Managing Insurance Risks : Research into Price *

by Maurice Salvator **

1. Introduction

Price researching consists of finding at the lowest cost the insurance guarantees necessary for the risk management of the firm.

This lowest cost is :

- sometimes an objective price, that is to say the lowest price proposed by the companies which are active in the market, or in other words the best quotation ;
- sometimes a subjective price, that is to say the highest price which the firm is prepared to pay to obtain the desired cover.

The objective price may be retained where there is an obligation to insure, whether that obligation is of legal nature or arises from an insufficiency of liquidity.

The subjective price is appropriate to all circumstances where the firm may choose whether or not to insure. It is the maximum premium, beyond which the insurance does not justify itself economically. Each firm has its own limit in this respect. It is the cost effectiveness of the insurance.

2. Finding the best quotation

The best quotation can only be obtained by putting the insurers present in the market into competition with one another. However, it is not normally obtainable by a simple tender procedure. To make the competition work effectively it is often useful to know the particularities of the distribution of the product "insurance" as well as the principles of the establishment of its price.

2.1. Understanding distribution so as to promote competition

The so-called "insurance costs" appear in the accounts relating to works, supplying goods and services to the outside and under the heading "personnel costs".

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These costs thus form part of the cost of production, just like any other raw materials or services. The negotiation of an insurance contract thus appears to resemble that of the purchase of raw materials or services. But the analogy stops there, since the procedures for purchasing by firms are almost inapplicable to the purchase of insurance. There is a special insurance market. Insurance is provided by different rival units which have to adapt their activities to the laws of supply and demand.

However, the way the distribution system works makes the selling of insurance different to that of any other product bought by the firm.

The notion of "insurance distribution" represents in fact the "coming together of the needs of the client and the offers made by the company". There will be as many types of distribution as there are of means of bringing together the client and the insurer.

— The client approaches the company

The client goes to the company's office to subscribe to an insurance, this is called "direct writing" in the United States of America. Companies which use such a system hold about half of the private market. In France this system has only been in operation since the sixties and only by professional mutual insurance groups.

— The company approaches the client

The principle is simple. The company makes proposal forms available to the potential client where the latter can be expected to be found. This can be done in many ways, such as the self service familiar to all airport users. Distribution by mail is another form which this style of distribution can take.

In France direct contact between the company and the public is a form of distribution which is developing slowly for private insurance and is practically unknown for firm's insurances. The fact is that an insurance contract is a document whose interpretation is somewhat complex. As soon as the contractual commitments become important the client seeks the advice of professionals who are separate from the insurer. In a way this is a form of distribution through intermediaries. The intermediary may be acting either for the insured or the insurer.

— Intermediary acting for the client

This is distribution through a broker whose essential role is to assist his client; the client charges him not only with the giving of advice as to details of the contract but also with the placing of the risk, that is to say with the finding of the company or companies which will give the cover. He is of course bound to give the insurers full information as to the elements necessary for proper appreciation of the risks involved.

— Intermediary acting for an Insurance Company

This is distribution by general agents, who are essentially the agents of a company and not officers thereof. Their activities which are exclusively related to the companies who give them their mandate, are autonomous. The agent is fully responsible for his own actions.

In France the firm can promote competition :

- by addressing itself directly to the insurance companies. But it must select beforehand companies which are not represented by a network of agents ;
- by addressing itself to the network of a general agent. It then has to contact the agents of different companies since each one of them will only be able to quote on behalf of his parent company ;
- by addressing itself to one or several brokers.

But those procedures cannot be separated from the criterion of service.

If obtaining the best price is the main criterion this can lead to negotiations direct with insurance companies, the object being the reduction of costs by the suppression of the commission of intermediaries ; this is logical and few insurance companies discretely acknowledge this, but in practice the objective may not be reached since a certain number of distribution cost elements cannot be reduced. In the absence of an intermediary the insurer has to take over certain services such as : visits to evaluate risks, preparation of experts' reports, periodical checking of risks, up-dating of contract clauses to include risks encountered by the insured, premium reminder notices, etc.

These tasks, traditionally carried out by the intermediary, have thus to be accomplished by salaried staff of the insurer. The only means of paying these salaries is by drawing them from the premiums paid by the insured.

Also, even if the insurer states that he is giving a premium reduction because of the absence of intermediaries, it is unlikely that this rebate is real since the insurer who depends for a large part of his business on intermediaries cannot, for fear of upsetting these, consent in favour of an insured client to a premium rate lower than what he would give to an intermediary.

The advantages of direct negotiation may be hypothetical but its drawbacks are real enough at all stages of the life of the contract :

- absence of the opinion of the third party at the time the contract is signed ;
- absence of systematic up-dating of the terms of the contract to follow the evolution of the risks run, by an independent professional ;
- insufficient capacity of the insurers part to handle the risks. The client is then obliged to contact several insurers to obtain the amount of cover he needs ;
- above all the absence of means of bringing pressure on the insurer in the event of a claim which could, according to the interpretation of the contract, not be indemnifiable. The disproportion between the annual premium and the amount of the claim in question render ineffectual such arguments as "Pay up or I shall cancel the contract" from the client.

The search for the best price cannot be carried out independently from the search for the best service available to help in negotiating with the insurance company.

2.2. Understanding price fixing so as to obtain the best quotation

The insurance premium is always calculated by adding together the product of the insured sum and the premium rate, and a percentage for tax :

The sum insured is often the amount of the capital cover required, or another value which expresses the extent of the risk to be covered.

For example the salaries paid by a firm could be used for the "General liability" risk.

The premium rate always comprises a so called technical rate and a commercial loading. The technical rate expresses the insurer's knowledge of the risk. It is the cost of claims which he thinks he may have to bear. The commercial loading is the percentage of management expenses which the insurer considers necessary to cover the services he provides.

The percentage for tax corresponds to the tax levied on insurance agreements ; this is an annual tax which is supposed to cover stamp duty and registration. The tax is added to the premium before tax, called net premium ; thus :

Insurance Premium = {basis of assessment $\times$ (technical rate + loading)} $\times$ (1 + % tax)

One would expect in principle that only the term "loading" could be the object of negotiation, but in practice this is not the case. Any of the items may be reduced by appropriate methods. Examples : Calculation of an annual fire insurance premium :

Basis of assessment : This is the value of the goods, buildings, materials and merchandise to be insured. Their value appears to be an objective set of data. Nevertheless with the agreement of the insurer one could deduct from that value the amount corresponding to those items which would not be damaged by a fire, as for example the foundations of buildings.

The technical rate : This rate is established by each insurer on the basis of statistics available to him. Fire insurers habitually group all their statistics and catalogue them by the branch of activity concerned. For each of the latter, the technical rate or pure premium rate results from the relationship between the total of claims settled or evaluated relating to fires occurring in the course of the financial year, and the total sum guaranteed.

The definition of this technical rate appears unambiguous. Nevertheless a single activity may because of the way it is described be classified by the insurer in one of several branches. A single factory may have several different activities; the insurer's choice in the selection of the principal activity may be influenced.

Also, the "Pure premium rates" of fire insurers have added to them :

- extra or increased premiums to cover the presence of higher risk elements or the absence of safety precautions ;
- credits or reductions for the absence of special risks or the setting up of protection or prevention procedures (See tables 1, 2, 3 and 4).

A knowledge of these tariff provisions enables the best adjustment to be made of the premium to the risks to be covered.

The loading : The loading is what must be added to the technical premium to obtain the commercial premium. It must cover production costs and management charges. Production charges, which in insurance usually means the costs of finding and convincing the client, have been fixed in France by a decree of 6 February, 1978 which fixes in particular the amount of commission and emoluments of brokers in industrial fire insurance matters. These restrictions do not apply to agents. Management

*Table 1 : Increase applicable for dangerous activities
(use of machines for work on wood)*

<i>Value of material for working on wood and of the untreated and treated wood in the workshop and adjoining buildings</i>		<i>Increase of normal premium for the principal industrial activity when the value of machines and the value of untreated and treated wood represents</i>	
<i>From francs</i>	<i>to francs</i>	<i>up to 10 % of contents of adjoining buildings</i>	<i>from 10.1 to 25 % of contents of adjoining buildings</i>
0	10 000	0 %	0 %
10 001	20 000	0 %	5 %
20 001	40 000	5 %	10 %
40 001	85 000	10 %	20 %
85 001	125 000	20 %	30 %
125 001	250 000	40 %	50 %

*Table 2 : Increase for exceptional risks — presence of inflammable liquid(s)
Increases applicable to whole premium*

	<i>Where there is no move- ment between containers and these are sealed</i>	<i>Where there is transfer between containers or where these are not sealed</i>
	%	%
Up to 200 litres	0	0
From 201 litres to 1050 litres	10	50
From 1051 litres to 3000 litres	25	100
More than 3000 litres	assessed individually	

*Table 3 : Reduction for presence of safety measures installation
of connected fire hose points*

		<i>With approved system of automatic detectors (Rule 7)</i>	
		<i>no</i>	<i>yes</i>
<i>With approved system of mobile extinguishers (Rule 4)</i>	<i>yes</i>	5 %	12 %
	<i>no</i>	7 %	15 %

Table 4 : Reduction for presence of safety measures : sprinklers (water filled) installation

	<i>Installation conforms to regulations of</i>		
	<i>1925</i>	<i>1936</i>	<i>1957</i> <i>+ annex VIII and 1974</i>
With 1 water source	25 %	50 %	60 %
With 2 water sources	12.5 %	25 %	35 %

charges have to cover the general expenses of the insurance company. Obviously these vary from one firm to another. Thus the amount of loading can be influenced by the negotiations carried out and the intermediaries chosen.

Taxes on insurance agreements : Since January 1, 1973, fire insurance premiums are subject in France to 15 % tax when the cover relates to "assets used wholly and permanently for industrial, commercial, artisanal or agricultural activity".

Insurance premiums relating to other risks, in particular to dwellings, are taxed at 30 % ; finally, almost all insurances relating to additional cover and extensions of cover, such as for loss of profits (consequent on a fire which is insured) are taxed at the rate of 9 %.

Again, the premium turns out to be by no means insensitive to the way the cover is described.

What applies to premium calculations for fire premiums is also true with respect to other types of insurance. The best quote comes :

- from judicious definition of the basis of assessment ;
- from a correct definition of the activity concerned ;
- from examination of all the possibilities for rebates and discounts ;
- from the insurer's choice of the benefit pattern ;
- from careful designation of the cover provided.

These measures enable the finding of the best quotation. But looking beyond the quotation one may still find a lower premium by, for example, a partial transfer of risk, that is by the practice of retention.

Retentions through proportional excess allows linear variation of quotation as a function of the percentage transferred (see figure 1).

But more often, firms practice retention by means of an absolute excess per event. This type of retention represents a non proportional transfer of the cost of the risk.

Statistics gathered by insurance companies in fact show that the technical premium is inversely proportional to the level of risk retention. If X is the level of absolute excess per event and C and V are "cost" * and "variability" ** of the risk conserved, one can plot the relationships (see figure 2).

* Total of the annual charges of a risk for insurance, prevention, maintenance, security as well as for average losses of non insured parts of it.

** Amount of maximum potential accidental losses due to a risk occurrence. It is also the difference between maximum and minimum cost of a risk.

Figure 1 : Reduction of quotation as a function of percentage of risk retained

Beyond simple seeking for the best quotation, the premium can be further reduced, proportionally or not proportionally, by the appropriate method of risk retention.

3. Seeking the cost effectiveness of Insurance

When it is taken out, neither in the event of legal obligation nor for reasons of liquidity should insurance be bought at a price above its useful price. This price can only be evaluated case by case, according to whether the insurance is destined to reduce variability or sought for the ancillary service it gives.

3.1. The utility cost of the reduction of "variability"

A firm which does not transfer the "variability" of its risks, must possess the necessary financial means to face up to accidental financial losses.

Figure 2 : Variation of cost and variability of risk
as a function of the level of absolute retention per claim

These financial means (reserves, provisions, working capital, bank credit lines held open, etc.) are available to the firm, but are not employed to finance its fixed assets, to be available (in case of accident), these financial means may only be employed on a short-term basis.

Transfer to insurance reduces the variability element of the risks run. This decrease should enable the firm to reduce its liquidity and to invest longer-term funds which before had been tied up on short-term. Thus one can express quantitatively the cost of utility of such a transfer.

If T_i = Rate of internal yield in the firm

T_c = Rate of yield of short term funds of the firm

V = variability transferred

$$\text{cost of utility of insurance} = V (T_i - T_c)$$

This expression illustrates the linear progression of utility cost of transfer according to the quantity of variability transferred (see figure 3).

Figure 3 : Graphic representation of the cost of utility of transfer as a function of the amount transferred

3.2. Cost of auxiliary services of insurance

Insurance is a privileged tool for dealing with variability. But in certain circumstances, it is sought above all for services it provides. Thus :

- Insurance to make the cost of risk uniform

In such a case insurance enables the taking account of cost of risk in the calculation of the cost price of the product. An identical result may be obtained for example by reinforced quality control. The utility cost of insurance in such a case can be expressed :

Utility cost = cost of quality controls which would otherwise be necessary.

- Insurance to give the firm guarantees in its markets

Insurance can guarantee the firm's ability to repair any damage it could accidentally cause to third parties. The utility cost of this service can be measured by comparing it with the loss of profits which the absence of such guarantees would involve.

Example : Impossibility of concluding certain contracts because of the absence of an insurance certificate.

— Insurance to protect the business relationships of the firm

The firm may find itself either in the situation of having to demand reparations, or being sued. In either case, the litigation in progress may interfere with other negotiations or with pre-existing business relationships.

In both cases, the insurance can transform the litigation which is between supplier and client into two other sets of litigation, between on the one hand the insurer and supplier and on the other hand insurer and client.

In such situations the utility cost of insurance can be assessed from the cost of analogous services rendered for example by a debt collection or similar agency.

Even when the insurance is sought not to deal with variability, but for its associated services, its utility cost may be measured. If we call this cost K , the general expression of utility cost of insurance becomes

$$\text{Utility cost of insurance} = V(T_i - T_c) + K$$

4. Finding the best price

When the taking out of insurance is a legal obligation or arises through insufficient liquidity, the search for the best price tends to be the finding of the best quotation.

In all other cases, it will be necessary to check that that best quotation is still below the utility cost of insurance for the firm.

It is frequently found that the best quotation for a total transfer of risk is above the utility cost.

In such situations it is often possible to find a suitable retention level at which the quotation becomes equal to or lower than the utility cost. It is true that when the utility cost varies linearly as function of variability the insurers quotation generally varies as

$$\frac{K}{\text{retained variability}}$$

The curves which represent these two functions generally have a common point (see figure 4).

- In R_1 the best quotation is greater than the utility cost :
- In R_2 the two prices are identical ;
- In R_3 the insurance is available for a price inferior to its utility cost

Example :

A group running 28 factories made a call for tenders for a fire insurance, machine breakdown and loss of profits insurance programme. Quotations were asked for for several levels of risk retention.

Figure 4 : Curves showing variations in the utility cost of insurance (A) and the best quotation (B) as a function of the level of transfer risk

As a first step, the group examined the proposals summarized in table 5.

From the available statistics, the "Risk Manager" measured the cost and variability of the global annual loss which would arise from various systems of retention, as indicated in tables 6 and 7.

From this was drawn a representative curve of cost of risk with best quotations as a function of level of transfer of variability (figure 5).

The curve shown is the theoretical curve of best quotation for each level of transfer of risk.

If point M is taken on the curve :

For a given variability M_1 represents a higher cost ;

For the given cost, M_2 presents a higher level variability :

For a given variability, M_3 presents a lower cost ;

For a given cost, M_4 presents a lower variability.

We can thus consider the two areas, "I" to the left of the curve representing an offer which is more favourable than the average found in the market. All points to the

Table 5 : Summary of principal proposals received

<i>Solution</i>	<i>Excess per claim</i>	<i>Limitation per claim</i>	<i>Annual excess</i>	<i>Annual Guarantee</i>	<i>Premiums including Taxes</i>
A	0	100 M	—	—	12 500 000
B	100 000	80 M	—	—	8 450 000
C	500 000	100 M	—	—	9 113 000
D	1 000 000	100 M	—	—	7 711 000
E	—	—	5 000 000	45 M	1 450 000
F	—	—	5 000 000	75 M	5 620 000
G	—	—	10 000 000	90 M	6 400 000
H	5 000 000	100 M	15 000 000	20 M	6 300 000
I	20 000 000	100 M	15 000 000	20 M	5 600 000
J	50 000 000	80 M	15 000 000	20 M	1 750 000
if investment : A B					— 30 % — 60 %

Table 6 : Calculation of cost of retained losses

<i>Proposals</i>	<i>Premium including taxes</i>	<i>Average losses retained</i>			<i>Total cost of risks</i>
		<i>as excess</i>	<i>beyond maximum insured</i>	<i>beyond annual maximum</i>	
O	—	5 332 543	—	—	5 332 543
E	1 450 000	3 600 000	—	332 543	5 382 543
J	1 750 000	4 600 000	55 004	—	6 405 004
I	5 500 000	3 700 000	—	—	9 200 000
F	5 600 000	3 600 000	—	32 543	9 232 543
H	6 300 000	3 009 218	—	—	9 309 218
G	6 400 000	4 300 000	—	—	10 700 000
D	9 197 000	1 653 336	—	—	10 850 000
B	10 400 000	456 959	55 004	—	10 911 963
C	10 513 000	1 173 339	—	—	11 636 339
A	12 500 000	—	—	—	12 500 000

Figure 5 : Cost of risk with best quotations as a function of level of retention

	Average cost X	Variability Y
O	5332543	105000000
E	5382543	60000000
J	6405004	60000000
I	9200000	15000000
F	9232543	25000000
H	9309218	15000000
G	10700000	10000000
D	10850336	5500000
B	10911963	21074194
C	11686339	3300000
A	12500000	0

Table 7 : Calculation of variability of losses retained

Proposals	Average cost of risk	Minimum cost of risk	Maximum cost of risk	Variability Max/Min
O	5 332 543	—	105 000 000	105 000 000
E	5 382 543	1 450 000	61 450 000	60 000 000
J	6 405 004	1 750 000	61 750 000	60 000 000
I	9 200 000	5 500 000	20 500 000	15 000 000
F	9 232 543	5 600 000	30 600 000	25 000 000
H	9 309 212	6 300 000	21 300 000	15 000 000
G	10 700 000	6 400 000	16 400 000	10 000 000
D	10 850 336	9 197 000	14 697 000	5 500 000
B	10 911 963	10 400 000	31 474 194	21 074 194
C	11 686 339	10 513 000	13 813 000	3 300 000
A	12 500 000	12 500 000	12 500 000	—

right of the curve that is in part "II" represent a proposal which is less favourable. This permits elimination of proposals *H,G,F* and *B* which appear to be overpriced.

The group also estimated at fifteen million francs the variability of accidental losses which it could be led to bear annually.

The utility cost of the transformation of the variability into cost was estimated at 7 % ; the final two estimations eliminate all the other proposals situated above the horizontal (*S*) and to the right of (*V*) (see figure 6).

Only quotations (*J*) and (*D*) are among the best quotations proposed by the market and present in addition a price which is below the "Utility Cost".

Remark :

When insurance concerns an asset which is subject to amortization, the indemnities are subject to three tax regimes.

- Up to the net book value of the asset which is the object of the indemnification no tax is chargeable ;
- That fraction which indemnifies the difference between the net book value and the gross amount invested bears tax as on an added value of 50 % by "short term".
- Any balance of indemnity beyond the gross investment value bears tax at 15 % of the tax on a long term added value.

The indemnity for an amortized asset bears tax at 50 %, while in a non-insurance situation, the un-amortized value of the asset is deductible from the taxable profit and receives by that means a 50 % tax remission.

The question may thus be asked as to whether by so-called excesses well adapted, one can reduce the cost of the risk by combining insurance and tax aspects.

For that to be possible, it is necessary to have at the same time a loss at balance sheet level and a favourable balance under the heading of added values. Alas, the

Figure 6 : Graphic representation of acceptable proposals

procedures approved in France by the Ministry of the Economy for the bookkeeping of insurance indemnities precludes this simultaneity. Let us take a concrete example :

An industrial installation is totally destroyed by fire. The accounts of the insured show :

	millions of francs
— original gross investments	22
— amortizations effected	13
— net book value on day of accident	9
— effective value on day of accidents	26

Suppose that the insurance indemnity is equal to the effective value : this indemnity will be analyzed by the tax authorities as follows :

	million of francs
● indemnity	26
● global added value (indemnity less net value)	17
— taxable at 50 % (the added value on short-term up to the amount of the amortizations), that is	13
— taxable at 15 % (the added value at long term) that is to say the difference between the global added value and the short term added value (17 MF — 13 MF), that is	0,6

Now let us examine various hypotheses of excesses, for example 1 MF, 3 MF, 6 MF, 10 MF, and analyze the impact thereof after the accident on the level of net "cash flow" (table 8).

This example clearly shows that excesses on accidents cannot be set off against tax.

However, if the net "cash flow" of the insured diminishes as the excess increases, the variations are not proportional. Let us follow this analysis by comparing the evolution of the decrease in "cash flow" with an increase in the excess (see table 9).

Having an excess of a given amount per case will not show up completely in the net cash flow. This is shown in figure 7.

This graph call sfor the two following comments ;

1^o) *the excess per claim is partially compensated by a smaller amount of value added tax ;*

2^o) *the compensation is relatively more important the higher the excess ;*

But one must be careful not to generalise too quickly as to the interest in having high excesses. Other elements must be taken into account, thus ;

— the firm's retention capacity ; the compensation by tax only becomes important for levels of excess which in themselves are relatively important (10 million francs in the preceding example) ; the amount of such an excess may be more than the firm can bear ;

— the reduction given for excess ; this reduction is really only significant for the first francs of the excess ; the passage of the excess from 5 to 10 million francs would certainly produce additional premium reduction but this would be much inferior to that given for the first 5 million.

Table 8 : Impact of the level of the net cash flow on excess per claim

1. Assumed excess	0	1 MF	3 M	6 M	10 M	20 M
2. Gross investment value	22	22	22	22	22	22
3. Net book value	9	9	9	9	9	9
4. Use value	26	26	26	26	26	26
5. Insurance Indemnity	26	25	23	20	16	6
6. Global added value	17	16	14	11	7	0
7. Taxable at 50 %	13	13	13	11	7	0
8. Taxable at 15 %	4	3	7	0	0	0
9. 50 % deductible from tax	0	0	0	0	0	3
10. Net cash flow $5 + \frac{1}{2}(9) - \frac{1}{2}(7) - 0.15(8)$	18.9	18	16.3	14.5	12.5	7.5

*Table 9 : Reduction in net cash flow
as a function of the importance of the excess per claim*

11. Assumed excess	0	1 MF	3 MF	6 MF	10 MF	20 MF
12. Excess per claim	0	1	3	6	10	20
13. Reduction in cash flow arising from the excess	0	0.9	2.6	4.4	6.4	11.4
14. Excess less reduction of cash flow (12) - (13)	0	0.1	0.4	1.6	3.6	8.6

*Figure 7 : Variation in net cash flow
as a function of the importance of excess per claim*