE AFTERMATH

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In the aftermath of an earthquake, the whole ecosystem is disrupted for extended periods of time. Below are the main common and often inevitable "disruptions".



3. MARKET SOLUTIONS

- A. CALIFORNIA - CEA
- B. NEW ZEALAND - TOKATU AKE EOC
- C. FRANCE - STATE GUARANTEE - CCR
- D. TURKEY - TCIP
- E. MOROCCO - CAT
- F. IRAN

Slide 26

Slide 27

3.A MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

CALIFORNIA EARTHQUAKE AUTHORITY – CEA

Established in 1996

- Established following the 6.7 magnitude 1994 Northridge earthquake causing an estimated \$20 billion in total property damage, including \$12.5 billion in insured losses.
- The CEA is a publicly managed, privately funded, not-for-profit organization that provides residential earthquake insurance and encourages Californians to reduce their risk of earthquake damage and loss.
- Compulsory to provide minimum Natural perils protection with all property policies

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3.B MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

NEW ZEALAND – Toka Tū Ake EQC

- Automatic EQ Cover for home and land with any private insurance policy for any home that includes fire insurance.
- The EQCover building cap for a residential building containing one dwelling is \$300,000 + GST.
- Any building cover above the EQCover cap is provided by private insurers. The EQCover Premium is 16c per \$100 of the EQCover amount, up to a maximum of \$480 (\$552 incl. GST)...
- Private insurers collect the EQCover premium and pay it into the Natural Disaster Fund which is managed by Toka Tū Ake EQC and is used to pay EQCover claims.

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Slide 28

3.C MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

FRANCE – STATE GUARANTEED COVER BY CCR

- CCR provides the protection with the state guarantee for some perils (including natural disasters).
- It is not mandatory for insurers to reinsure with CCR.
- Compulsory to provide Natural perils with all property policies.
- For natural catastrophes, protection to insurers is made of two treaties, a quota share (50% cession rate) and a stop-loss. Thanks to the State guarantee, the stop-loss reinsurance treaties offered by CCR are unlimited.
- The State intervenes if the claims burden for CCR exceeds an amount called the State Intervention Threshold (SIE) which depends on the amount of the equalization reserve and the special reserve set up for the natural catastrophe risk.
- To date, the state guarantee has never been requested, as the threshold has never been exceeded.

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Slide 29

3.D MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

TURKISH CATASTROPHE INSURANCE POOL – TCIP / DASK

Established in 2000 after 1999 Izmit EQ

- Homeowners (residential) are required by law to purchase earthquake insurance (only) through the TCIP for property damage (only) – Other perils currently considered
- Compulsory but no obligatory implementation (but needed for administrative procedures such as Banking services, etc...)
- Insurance companies act as agents to the pool
- Basic compulsory protection limited to 640,000 TL (33,000 US\$)
- Additional protection available (eg:contents...)
- Premium collected through the insurance companies
- Claims are handled by TCIP directly

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Slide 30

3.E MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

MOROCCO – Compagnie d'Assurance transport (CAT)

- Covered Perils:
 - Natural Perils: Earthquake, Flood, Tsunami
 - US\$ 300M ACO and US\$ 900M AGG
 - Man made Disasters: Terrorism, Riots and Civil Commotion: US\$ 30M ACO and US\$ 80M AGG
- Event to be recognised by the state within 3 months of occurrence date
- 2 components: Insurance contracts and public fund (Solidarity Fund against Catastrophic Event)
- Managed by CAT as an aggregator

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Slide 31

3.F MARKET SOLUTIONS – EARTHQUAKE AFTERMATH

IRAN

Cover provided as combined RI capacity purchased to protect the insurance companies in the market.

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Slide 32

3.A MARKET SOLUTIONS - PARAMETRIC

MARKET-WIDE SOLUTION PROPOSITION

CHARACTERISTICS AND COMPONENTS

- Parametric insurance solution.
- Private (insurers) and the public sector.
- Perfect complementary solutions to traditional insurance for policy holders aiming to reduce their risk exposure and bridge the gap between insurable (private sector) and, so far, uninsurable risks (private sector).
- Provide funds for Public Sector to cover for uninsured risks (Event Relief)
- Previously agreed payment made quickly.
- Simply and without lengthy adjustments.

PARAMETRIC SOLUTION
SOME OF THE ADVANTAGES

FAIRNESS

Triggers are verifiable by independent recognized institutions.

SPEED

Allows for swift settlement because of process transparency.

PREDICTABILITY

Models operated and pay-out are known allowing for better planning.

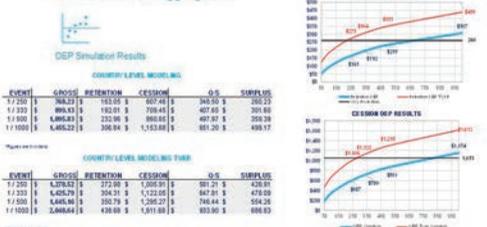
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Slide 33

3.A MARKET SOLUTIONS

2.A.6 MODELING – Country Level Check

THE EFFECT OF Aggregation



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Slide 34

2.A.6 MODELING – Country 2 Level Check

THE EFFECT OF Aggregation

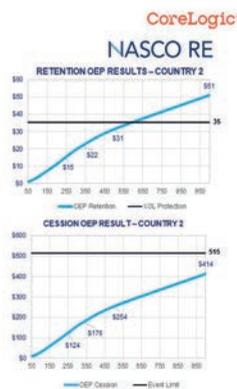


OEP Simulation Results

COUNTRY LEVEL MODELING

EVENT	GROSS	RETENTION	CESSION	O/S	SURPLUS
1/250	\$ 139.34	\$ 15.45	\$ 123.59	\$ 66.82	\$ 57.07
1/333	\$ 196.16	\$ 21.70	\$ 175.86	\$ 93.25	\$ 83.14
1/500	\$ 285.26	\$ 31.35	\$ 253.75	\$ 130.01	\$ 117.91
1/1000	\$ 466.44	\$ 51.09	\$ 414.05	\$ 221.10	\$ 193.24

*Figures are in millions



Slide 36

2.A.6 MODELING – Country 2 Level Check

THE EFFECT OF Aggregation

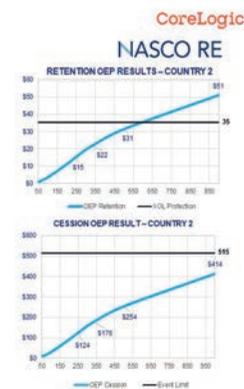


OEP Simulation Results

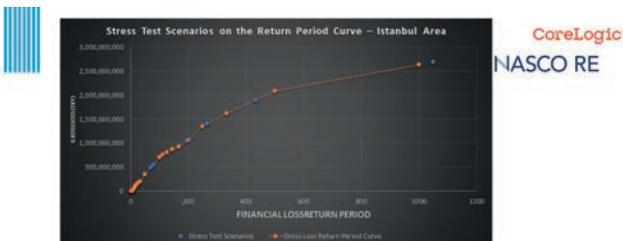
COUNTRY LEVEL MODELING

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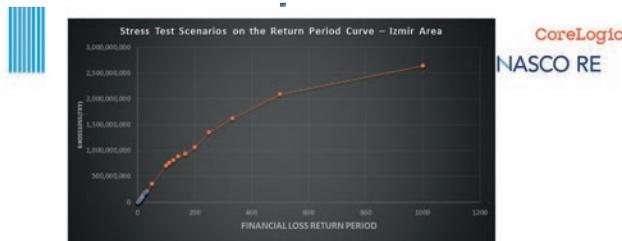


Slide 37



Event ID	Financial Return Period	Stress Test OEP	Fault Type (Long/lat/Depth)	Frequency	Return Period of the Event Happening	Intensity
127224	1050	2 682 316 361	NNAF-E MarmaraF1 (40.917.28.816.0.00)	0.0010267	974	7.2
127225	435	1 804 300 958	NNAF-E MarmaraF2 (40.87.28.81.0.00)	0.0020533	487	7.2
127226	265	1 406 633 718	NNAF-E MarmaraF3 (40.817.28.824.0.00)	0.0020533	487	7.2
127219	80	555 263 674	NNAF-W MarmaraF2 (40.887.27.638.0.00)	0.0008333	1200	7.2
127219	70	491 454 048	NNAF-W MarmaraF3 (40.826.27.658.0.00)	0.0032900	305	7.2

Slide 38



Event ID	Financial Return Period	Stress Test OEP	Fault Type (Long/lat/Depth)	Frequency	Return Period of the Event Happening	Intensity
27485	30	183 907 519	Zone 15 (38.418.27.144.2.87)	0.0001500	9996	6.00
27432	22	149 591 231	Zone 15 (38.499.27.221.1.82)	0.00008333	12000	6.25
27909	10	51 849 872	Zone 15 (38.429.27.179.4.81)	0.0003733	2676	5.50
27672	5	24 510 937	Zone 15 (38.45.27.14.5.50)	0.0000967	1648	5.25
27739	4	8 114 200	Zone 15 (38.441.27.21.6.01)	0.0004200	2380	5.00

Slide 39



EventID	Financial Return Period	Stress Test OEP	Fault Type (Long/Lat/Depth)	Frequency	Return Period of the Event Happening	Intensity
22996	6	11 079 573	Zone 10 (36.838.25.087.0.00)	0.0000067	149 999	8.5
22997	4	7 013 937	Zone 10 (36.797.24.94.0.00)	0.0000067	149 999	8.5
20385	3	2 277 126	Zone 09 (36.172.24.723.0.00)	0.0000067	149 999	8.5
81192	2	1 327 635	Subduction Interface (36.733.21.872.0.00)	0.0000100	149 999	8.5
20384	1	250 191	Zone 09 (36.105.24.811.0.00)	0.0000067	149 999	8.5

Slide 40

3.F MARKET SOLUTIONS – XOL PROTECTION BY CEDANT

MARKET-WIDE SOLUTION XOL PROTECTION UMBRELLA

The XOL Protection Umbrella bridges the gap between the exposure of a 1250 event and a 1500 event for all cedants operating within the same country.



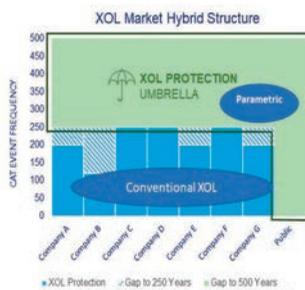
Slide 41

3.F MARKET SOLUTIONS – Hybrid Structure

MARKET-WIDE SOLUTION XOL PROTECTION UMBRELLA

The XOL Protection Umbrella bridges the gap between the exposure of a 1250 event and a 1500 event for all cedants operating within the same country on a Parametric Solution.

The XOL Protection could be for:
 - The protection of the Treaties OR
 - The Full portfolio F&U if EO is protected separately outside the treaties



Slide 42

3.F MARKET SOLUTIONS – XOL PROTECTION BY CEDANT

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