

## **INSURANCE WORLD 2**

### **A COMPLEX MODEL TO MANAGE RISK IN THE AGE OF GLOBALIZATION**

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**Abstract : Iw2 focuses on issues associated with managing the total risk within an enterprise including the risks (insurable, financial and investment) associated with large losses using the modern science of complexity.**

**Keywords : simulation, complexity, insurance, reinsurance, strategy**

Dramatic events of the past several years have drawn worldwide attention to the destruction caused by natural catastrophes. Some scientists allow researchers to measure the vulnerability of societies to losses from catastrophes and helping them to understand the potential consequences of these events .

Insured losses in 1999 amounted to USD 28,4 billions – being the second most expensive year in insurance history -. In Europe Anatol, Lothar and Martin caused major winter storm after a quiet period lasting several years . The insured losses of Lothar and Martin are estimated to be around USD 7 billions whereas Anatol caused at least USD 1,5 billion of insured losses in the Northern Europe.

The landslide catastrophe caused by torrential rain in Venezuela caused some 400 millions US\$ of insured losses.

Another important event was the earthquake in Turkey (total losses estimated for USD 20 billions versus insured losses for USD 2 billions).

With its devastating storm and earthquakes,1999,as indicated above, was the second most expensive year for reinsurers after 1992, the year of Hurricane Andrew.

An analysis of the last fifty years shows that European storm events involving losses of more than US\$ 1 billion and a return period of 2 or 3 years must be expected to occur more frequently but also storm losses amounting to some US\$ 30 billion – which used to be unrealistic for Europe – are now expected to occur on average once every 100 years.

Generally, the worst catastrophes have the most effect on poorer countries, where they kill or injure more people and destroy proportionally more property than if a similar event occurs in the developed world.

An indication of how a country's insurance industry is developing can be the percentage of insured loss compared with the total amount and it is not a coincidence that the average insured loss percentage is about 10% worldwide against the 50% of Europe and 90% of Japan !!!!

In light of the increase of the catastrophe losses in term of frequency and insured amount, the Insurance Industry felt the necessity to limit fluctuations in catastrophe losses in order to obtain a positive balance sheet result and avoid a possible bankruptcy.

## 1. THE BIRTH OF INSURANCE WORLD

The Insurance World simulator grew out of the wish of several firms in the catastrophe insurance industry to create a kind of “laboratory” with which to experiment with various risk scenarios. For instance, suppose a force 5 hurricane drops on Miami Beach. Who are the winners and who are the losers in the aftermath of such a major catastrophe? And what kind of companies spring up to fill the niches left behind by firms that disappear after such event? These are the type of questions that are of vital concern to catastrophe insurance companies – but for which no experimentation is possible.

The foundation of the Insurance World simulator is the Science of Complexity – the science of simple entities creating surprising and unexpected outcomes through simple interactions. Complex Systems produce behavioural patterns that cannot be predicted from knowledge of the parts in isolation . The Catastrophe Insurance Industry is just such a Complex System. No one predicted the extensive changes to the industry, the creations of new companies, and flow of capital that occurred after Hurricane Andrew struck Florida in 1992.

Forward thinking people in the industry recognized that there was much to be gained by applying this new way of thinking to their industry. Much of the understanding of Complex System Theory was developed by John Casti and others at Santa Fe Institute in New Mexico .

The development of Insurance World was driven by the industry. Industry shareholders formed a consortium of reinsurance companies, insurance companies, and research institutions and companies to clarify and address the issue. The first phase of the Insurance World project began in the fall of 1997 and ran for one year.

The end result of this first phase was a software package termed “Insurance World Simulator”. It represents a “toy model” of the real world of catastrophe insurance, incorporating only two types of catastrophe – hurricanes and earthquakes – occurring in three geographic areas: Japan, California and the Eastern Atlantic Coast . In this world there are five insurance firms and five reinsurers considering a ten years period – quarterly simulated. At the outset, the user sets parameters for the external economic climate, estimates of the climate and earthquake conditions and various factors distinguishing one firm from another.

The simulation then traces out the implications of the decisions each firm makes in regard to developing market shares, repayment of loans, attitudes toward risk, amount of risk assigned to reinsurers and so forth. In this way, various management strategies can be tried in an attempt to find those that lead to prosperity, or at least avoidance of extinction .

The success of Insurance World 1 – IW1 – led to the formation of a new consortium, **Insurance World 2 – IW2** - which began in early 2000.

## 2. INSURANCE WORLD 2

The members of the Insurance World 2 Consortium are:

- Italtre / Victoria Rueck
- California Housing Loan Administration
- American Management Administration
- Ernst & Young
- Complexica

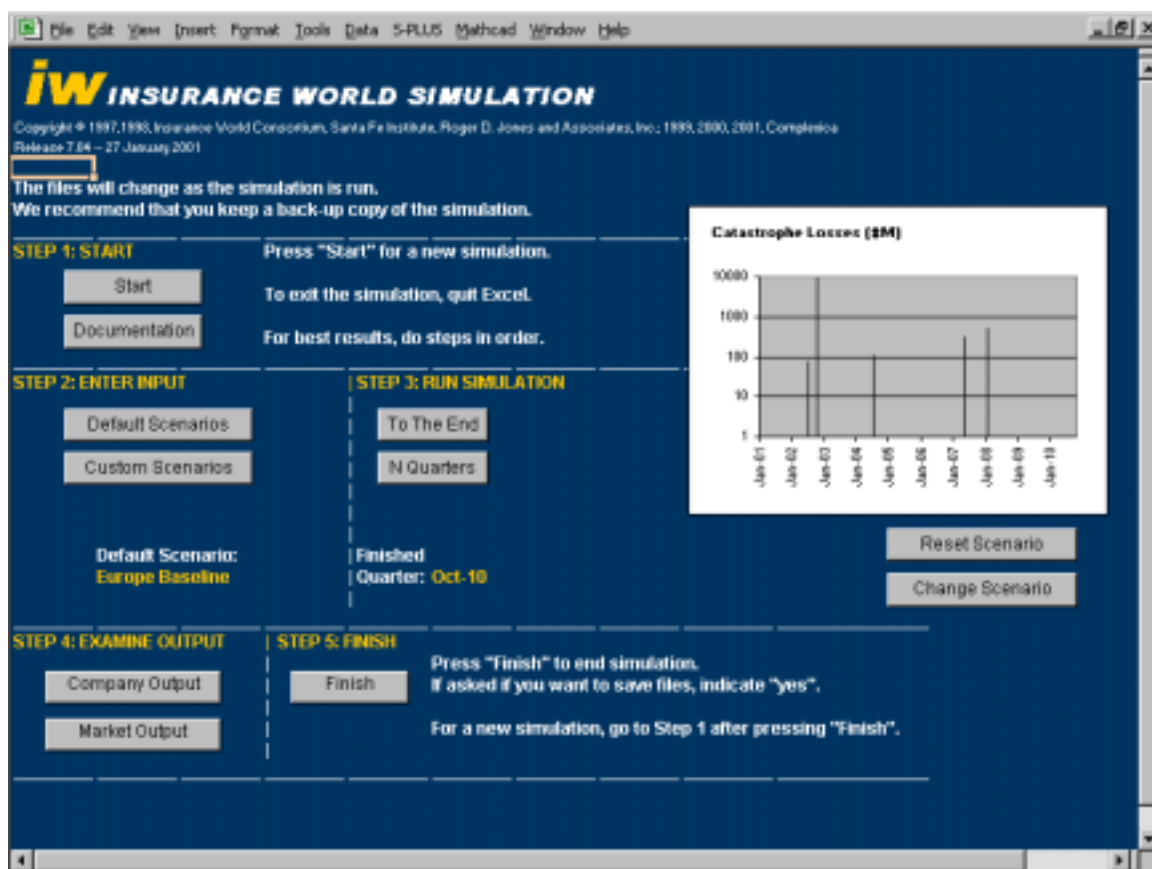
Insurance World 2 focused on issues associated with managing the total risk within an enterprise including the risks associated with large losses and catastrophe. These risks include not only insurable risks, but also financial and investment risks.

Using the technique of modern science of complexity, the consortium developed a software tool to assist insurance companies in managing their activities in the competitive consumer and economic environment of the Information Age, answering to many questions concerning the activity of a company, for instance :

- ✓ How do the frequency, magnitude and geographical distribution of natural catastrophes affect the balance sheet of a (Re) Insurance Company ?
- ✓ How is business/exposure spread among the companies ?

- ✓ What is the effect of various pricing strategies on the Industry as a whole and on individual companies ?
- ✓ How do the consumer affect the business of companies ?
- ✓ What affect does the availability of capital have on the strategy of a company ?
- ✓ What is the effect of marketing strategies ?
- ✓ What is the effect of the desired retention under the given (Re) Insurance structure ?

The following screen captures give an overview of the operation and features of Insurance World 2 .



Main screen of Insurance World simulation .

The modern business environment has become global and interconnected. An earthquake in California can lead to the failure of a major insurance company and / or a bank in Japan. This means that it is no longer possible to manage different risks in an independent way and, consequently, the interaction of the global economy forces enterprises to manage uncertainty and volatility at the risks portfolio level, not as independent events.

The science of complexity adaptive systems is the science of interaction. As such it is well suited to address the issues of risk management at the portfolio level .

One of the main accomplishments of Insurance world 2 was to develop a set of complexity based intellectual and software tools to help today's manager make sense of enterprise-wide risk .

IW2's approach is to create more realistic scenario about the interconnections between the (Re) Insurance and Economic & Financial Market .

Each (Re) Insurance Company has four goals, as follows:

$$F = f ( CR; \gamma; \eta; dMS)$$

- to achieve its desired Net Combined Ratio – the ratio of (expected annual retained losses R + costs C) to retained premium  $\pi$

$$CR = ( R + C ) / \pi$$

- to achieve its desired premiums to Total Assets

$$\gamma = \pi / TA = ( R + C ) / ( TA * CR )$$

- to achieve its Efficiency of Capital Use – the ratio of Subscribed Capital to Total Assets

$$\eta = SC / TA$$

- to achieve its desired Market Share, dMS

Each company achieves its best performance through a mechanism of interaction which works on three different key levels:

- simulation of natural catastrophes and their impact on the considered insurance and reinsurance markets in term of amount
- simulation of technical components of developing company growth and their vulnerability to natural catastrophes
- the impact of the natural catastrophes on the (Re) Insurance Companies' balance sheets, following the strategy of each company (market, investment, etc ...)

The mechanism of interaction works on three principal factors as : price, desired supply of capital and desired risk retention. Each company adjusts the price of its policies to balance the supply of capital with the demand for capital (risk retention).

The business activities of insurance companies are subject to supervision in the interest of consumer protection. In Europe and USA, the importance of minimum solvency margins is due to deregulation of price and different type of products .

In the Usa, the minimum amount of capital funds for insurance companies is calculated using complex formulae which take into account underwriting risk, assets risks and credit risk whereas in European Union, the capital funds required are calculated only on the basis of underwriting risks.

The impact of catastrophe losses on solvency margin can give a negative annual result even though the company has the financial instruments at its disposal to bring losses under control.

With an adequate reinsurance programme, an Insurance company can avoid a balance sheet loss and thus a reduction in its capital fund.

It is important to highlight that also in light of the increasing globalization of the market , an Insurance Company will overexpose its portfolio if the firm does not know and check each single risk underwritten and does not pay enough attention to the fluctuation of exchange / interest rates.

The availability, the quality and the continuous adjournment of the portfolio's information (earthquake, flood, windstorm, etc...) permit to have the right catastrophic exposure according to the firm's capacity . For this reason, the Insurer has to have in-depth knowledge of the market as well as of its total portfolio .

In IW2, the catastrophe premium is one of the company's principal parameters : it is essential for achieving the desired Net Combined Ratio and market share, based on each company's efforts to maintain its customers (a measure of wheter consumers on a given market tend to choose their insurance company for its low price or high brand recognition).

In addition, companies determine the availability of risk-based capital through their "risk attitude", for example the desire of market share over profit (it is a measure of wheter the company has set its premium price low enough in order to capture long-term market share or high enough to capture shor-term profit).

IW2 - an improved version of the Insurance World Simulator - features new characteristics including :

- the external environment (natural catastrophes, consumers market, additional information about the financial market )
- more complex technical and economic models for the (Re) / Insurer Companies
- the ability to change the strategy of a company during the simulation
- more comprehensive company balance sheets and earnings statements

## The external environment

As opposed to Insurance World 1, that had only four pre-defined markets, IW2 brings into the picture a wider scenario with 10 user – defined markets, including Europe.

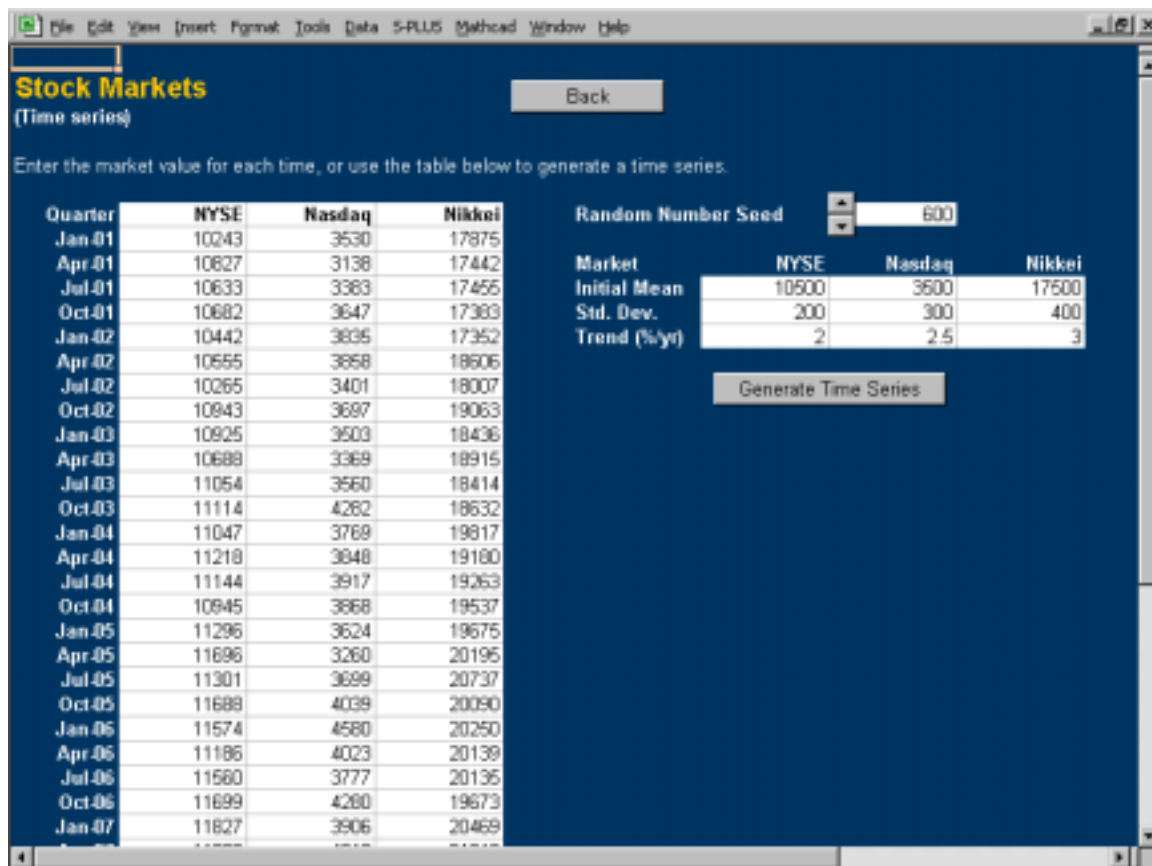
These ten different regional markets, can be affected by several natural catastrophes (the amount of each loss depends on the random parameter and the probability of catastrophe per year). Each market is also characterized by a “Growth Index“ and typical “consumer’s trend” i.e. consumers moving to the insurance company with the lowest premium or the best brand image.



Market	Name of Market	Probability of a Catastrophe, per year (%)	Expected Loss (\$M) Given a Catastrophe	Expected 100-Year Loss (\$M)	Annual Expected Regional Loss (\$M)	99% P (Qu)
Market 0	W Europe Earthquake	7	2000	4159	140	
Market 1	W Europe Flood	7	500	1040	35	
Market 2	W Europe Windstorm	7	500	1040	35	
Market 3	N Europe Earthquake	7	2000	4159	140	
Market 4	N Europe Flood	7	500	1040	35	
Market 5	N Europe Windstorm	7	500	1040	35	
Market 6	S Europe Earthquake	7	2000	4159	140	
Market 7	S Europe Flood	7	500	1040	35	
Market 8	S Europe Windstorm	7	500	1040	35	
Market 9	Other Large Cats.	7	1000	2079	70	

In a custom scenario, the user first specifies the catastrophe markets.

In the above screen, the model displays Windstorms ,Floods and Earthquakes in three different regions of Europe, however, as previously indicated, it can study other countries too, including the Usa and Japan.



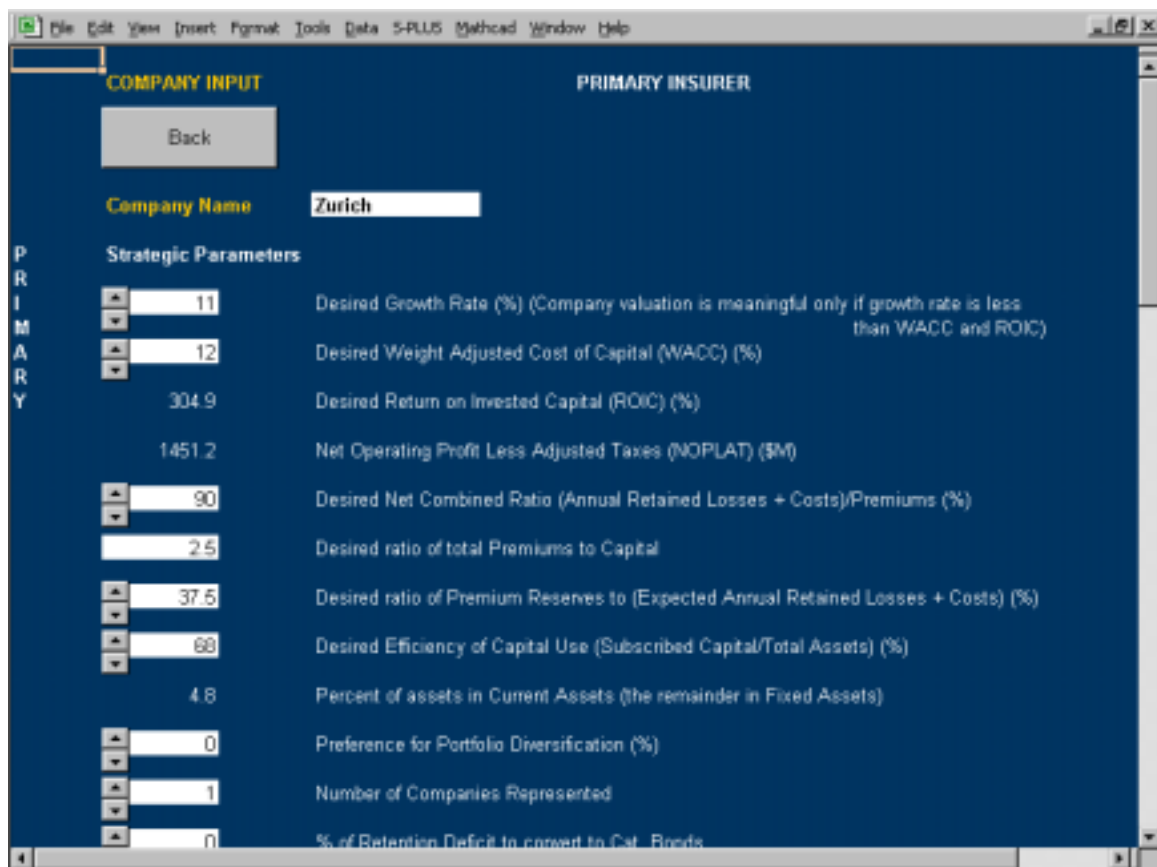
Capital markets include short- and long-term bonds, stocks, real estate, and catastrophe bonds.

The Capital Market information consider trend among different types of investments such as Short Term Bonds (6 / 9 / 12 months), Long Term Bonds (5 / 10 / 15 years), Stock Market (NY / Nasdaq / Nikkei for instance), Reale Estate (in three different markets), Cat bond (before and after a catastrophe).

### More complex technical and economic models for the (Re) Insurer Companies

The improved version of the simulator now considers parameters such as fixed and variable costs, inflation, outstanding losses, premium reserve, company solvency requirements, antitrust laws, ect...) which characterize each (Re) / Insurance Company both in terms of real value and strategy .

IW2 also determines also the retention of each company in relation to the amount of the expected annual loss retained in each regional market. This retention level is “optimal” because it comes from the technical & financial characteristics associated with the company’s strategy during the simulation period.



After specifying market conditions, the user sets strategic parameters and the distribution of assets for each primary insurance company and each reinsurance company.

The screenshot shows a software window titled "Market Share Primary Insurers". It contains a table with the following data:

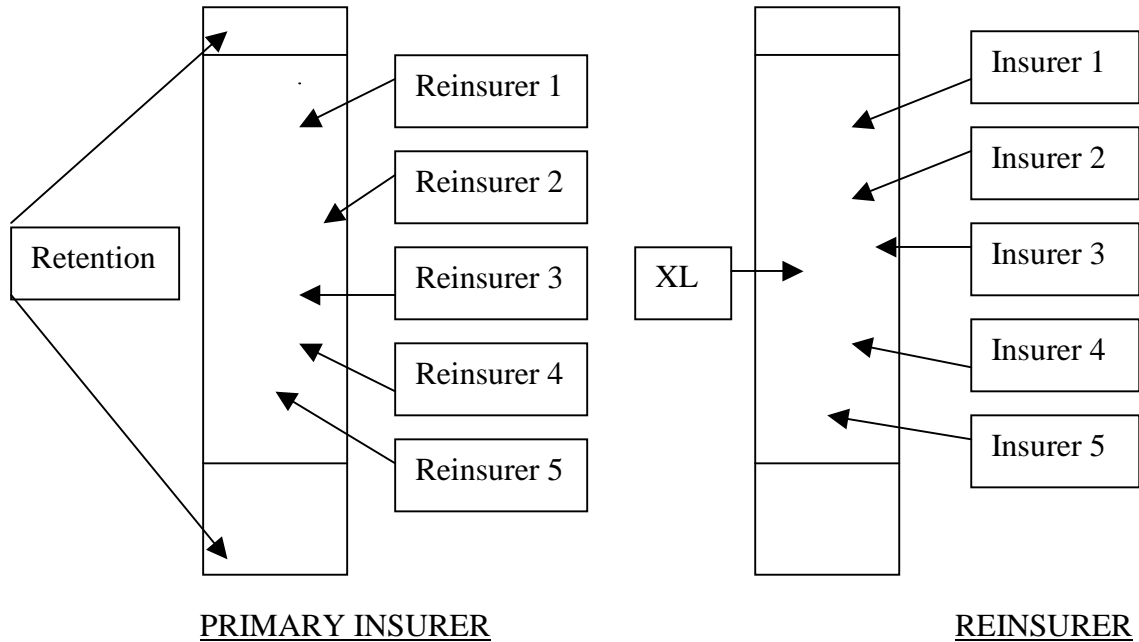
	Zurich %	Allstate %	State Farm %	Prudential %	Nationwi
W Europe Earthquake	16	18	20	22	
W Europe Flood	18	20	22	24	
W Europe Windstorm	20	22	24	16	
N Europe Earthquake	22	24	16	18	
N Europe Flood	24	16	18	20	
N Europe Windstorm	16	18	20	22	
S Europe Earthquake	18	20	22	24	
S Europe Flood	20	22	24	16	
S Europe Windstorm	22	24	16	18	
Other Large Cats.	24	16	18	20	

Finally, the user sets the initial market share for each company.

In a competitive market, it is important to determine the best retention according to objective technical characteristics (such as portfolio, technical reserves, reinsurance programmes, total assets, etc ...) and subjective characteristics (such as limitation of portfolio's fluctuations, desired Loss Ratios, desired profit margin, risk's propensity, ect ....) because a level that is too high or too low could limit the Insurance Company's economic and financial potential .

In IW2, the total amount ceded to all reinsurance companies plus the total amount retained by all insurance companies is approximately equal to the 100 years expected loss for a region .

Example : Expected Loss Distribution in a Market



At the same time, the simulator calculates the amount of premiums :

- paid by insured parties

$$\pi_0 = (1 + \epsilon_0) E$$

where  $\pi_0$  are the total premiums to a company from a region and  $\epsilon_0$  is a profit factor associated with the insurance company (this factor is also called “safety factor”)

- retained by an Insurance Company

$$\pi_1 = (1 + \epsilon_1) R$$

- paid to a Reinsurance Company

$$\pi_2 = (1 + \epsilon_2) XL$$

where  $\pi_2$  are the total premiums ceded by all Insurance Companies to Reinsurance Company from a region and  $\epsilon_2$  is a safety factor associated with the last firm .

In the old “game” of demand and supply, each insurance company offers to cede a given amount of risk to each reinsurance company, which in turn decides to accept it . The actual amount of risk that is ceded is the weighted average of the offered amounts to the reinsurer and the market share of each company determines the weights: obviously, the larger the market share of a company , the greater is its clout in the negotiation.

IW2 will calculate the retention per each (Re) / Insurance Company which should be defined using the following factors:

$$\text{Retention} = (M_p * (1+E_p) * R_p + \sum M_r * (1+E_r) * R_r) / (M_p + \sum M_r)$$

$M_p$  = Insurance Company’s market share

$M_r$  = Reinsurance Company’s market share

$R_p$  = Insurance Company’s desired retention (associated to strategic & financial parameters)

$R_r$  = Cover offered by Reinsurance Company

$E_p / E_r$  = safety factors

REINSURANCE CONTRACTS								
W Europe Earthquake								
RETENTION (\$M)								
Primary	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07	Jan-08
Zurich	359	390	397	403	402	395	390	385
Allstate	383	473	487	496	518	517	548	548
State Farm	404	573	590	607	618	634	647	647
Prudential	424	698	737	762	773	801	815	815
Nationwide	442	823	875	976	988	990	974	974
<b>TOTAL</b>	<b>2812</b>	<b>2956</b>	<b>3088</b>	<b>3244</b>	<b>3300</b>	<b>3337</b>	<b>3375</b>	<b>3375</b>

CatXL (\$M)								
Reinsurer	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07	Jan-08
Swiss Re	429	229	204	169	155	143	131	131
Munich Re	429	235	210	175	165	158	151	151
General Re	429	241	215	187	178	174	170	170
ACE	429	245	218	190	182	181	180	180
Centre Re	429	252	224	194	179	166	152	152
<b>TOTAL</b>	<b>2147</b>	<b>1202</b>	<b>1071</b>	<b>915</b>	<b>859</b>	<b>822</b>	<b>784</b>	<b>784</b>

The user may also review the reinsurance contracts in each market.

### Ability to change the company's strategy during the simulation

IW2's considers a ten years period - in quarterly step – and the user may choose the number of quarters in the simulation period. It is also possible to change the company's year to year strategy during the simulation and define a new behaviour due to changing market conditions and / or worldwide economic situation.

### More comprehensive company balance sheets and earnings statements

In light of these new technical, economic and financial parameters, IW2 considers the impact of insurance risks (natural catastrophes that have occurred in each regional market) and / or economic – financial risks (spread of investments portfolio in relation to trend) on the company's balance sheet and earning statement.

The user may choose two different types of information: one more detailed than the other (executive summary).

In the more detailed format, IW2 shows the effect of the company's investments strategy in terms of fixed / current assets and derived interests, losses and premiums according to each single market, etc .....

**EXECUTIVE SUMMARY**

Zurich    Back    Detailed Financials    Summary

**BALANCE SHEET (\$M)**

Yearly Average	Initial	2001	2002	2003	2004	2005	2006	2007	2008
Current Assets	24.09	569.94	1446.65	1510.22	1501.52	1513.82	1492.46	1473.46	1485.75
Fixed Assets	475.91	243.78	946.06	1746.66	3694.39	5673.27	8255.45	11395.69	15260.26
<b>Total Assets</b>	<b>500.00</b>	<b>813.73</b>	<b>2392.71</b>	<b>3256.88</b>	<b>5095.91</b>	<b>7187.09</b>	<b>9747.91</b>	<b>12869.16</b>	<b>16746.02</b>
Solvency Margin		1.54	67.31	83.24	97.06	96.17	96.79	95.32	94.45
Subscribed Capital	360.00	553.33	1627.04	2214.68	3465.22	4887.22	6628.58	8751.03	11387.29
Premium Reserves	14.46	631.06	874.17	909.93	901.57	907.43	893.61	885.43	886.77
Outstanding Loss Reserves	0.00	0.00	96.39	43.67	2.59	0.24	0.00	8.56	13.35
Debt	10.00	9.64	8.75	7.99	7.28	6.61	6.00	5.44	4.94
<b>Total Liabilities</b>	<b>374.46</b>	<b>1194.04</b>	<b>2606.36</b>	<b>3176.27</b>	<b>4376.66</b>	<b>5881.50</b>	<b>7528.19</b>	<b>9650.47</b>	<b>12292.35</b>
Equity (Free Reserves)	125.54	-360.32	-213.66	80.61	719.25	1365.58	2219.72	3218.69	4453.67
<b>Total Liabilities &amp; Equity</b>	<b>500.00</b>	<b>813.73</b>	<b>2392.71</b>	<b>3256.88</b>	<b>5095.91</b>	<b>7187.09</b>	<b>9747.91</b>	<b>12869.16</b>	<b>16746.02</b>

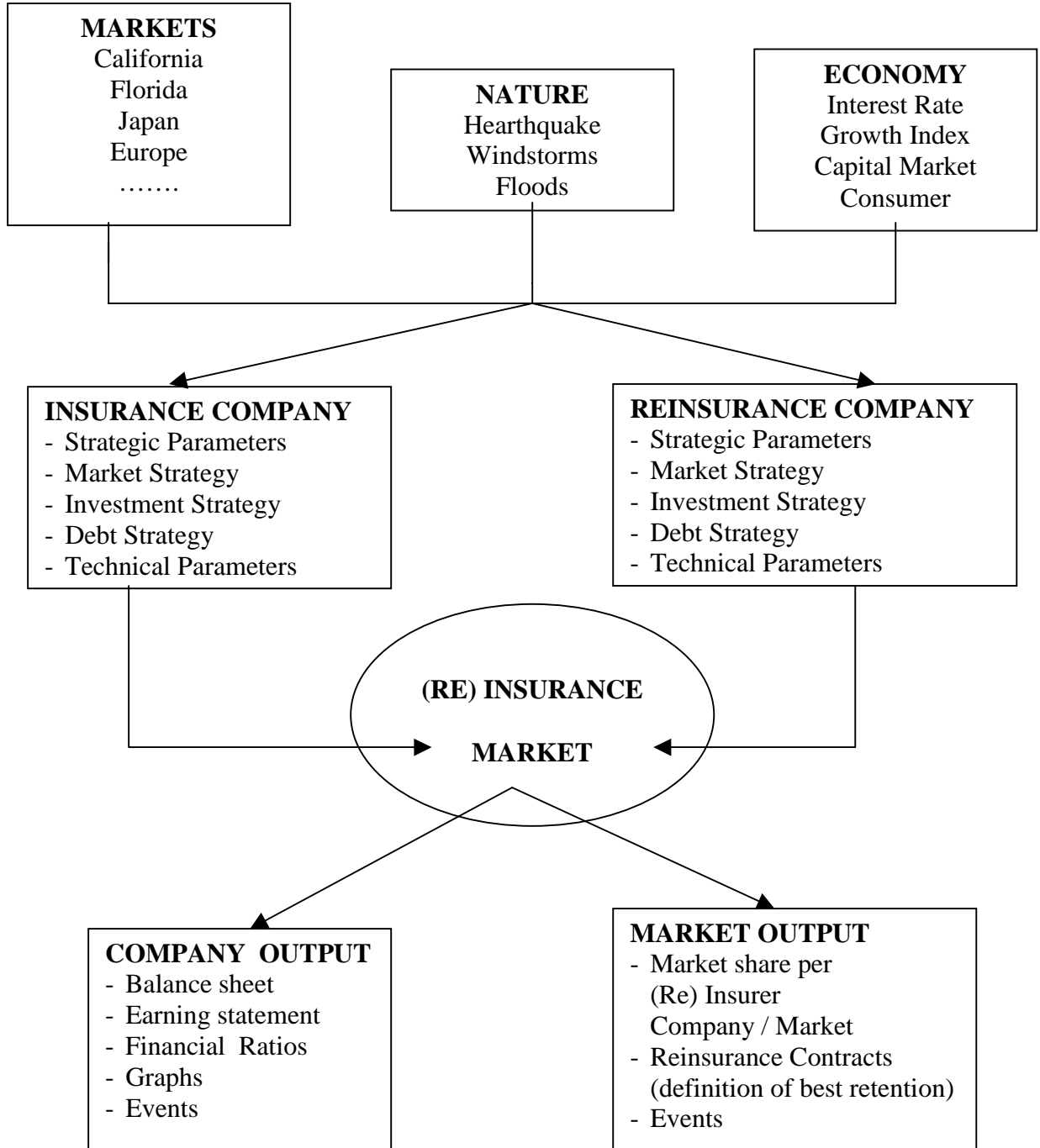
**EARNINGS STATEMENT (\$M)**

Yearly Total	2001	2002	2003	2004	2005	2006	2007	2008
<b>Total Retained Premiums</b>	<b>1682.0</b>	<b>2331.1</b>	<b>2426.5</b>	<b>2404.2</b>	<b>2419.0</b>	<b>2382.9</b>	<b>2361.2</b>	<b>2364.7</b>
Net Non-Cat. Earnings	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
<b>Total Retained Losses</b>	<b>0.0</b>	<b>718.7</b>	<b>512.4</b>	<b>23.7</b>	<b>2.0</b>	<b>0.0</b>	<b>74.8</b>	<b>116.2</b>
Total Costs	440.7	602.8	626.6	621.0	625.0	615.7	610.3	611.2
<b>Operations Earnings</b>	<b>1322.1</b>	<b>1089.7</b>	<b>1367.5</b>	<b>1839.5</b>	<b>1872.9</b>	<b>1847.2</b>	<b>1756.0</b>	<b>1717.3</b>
Total Interest Income	33.1	152.0	286.8	575.3	727.8	1769.3	2964.5	3048.6
Total Cat. Bond Payout	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Interest Expense (on Debt)	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5
Total Cat. Bond Payin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

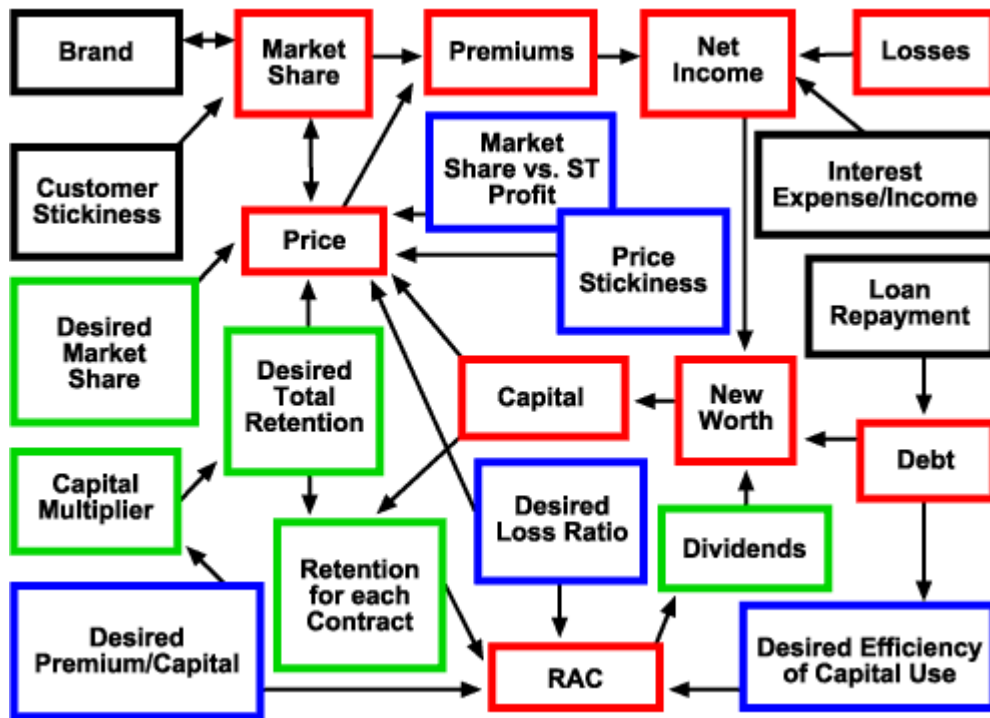
After running the simulation (for any number of quarters), the user may examine detailed financial statements or an executive summary of each company's performance.

Whilst we appreciate that IW2 is a complex model, in order to ease up the understanding of how it works, we set up the following graph which clearly displays the interactions of the various technical and financial parameters :

**WHAT DOES THE INSURANCE WORLD 2 MODEL SIMULATE ?**



## Model of a (Re) Insurance Company



A schematic of a company model is illustrated above. The drivers of the company models are the strategic financial goals of the senior management. These include:

- Desired Net Combined Ratio
- Desired Premiums to Total Assets
- Efficiency of Capital Use
- Desired Market Share

### 3. INSURANCE WORLD: THE FINAL PRODUCT

Insurance World is now behind the research and development phase and is a powerful tool to assist to the (Re) Insurance Company in relation to the Catastrophe business . It is being used as decision support tool, management-training tool and is being customized to serve the proprietary needs of individual clients .

The product is a set of business simulation software with consulting support :

- IW Decision Support through software based on a common platform and Applications Service Provider (ASP) for managing reinsurance and insurance companies through large catastrophes such as earthquakes, hurricanes ..... Marketing to European clients is done through a strategic partnership between Complexica and Italtre.
- IW Management Training of reinsurance and insurance personnel in Europe and the U.S. . This will help senior management build an expertise in the case of catastrophic events. The training is done through a strategic partnership between Complexica and Alliance Performance, a Florida based management training and facilitation firm.
- IW Tools is a modified decision software development for specific needs and clients. In this case, the marketing partners are Italtre in Europe and Alliance Performance in the U.S. .

Decision support, management training and modified software development are bundled into a single customized package for the client .

#### 4. EXAMPLE

The Insurance Companies and Reinsurance Companies are characterized by the same technical parameters but different economic and financial strategies which show an aggressive Insurer Company – “Blue” - among a group of conservative Insurers .

The scenario is the following :

- ✓ Five Insurance Companies: one aggressive – four conservative
- ✓ Five Reinsurance Companies
- ✓ Ten European scenarios (West – North – South)
- ✓ Different types of natural catastrophe (Earthquake – Flood – Windstorm) which come from a random losses distributions
- ✓ Technical parameters : the same for each Insurance Company
- ✓ Economic and Financial strategies: an aggressive Insurance Company – “Blue” - among four conservative ones
- ✓ Antitrust law : the Insurance Company’s maximum market share is not higher than 40% .

These are “Blue” ‘s principal strategy factors :

- ✓ During the first phase, Blue aggressively seeks market shares in Western Europe by underwriting risks characterized by earthquake / flood / windstorm exposures whereas in the other European markets (North and South ) it does not want to lose its portfolio.

In the second phase, Blue’s strategy changes. It decides to maintain its leadership in Western Europe but, at the same time, it seeks market share in Southern Europe .

In the ten years period, the strategies of the other four companies are mainly focussed on ensuring a geographically well spread portfolio .

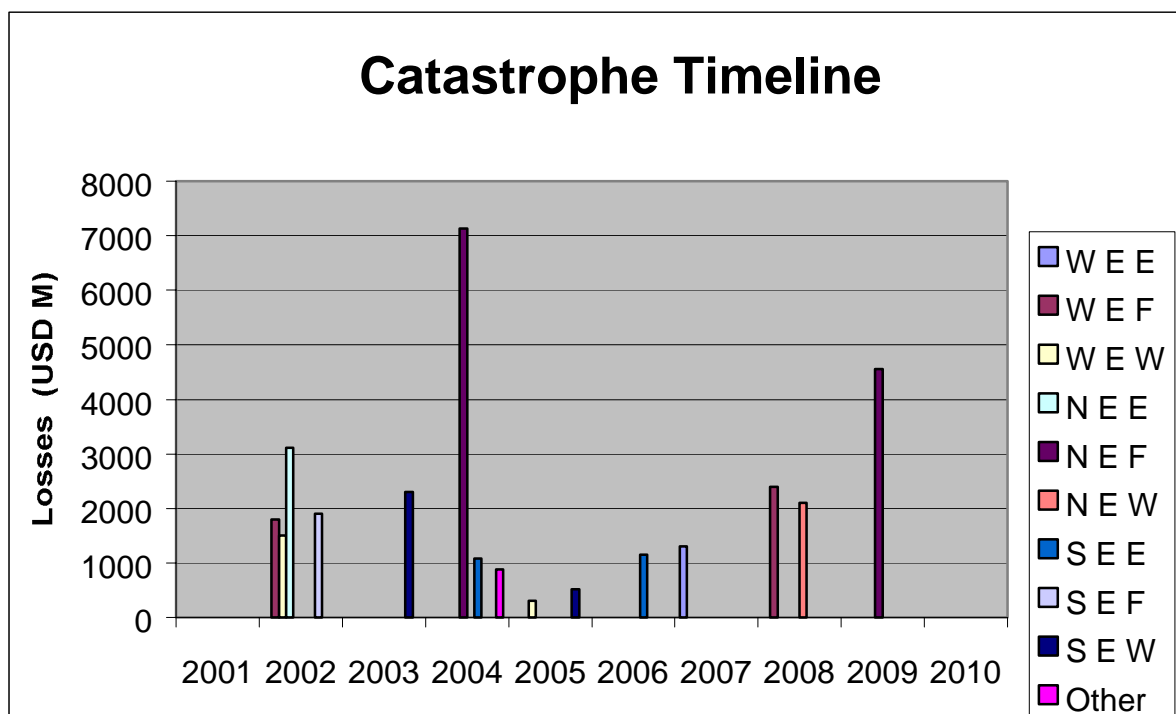
- ✓ Blue's desire for market share is greater than its desire for profits; so the Company prefers to keep its prices lower than the others in order to obtain market share instead of profits .
- ✓ Blue has a desired Net Combined Ratio  $((\text{Annual Retained Losses} + \text{Costs}) / \text{Premiums})$  that is higher than the other four Companies, due to Blue's decision to take on greater risks .

There is an optimal amount of risk to retain, infact if :

- If an insurance company retains too little risk, its return on capital is too low  
→ the company cannot work successfully
  - If an insurance company retains too much risk, its capital volatility is too high  
→ the company might fail
  - If an insurance company retains a level of risk that is "just right", based on risk exposure and the behaviour of the competition and the market  
→ the company should not fail
- ✓ Blue's goals are market share and long term profit, as a consequence the excess of capital is used to focus on capturing market share .
  - ✓ Blue's aggressive behaviour – opting for a high LR – is characterized also by the decision not to write Cat Bonds in order to retain more catastrophe risks .  
Conversely, the strategy of the conservative companies to use the Cat Bonds to protect themselves from the financial risk of a catastrophic event .

Figure 1 depicts the catastrophe loss scenario

Figure 1.



W E E = West Europe Earthquake  
W E F = West Europe Flood  
W E W = West Europe Windstorm  
N E E = North Europe Earthquake  
N E F = North Europe Flood

N E W = North Europe Windstorm  
S E E = South Europe Earthquake  
S E F = South Europe Flood  
S E W = South Europe Windstorm  
Other

Blue’s strategy is based on capturing market share in the Europe’s West and South maintaining its position in the North .

After a ten years period, Blue’s strategy seems to be successful for the following reasons:

*Market Share (figure 2., 3., 4.)*

- after 4 year Blue Company is the leader company in Western Europe with the largest share allowed by antitrust law (40%) ; Blue will maintain its market share in the rest of Europe
- at the end of the ten years , the European Market will be dominated by Blue in the West and South whereas the Northern market will be well balanced among all five companies

*Total Assets & Net Earnings (figure 5., 6..)*

- Blue seeks market share in the West and South of Europe by pricing itself lower than the other four Companies; it wants to obtain market share instead of profit in the short term and, as a consequence, a higher return on equity in the long term.  
Figures 5. and 6. show the impact of a “preference for market share over profit” attitude in the initial period, when Blues’s strategy is totally dedicated to capturing market share (in this first phase Blue’s Net Earning are lower than its competitors).
- In 2005 and 2007, there are major losses which negatively affect the balance sheet of the conservative companies showing Cat bond losses.  
Blue’s aggressive behaviour – from a technical and financial point of view – is now generating a positive balance sheet result and a positive ROE (i.e.long term strategy) also in the years characterized by major losses in terms of value and frequency .
- In the last two years (2009 / 2010), the scenario seems to have changed once again: Blue is the leader in Western and Southern Europe (it holds the maximum market share under antitrust legislation), and is maintaining its long term strategy with a lower ROE than the conservative companies .

Figure 2.

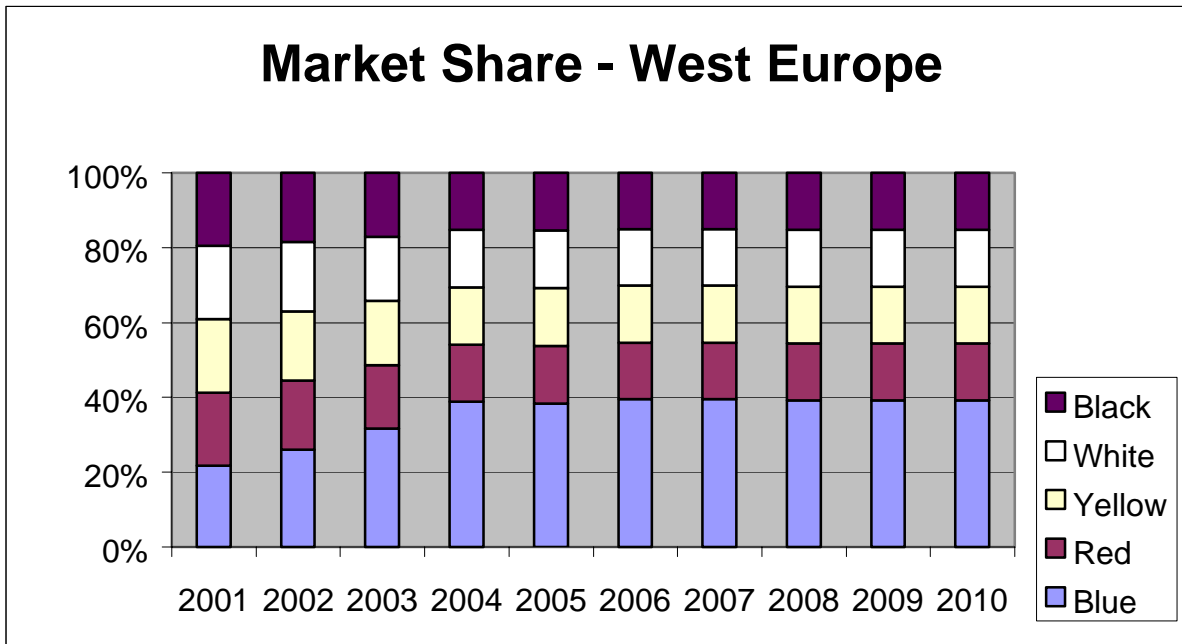


Figure 3.

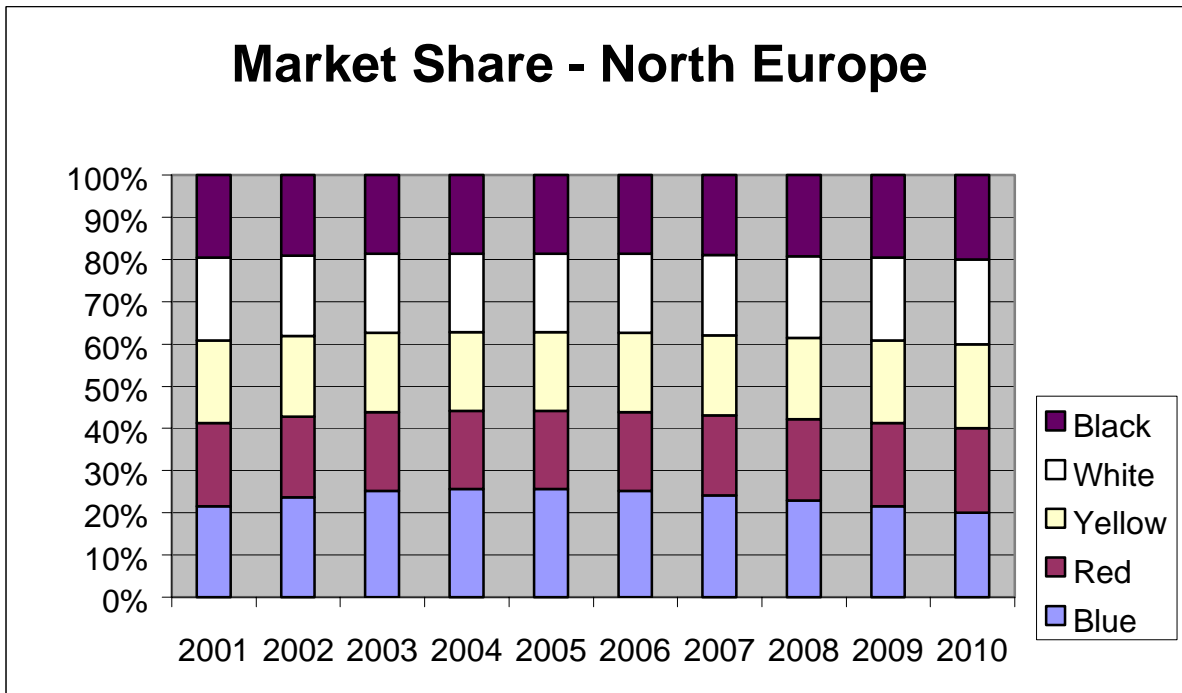


Figure 4.

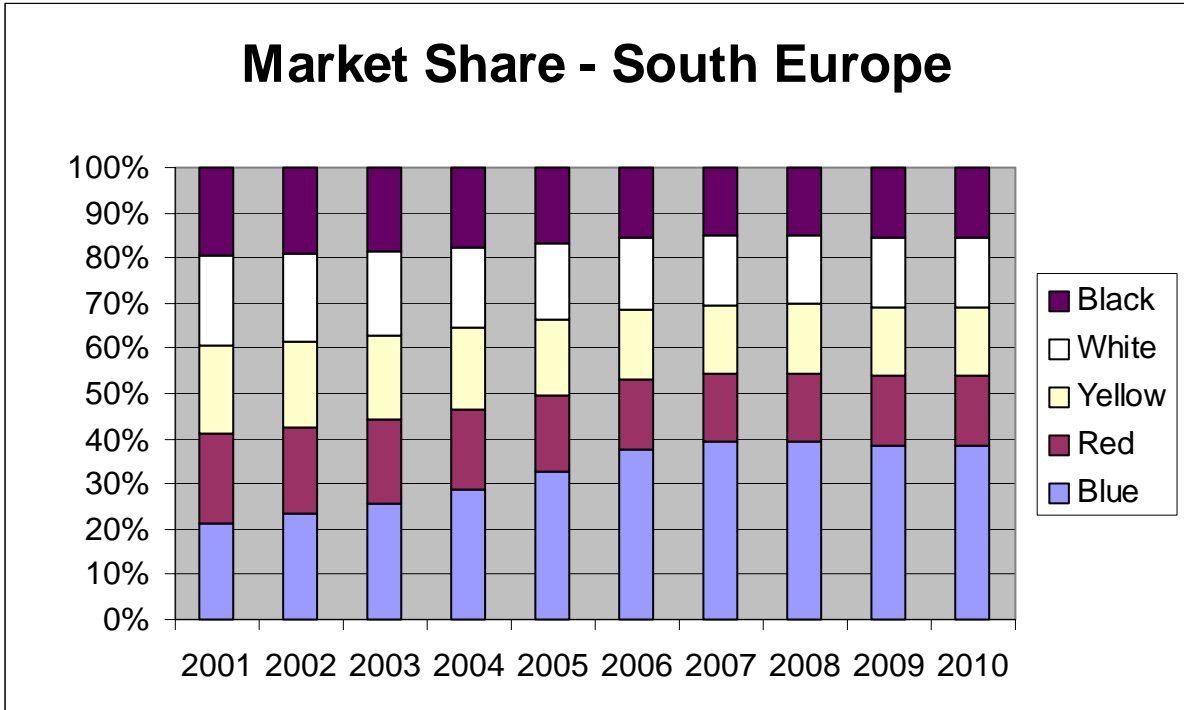


Figure 5.

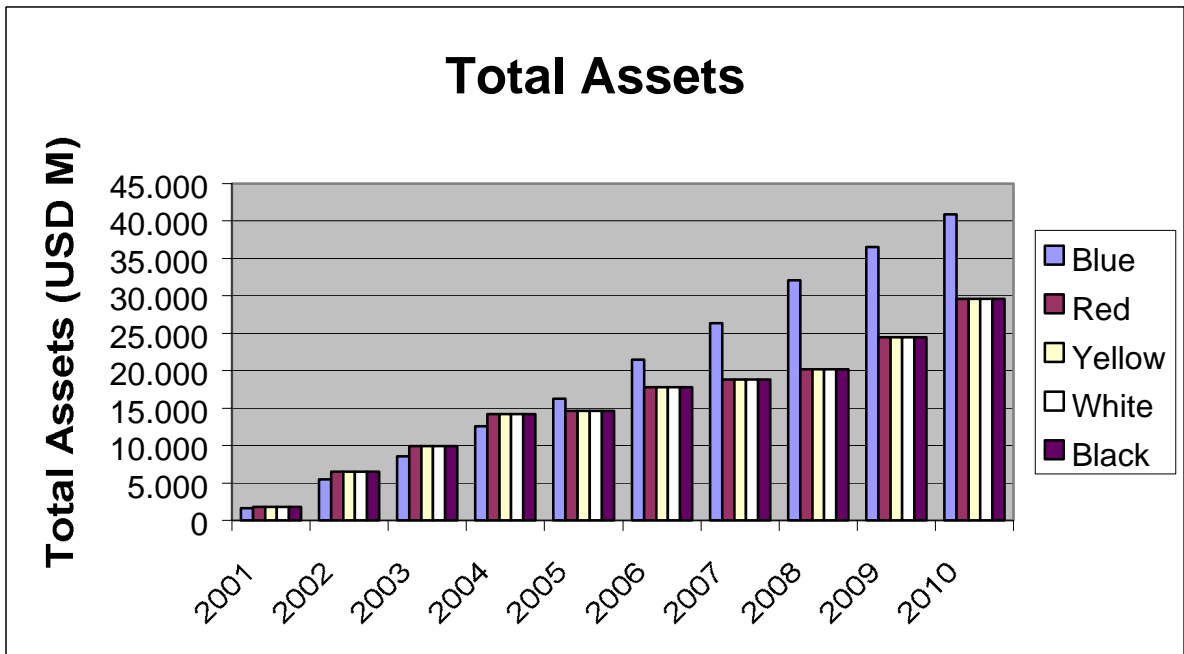
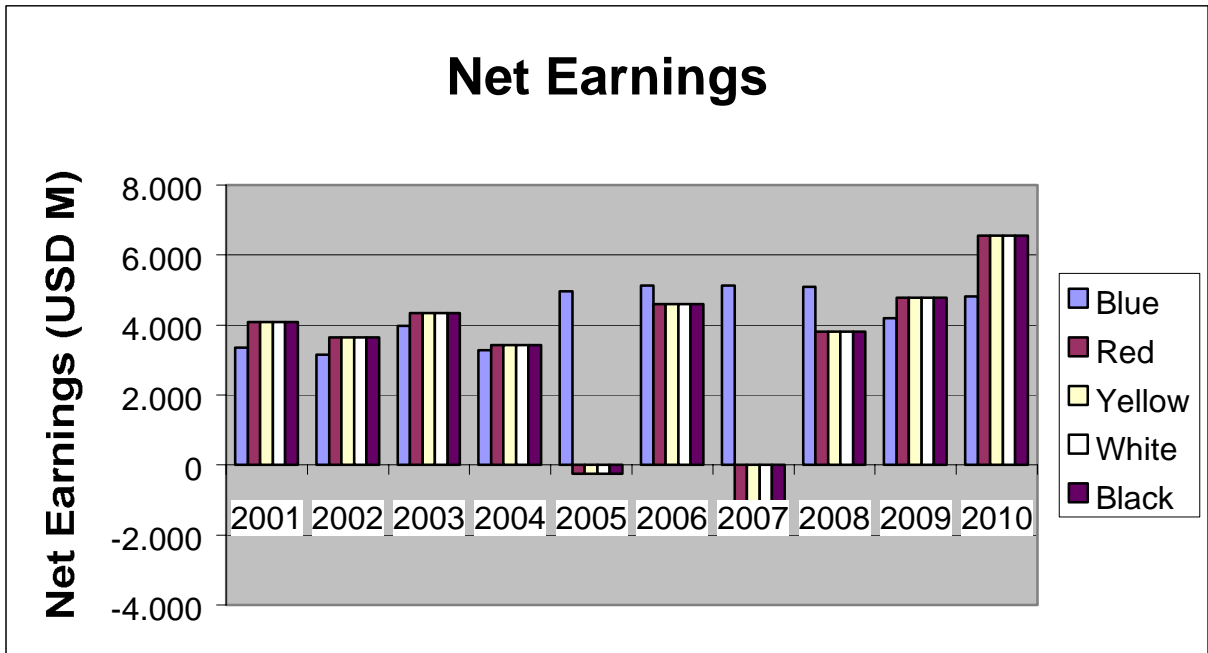


Figure 6.



## Appendix

### Italre Group

Italre Group was founded in 1987. The Capital Stock and Reserves at 31.12.99 is 1.0 Million Euro. The Group is composed of an Italian Holding Company Italre Spa and Italre International Ltd .

The Group has developed a Reinsurance Portfolio Business amounting to 130 millions Euros between traditional and non traditional reinsurance and it is one of the few independent reinsurance intermediary and consultant in Europe owned by the management .

Italre Group's business is produced in Europe, United States and in South America and it is placed with over 100 reinsurance companies in 20 countries .

Italre founded the consortium A.F.R.A.I.D. (A Flood Risk Analysis for Insurance Damage) a tool to calculate the risk of inundation thanks to the satellite technology and is also consultant to FUNENSEG (the Brazilian School of Insurance) and a supporting member of COMPLEXICA/IW2 .

### Complexica / Santa Fe Institute

Professor John Casti\* of Santa Fe Institute and Dr Roger Jones, formerly of Los Alamos National Laboratory, founded Complexica in 1999 with the idea to use complexity science and machine learning technology to solve business and engineering problems.

Insurance World simulator was the first Complexica's project and it was focused on the behaviour of the insurance industry after the impact of natural catastrophes. The success of IW1 led to formation a new consortium – IW2 – which began in early 2000 and developed the previous simulator .

\* John Casti is a member of the faculty of the Santa Fe Institute and a professor at the Technical University of Vienna. His current research interests center on the use of large-scale microsimulation to study the properties of complex adaptive systems like stock markets, the business world and the bad-traffic networks.