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Challenges of Home Underinsurance and a  
solution framework for insurance  
companies

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## Nomenclature

$w$	Premium of a household policy
$w'$	Premium after taxes and administrative levies
$w_u$	Premium of a household policy, assuming underinsurance
$w_{max}$	Highest premium that a policyholder accepts to pay
$r$	Policy rate
$c$	Sum insured
$t$	Taxes and administrative levies
$p_a$	Claim probability
$n$	Nr. of years in which policyholders have their assets underinsured
$m$	Households' net income
$S$	Policyholders' savings
$S_h$	Households' annual savings
$B$	Underinsurance burden for policyholders
$N$	Nr. of years necessary to pay a claim
$B_s$	Expected benefits of financial protection
$C_s$	Expected costs of financial protection
$\delta$	Percentage of underinsurance
$\alpha$	Percentage of loss in respect to the real value
$\mu$	Households' savings rate
$\rho$	Ratio between perceived underinsurance and real underinsurance
$y$	Incurred claims
$LR$	Loss Ratio
APROSE	Associação Portuguesa dos Produtores Profissionais de Seguros
P&L	Profit and Loss Account

## **Abstract**

All over the world, evidence suggests that individuals tend to undervalue their assets. This subject seems to be particularly dramatic in the case of home insurance line of business because of its social and economical relevance. Consumers' behaviour is guided by some core principles and variables which mixed with environmental characteristics can lead in many cases to some sort of underinsurance.

This work presents a framework in order to understand why individuals take insurance decisions and why they frequently underinsure their assets, by presenting the most significant causes that can help us to identify the true origin of the problem. Moreover, analysis of its consequences allows understanding of impact over economical agents, namely insurers and policyholders. Even though this issue could be also analyzed under a social perspective, involving the role of government's authorities, discussion is centered in interactions between the two sides of an insurance contract. Finally, we propose a set of solutions that may be designed in order to minimize likelihood of underinsurance.

**Keywords:** underinsurance; insurers; policyholders; premium; assets; average clause.

## Resumo

Existem dados que indicam que, de forma global, há uma tendência natural dos indivíduos para subavaliarem os seus activos, sendo que este assunto parece ser particularmente dramático no caso do seguro de habitação devido à sua relevância social e económica. O comportamento dos consumidores é guiado por algumas variáveis e princípios-chave que, em conjunto com as características do meio envolvente, levam em muitos casos a situações de infra-seguro ou subseguro.

Este trabalho apresenta uma sistematização do problema para que se compreenda a forma como os indivíduos tomam as suas decisões no contexto dos seguros e o porquê de colocarem frequentemente os seus activos em situações de infra-seguro. Nesse sentido, apresentar-se-ão igualmente as causas mais importantes que nos ajudam a identificar a verdadeira origem do problema. Para além disso, a análise das suas consequências permite compreender o impacto nos agentes económicos, nomeadamente nos seguradores e nos tomadores de seguro. Ainda que este assunto possa ser analisado sob uma perspectiva social, envolvendo o papel das autoridades governamentais, a discussão é centrada nas interações entre as duas partes do contrato de seguro. Finalmente, propomos um conjunto de soluções que podem ser desenhadas de forma a reduzir a possibilidade de ocorrência de infra-seguro.

Palavras-chave: infra-seguro; subseguro; seguradores; tomadores de seguro; activos; regra proporcional.

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## 1. Introduction

The role of insurance in the economy is crucial as it allows individuals and firms to face future with less uncertainty by reducing the risk of their choices. In that sense, it's very important to guarantee that every insurance policy in force, with the function of mitigate a particular risk, is properly designed in order to achieve its purpose. Otherwise, economic agents would be misusing a costly tool and taking their decisions without an effective safety net.

This work aims to present underinsurance as one of the dangerous traps in which policyholders and insurers can fall when buying or selling an insurance policy but also intends to analyze its effects in the economy from both points of view and to propose some guidelines for the future in order to reduce the problem. Even though we're dealing with an issue that may affect a large variety of lines of business, in terms of insurance products, we will limit our study to home insurance. This choice was mainly based on the social importance of this product in developed economies, not only among households, but also among insurance companies due to the high proportion of these products in the books of insurance companies. Preferably, we will base our study in literature about those economies for who the underinsurance theme is quite critical and where a large amount of data is available, but, where possible, this work will try to give a special emphasis to the Portuguese Market.

Underinsurance is a situation in which the sum insured is lower than the real value of the asset. Focusing on household insurance, we may also define underinsurance as the situation when the maximum value that can be paid after a claim is less than the rebuilding cost or the replacement value, depending if we are dealing with buildings, contents or both. As buildings, we're considering any permanent structure used for

domestic purposes, including main buildings, fixtures and fittings, outbuildings, tanks, pipes and cables, aerials, etc; and as contents, household goods and personal property of the permanent members of household.

In addition to covers' type and extent, insurance policies stipulate the level of coverage in terms of the capital insured. In many cases, people's residence is the single or the largest asset that households possess and therefore, there should be a great concern about getting a good financial protection. The fact is that this may be not achieved if the insurance limit doesn't reflect the property's full value. During the last decades, reality has showed that beyond the risk of a facing a small or medium-size claim, for example, a theft or a simple escape of water, just to mention two of the most common ones, there are very large risks that mankind can face, as there's a record of thousands of homes that all over the world have been completely destroyed by catastrophic floods, earthquakes and fires. In parallel, insurance companies should be also very interested in having the full information in their books by getting the correct values of the assets covered, in order to write at the right price and to make good decisions in their investments.

The next three chapters will present a theoretical overview on underinsurance most important issues. In Chapter 2, a framework will be presented to better understand how consumers take their decisions in the context of insurance, followed by Chapters 3 and 4 that will introduce the most relevant causes and consequences of underinsurance. A critical view on the subject and the discussion of these causes and consequences are the main goals of Chapter 5 and finally, in Chapter 6, we will propose some principles and tools that could be used by insurers in order to avoid or to reduce underinsurance.

## 2. Decision-making process

Before starting to present the causes behind underinsurance, it's important to understand the reasons that sustain individuals' decisions when they face a certain situation in their lives that could require an insurance contract, in order to reduce risk and uncertainty. In that sense, this paragraph will present a framework that allow us to better understand decision-making processes, guiding most of the analysis of the following sections.

According to Tooth and Barker (2007) the reason why some people do not fully insure is because they feel the benefits of doing it do not outweigh the cost. Therefore, decision is in many occasions subjected only to a cost analysis, especially if there is a previous bad experience with an insurance product. Let  $s$  denote the investment in assets' financial protection and let  $B_s$  denote the expected benefits of doing it and  $C_s$  its costs. Thus, it is expected that individuals are willing to do their investments only if:

$$B_s > C_s$$

Kunreuther (1996) observed that, in many cases, proprietors don't care about general protection measures. In other words, there is a natural level for  $B_s$  that tends to be small. For this reason their interest in home insurance is also limited. In respect to costs, Kunreuther and Pauly (2006) pointed out that empirical evidence suggests that cost-effective preventive measures are not rewarded by insurers in order to change consumers' behaviour. By not reducing  $C_s$  at the margin, marketing activities do not always produce results that are in the best interest of individuals at risk. Moreover, the relevance of price ( $C_s$ ) is quite high for its immediate nature, in opposition to the

potential benefit of buying an insurance policy ( $B_S$ ), specially, in cases where a previous bad experience with an insurance policy may affect the expectations of getting a future benefit from it. As such, decision is frequently subjected to the conclusion that costs are high when compared to the benefits.

For Kunreuther and Pauly (2006), cost-benefit analysis is a good framework to understand the subscription process of an insurance policy and appears as a function of time, discount rate and probability of having a claim. So, any kind of decisions that try to avoid or limit the purchasing of insurance is fundamentally due to two main aspects.

- i. An underestimation of the probability of having a claim. Under the assumption that the owner sets a lifetime for his own house, he will probably think that any damage will only happen after he leaves his house, what can make him suppose that he's immune to any type of event. That's the case in which claim probability ( $p_a$ ), is lower than the probability level where policyholder begins to be worried about possible damages ( $p_a^*$ ).

$$p_a < p_a^*$$

- ii. Second, individuals with high discount rates tend to undervalue future benefits and this way, are less willing to adopt any type of protection or risk mitigation measures. Furthermore, the fact that an insurance policy is limited to a determined time period (annual, for instance), makes that the expected benefit of buying a policy may be more connected to the contract period than the expected lifetime of the subjacent asset.

Just like in many other products or services, in insurance decisions price to pay also plays an important role. Grace *et al.* (2002) analyzed a data set for 60 companies in 4 different years and estimated price elasticity and its effects on demand, for American home insurance market (particularly, New York and Florida). Results showed some differences from region to region, depending also on the type of coverage, but they found that insurance demand was generally price sensitive. As a result, price effects shall be studied when relevant decisions are under analysis: insuring or not, choosing type of coverage and deductible level or calculating amount to insure are just some examples.

Typically, the premium of a household policy ( $w$ ), before taxes and administrative levies, can vary according to changes in rate ( $r$ ) and sum insured ( $c$ ).

$$w = r \times c$$

Variations in rates can be explained by different factors such as risk location, number and type of covers, policyholder occupation, deductible level, home security devices, etc. However, some of them, like the risk location, cannot be manipulated by policyholders. On the other hand, some common actions that normally give to consumers a discount in premium, such as the purchase of an alarm system, can represent an extra-expenditure (increasing  $C_s$ ). Other actions, when a high deductible, is set, for example, may cause a large increase in the risk perception (decreasing  $B_s$ ). Consequently and considering  $r$  as a constant value, in cases where policyholders try to minimize  $w$ , decreasing  $c$  appears as the only solution possible.

In order to better understand changes in  $c$ , it's important to underline that in home insurance market we should be aware of the difference between the questions raised by the valuation of capitals for building and contents, in the sense that calculation of building's sum insured is in many cases more complex, requiring some specialized skills. However, there are also some sorts of contents very hard to value and there are also cases like the Portuguese market, for example, where local rebuilding costs for insurance purposes are determined by the law. Price sensibility is also different. In the view of Tooth and Barker (2007) demand for contents seems to be much more elastic and there are some principles supporting this idea. First, the potential loss in the case of buildings is generally greater and, consequently, individuals are less risk averse for contents (in fact, some people think they have very little to insure). Then, consumers can easily take the option of deciding to not insure house contents at all, which is much more difficult in the case of buildings, due to some legal implications or to the obligations related to bank loans. At last, policyholders have the possibility of replacing damaged high quality goods to low quality ones, being difficult to do the same with the building (with most building claims this option is not available as, almost by necessity, the damage needs to be quickly corrected by professional trade's people).

### **3. Causes of underinsurance**

There are several factors that are taken into account in cost-benefit analysis and that in the end can lead to the existence of underinsurance or in more extreme situations to non-insurance. Although it's quite common to find financial motivations that can increase the importance of centering the debate on price effects, some of them are related to social, economical and demographical reasons and others to behavioural aspects. The work of Krantz and Kunreuther (2007) reports that sometimes individuals purchase insurance that appears to be unattractive from a financial point of view but that achieves other types of goals.

#### **3.1. Poor knowledge of insurance contracts and lack of information**

Although the great social importance of home insurance, it's clear that a considerably part of the population of developed countries does not fully understand policy wordings and, commonly, policyholders are not aware of some fundamental questions that are behind the construction of an insurance policy until the insurer starts to settle the claim.

Spanish and Portuguese laws, for example, determine that policyholders must insure their assets according to their real value - see Calero (2001) and Decreto-Lei n.º 72/2008, respectively - which not only raises some questions related to the definition of value, but also establishes the obligation of doing a proper valuation of the assets. According to the law, in cases where the sum insured is lower than the real value, policyholders will only be entitled to recover such proportion of the loss, as the sum insured bears in relation to the real value of the asset. This is also known as the Average Clause.



Under the theoretical hypothesis of a market with perfect information, consumers would be more informed about potential consequences of getting incorrect values, and consequently, it would be expected that this would reduce, *ceteris paribus*, the likelihood of underinsurance. In other words, poor information allows consumers to think that their  $B_g$  is lower than what is and in practice, they won't feel the need to buy so much financial protection as they should.

Lack of information is a cause that seems to be directly related to poor knowledge of insurance issues but it comes also from a low level of transparency that may exist in the relationships between insurers and its clients, within an industry where contracts are for the most of the clients, quite complex. Jones (2007) indicates these reasons as some of the most relevant key factors in underinsurance and non-insurance.

However, actually, there's an effort made by insurers and other type of organizations that, in some way, are related to insurance industry, in order to promote some combat measures that may reduce underinsurance levels. As an example, from the twelve largest non-life Portuguese insurance companies (90% of the total market share, approx.), six of them have, on their websites, specific info about how to calculate capital to insure. This type of information is also available on an insurance guide issued in 2010 by the Portuguese insurance supervisory authority. This type of intervention in the market is even more common in mature markets like the United Kingdom or in countries that are particularly exposed to some perils, like Australia.

In some cases, due to a high opportunity cost in terms of time, sales people, agents and brokers, feel the need to speed up and to simplify the sale process. This way, policyholder may be not informed properly about every step to take during subscription. Eckardt and R athke-D oppner (2008) found that in the German market the duration of counseling interviews is the single most important factor that has a positive effect both

on the information quality as well as on the total service quality provided. However, they also recognize deep information asymmetries between insurers' intermediaries and their customers.

According to Tooth and Barker (2007) lack of insurance is more prevalent in youth groups, in cases where individuals do not work in full-time, among groups with low levels of education, in single-parent families and also among retired workers with mortgages. Thus, it is expected that levels of poverty and existence of financial and economic problems that negatively influence investment made in insurance subjects are positively correlated to the level of knowledge of insurance contracts. For Eckardt and R athke-D oppner (2008), the more knowledge that consumers have about insurance subjects, the higher is the quality of information given by a broker is expect to be. It's easy to understand that the financial situation and economical issues are also important factors that often lead to an attempt of reducing  $w$ , setting lower values than the real ones through variations in  $c$ .

### **3.2. Cost of obtaining a valuation**

In parallel with the question "what are the consequences of underinsuring" there are some problems around the topic "how to avoid underinsurance". In that sense, some problems sometimes arise in the time of calculating rebuilding and replacement costs. A report by Australian Securities & Investments Comissions (2005) includes a survey made in 2000, where 1000 homeowners were randomly selected by an Australian company specialized in estimating rebuilding costs. They found that 87% of the houses were insured for less than their rebuilding value. However, a gap seems to exist between real figures and estimates made by homeowners. An article published by Suncorp (2007), in which is related a survey made in 2001 by Insurance Council of Australia,

showed that 93% of the clients thought they were insured for the right amount or even over-insured.

The existence of a cost ( $C_s$ ) associated to the valuation of the sum to insure is certainly a factor that can reduce usage levels of this kind of processes and consequently, may raise the probability of getting incorrect values. Based in a survey made by Insurance Council of Australia in 2001, Jones (2007) also indicates the cost of obtaining a formal valuation as a key factor.

Even in countries like Portugal where there is a legal framework defining the cost of rebuilding or, at least, creating a generalized and accepted benchmark for it, in many cases they are totally inadequate because materials and techniques used may be far away from usual standards, turning the task of valuation even more difficult and costly. This leaves policyholders with the responsibility of doing such a complex task and leads them to put a lot of time and effort in. Alternatively, they can hire professional valuers, although this option will probably increase  $C_s$  for a larger amount.

In the case of contents, a correct quantification may be a very hard task that also requires a lot of time and effort, not only because of the large amount of general goods that is necessary to identify and quantify, as also because of the great difficulty of setting a price for each one, namely for special items such as jewellery, antiques or fine art. These can have a valuation price that may be sufficiently high to commit its execution. Besides the fee paid to professions valuers, there is also an opportunity cost in terms of time, effort and privacy since there is a generalized attempt of the insurers to encourage their clients to list this kind of contents in an individual basis, filling for each item its replacement cost.

### 3.3. Tax burden

In countries with high levels of taxation, including taxes on insurance industry, there is a pressure over income and for that reason it often turns difficult to consumers to legitimate insurance premiums. As a consequence, they might want to find ways to reduce it. This should be seen as a particular case of price effects over insurance demand, as the existence of a tax burden increases insurance premiums and consequently,  $C_s$ . Let's define  $w'$  as insurance premium after taxes and administrative levies ( $t$ ).

$$w' = w + t$$

Beside the legitimacy issue, the other reason why we should focus on this particular case is because in some markets where these problems have been studied through the last decades, this effect is particularly high with serious consequences.

Australia is one of the countries where taxation level in insurance industry is considerably high. Insurance Council of Australia (2007) reported that in the state of Victoria, a household policy suffers, via taxes, an increase in premium by approximately 50%. A Suncorp report (2007) defined that the behaviour that leads to underinsurance should be analyzed taking into account policyholders' perception of the value, as taxes and levies attached to insurance contracts are not perceived as good values and, so, distort the decision to purchase insurance. In the same way, Tooth and Barker (2007) stated that it is expected that the introduction of a marginal tax levy can distort the incentive to buy more insurance, resulting in the increase of underinsurance likelihood.

According to Insurance Council of Australia (2005), historically, it was held that demand for insurance was quite inelastic, since it was difficult to consumers to pool risk without this type of financial protection. However, this view has been challenged by the growing experience that has been showing that insurance purchase is, in fact, very sensible to price, existing a high correlation between tax burden levels and insurance products capture rate.

#### **3.4. Assymetric Information and Free-riding**

This section will focus on a specific issue that influences premiums evolution: adverse selection. Once again this choice is driven by the major role it plays in insurance markets analysis, particularly in some regions where this subject is particularly important and still being discussed.

Typically, insurance market is a good source of examples related to adverse selection and moral hazard. One of the most documented ones is that in cases where there isn't mandatory insurance for a specific peril, it may happen that only the high-exposed individuals run to buy the cover. One good example arises from Portugal, a country considerably exposed to the earthquakes risk, even with different levels of risk, depending on the region. A 2007 report from Instituto de Seguros de Portugal, indicates that in high risk areas the percentage of people buying this cover is much higher than in low risk areas.

Since the existence of adverse selection in this process leads to high premiums, some individuals potentially interested in buying earthquakes cover, for example, will possible be out of the game due to financial problems. Others, with a relatively higher  $B_s$ , will try to reduce their policy costs where possible, in order to respect their budget constraint. Figure 3.1 shows the vicious circle that will keep premiums in high

standards. This will reinforce the high probability of having different sorts of underinsurance. Many authors like Raschky and Weck-Hannemann in 2007, reported that without introducing mandatory insurance, at least in covers related to natural hazards that regions are exposed to, there will be a higher risk of adverse selection and underinsurance, as there's no possibility of turning this circle into a virtuous one by eliminating the adverse selection problem.

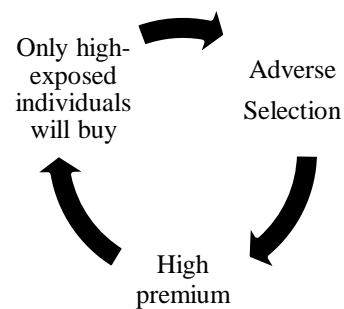


Figure 3.1 Adverse selection vicious circle

In parallel, another type of problem arises when consumers can reach a minimum level of  $B_s$  without having to face  $C_s$ . According to our methodology, it was expected that having  $B_s > C_s$  we wouldn't face underinsurance problems, as individuals would seek for financial protection. The question is that in some cases, individuals will put themselves out of the market, trying to benefit without purchasing the correct amount of insurance.

If we define, for the purpose of this discussion, aid and assistance as public goods and taxes over the premium as part of the contribution to support these services, we can find some evidence of the existence of free-riding behaviours: consumers expect to benefit from their position, getting the good without paying for it. For the sake of the

argument, we should recall that in Portugal firemen corporations are partially funded by a tax applied over insurance premiums, namely in fire perils.

The possible need to be helped by a third-party (government, family or non-governmental organizations) under the hypothesis of no-exclusion increases the expectation that is really possible to have the good without having to pay for it and, therefore, the probability of underinsurance or non-insurance. Logically, in this type of situations we are mainly discussing the consequences of a catastrophe, more than the occurrence of a normal and non-expensive claim, just a like a simple escape of water. Jones (2007) is one of the authors who supports the idea that in some cases, the decision of underinsuring can come from the expectation that it will always be a safety net (Government or family, in most cases) that will assist people in the case of the occurrence of a large catastrophe, what can diminish the incentive to insure assets properly. For Hood, Stein and McCann (2005), one of the reasons behind the low uptake in home insurance is the fact that his possession minimizes the possibility of getting emergency assistance and temporary housing at the expense of local authorities, after a catastrophic loss such as flooding or earthquake.

Along the last decades, it has been observed a large number of natural disasters where, despite clear social and private advantages of insurance, countries remain seriously underinsured. Although we can find high levels of underinsurance in industrialized countries, the problem is much deeper in developing countries. For example, by the time of Izmit Earthquake (Turkey, 1999), that happened one year before the introduction of Turkey Catastrophe Insurance Pool, only 5% of the assets (representing 21% of government total revenue) were properly insured.

### 3.5. Competitiveness

Although this work relies on the underinsurance theme in the case of home insurance – typically, a financial product for private clients – it would be also interesting to understand in which way firms can produce some kind of behaviours that can lead to underinsurance. Moreover, it is possible to find some firms as policyholders of home insurance policies: real estate companies which have to manage the property until the moment of the sale; firms that have real estate assets in their portfolio, etc. We'll see that in the case of corporate clients, different types of effects may be in place, either by having a high  $C_s$  or a small perception of  $B_s$ .

In the case of small and medium companies, the amount of  $w$  (impacting  $C_s$ ) takes an important role in the firms' cost structure, what can make them more reluctant in the moment they have to decide to buy or not more insurance. As a consequence, they may tolerate more easily risk and uncertainty. Jones (2007) considered that even when it is suggested that the level of insurance may be too low and the asset may be underinsured, an increase of the  $c$  and consequently in  $w$ , is seen as lost of competitiveness, on the assumption that competitors will maintain a low level of coverage, deciding for themselves to be underinsured in order to have lower costs and to be, this way, more competitive.

On the other hand, it's important the fact that a house does not represent the same for firms and for households, as for most of the families, their home is normally the only asset they have, besides the fact that is the place where they live. Thus, apart from emotional reasons, the likelihood of having a claim that damages a substantial part of a unique asset should be a sufficient reason for people to be concerned in the moment they have to define coverage and amount to insure. Even knowing that at a top-level, firms often have risk management policies that define strict protection measures, most



of the firms don't have the perception of the benefits ( $B_s$ ) they'll get by buying adequate protection measures: their managers don't live there and the house may represent only a small part of the portfolio.

### **3.6. Inertia and procrastination**

Some of the factors that we may consider as costs and that may increase  $C_s$ , are not material or easily measured, even in terms of time. Some of those influencing variables, like procrastination, are quite variable among different groups of individuals, are emotional related and can be better explained by psychological theories and behavioural approaches. However, they're important to understand some of the reasons behind the existence of underinsurance.

As explained before, some of the tasks that policyholders have to do in order to reduce the risk of underinsurance are not very attractive, as they take a great amount of time from them. This lack of interest mixed with a natural tendency that many individuals have for procrastination, can increase the probability of postponement. In fact, one of the most common reasons why people successively postpone the review and calculation of the amounts insured is the time they have to spend in this process (consequently, a high  $C_s$ ). But apart from valuations, there are also other very relevant tasks that are often procrastinated or even ignored, such as the full reading of the schedule and the policy wording or the regular contacts to the broker or insurance company to ask questions or to review capitals. For that reason, actually, it is possible to watch a great effort made by the insurers in order to explain some important clauses and vocabulary or to help consumers to list the contents and to index the amounts insured to the present economic reality. Marketing actions like these have an evident purpose of

saving some time to policyholders, but also to increase consumers' awareness to these problems.

The conclusion that inertia and procrastination are behind of underinsurance problems can be found in the work of Jones (2007). However, instead of stressing the cost side, his analysis is much more based in a relatively low  $B_S$ . Jones' main idea is that is not conceded to insurance issues sufficient importance to impose for itself as priority, in comparison with other aspects of life and because of that, individuals tend to impose themselves a different prioritization.

### **3.7. Feeling of invulnerability**

Underinsurance level may be also affected by the perception that individuals have of the risks they may face in the future. Just like procrastination, presented in the previous paragraph, this is another behavioural aspect that should be understood as an important constraint when consumers buy insurance. In fact, demand is not always driven by the desire to be protected, as many individuals don't think that they might need an insurance policy for "a rainy day" (consequently, a small  $B_S$ ). Curiously, one of the major forces that move consumers to purchase home insurance and that smoothes the path to underinsurance, is the fact that is often required by financial institutions when mortgages are negotiated. Without that obligation, levels of underinsurance would be in many countries much higher.

Jolls and Sustain (2006) defined "optimism bias" as the tendency of people to believe that their probability of facing a bad outcome is lower than it actually is, based on substantial evidence that people underestimate their own likelihood of being involved in a car accident or affected by a flood. In other words, there's a belief that a low-probability bad event won't ever happen to them. As such, one of the consequences

is a decrease in concern over whether the insured value is appropriated or not. Jones (2007) also addresses that in many cases, consumers have a feeling of invulnerability (believing that nothing really bad will happen to them) and informally get an optimistic risk estimate that leads them to underinsure their assets in an attempt to reduce  $w$ .

Decision-making processes are influenced by concepts and criteria that are available to consumers at the time the decision has to be made, which means that policyholders base their decisions mainly on their knowledge, feelings and previous experiences, rather than in rational thinking presumed by traditional models. For Fox (2010), one of these forces of influence is the fact that not many people have experienced the low-probability losses for which they seek insurance.

### **3.8. Level of risk aversion**

This section is also about risk perception, but from a slightly different perspective from the previous one. It's important to understand that, in many cases, policyholders who don't buy insurance policies because don't perceive it as an important thing to do, in fact, don't have the full perception of the high risk taken. However, there are some very rational consumers who consciously seek for a partial coverage of their assets, just because they are more willing to accept risk.

Jones (2007) concluded that there are some consumers who are sufficiently wealthy to self-insure. Similarly, a study from Dubin and Cicchetti (1994) about risk-aversion and the decision to self-insure, points out that for most consumers, increases in income lead to increases in the likelihood that self-insurance is selected, which corroborates the hypothesis that wealthy individuals with greater levels of education, are less likely to perceive real value in these kind of contracts, since these persons tend to be less risk-

averse and therefore it is higher the probability of self-insuring than consumers who face restricted budgets.

Both groups rely on a small  $B_s$ , as their perception of the benefit they'll get is not sufficient to avoid underinsurance. However, agents that may be affected by their decisions (namely insurers and Government agencies) and that may be interested in solving underinsurance problem, should be aware that different solutions are needed. Investments in marketing and communication that are focused on the increase of the awareness of consumers about underinsurance problems would certainly produce different results, as the group who consciously seeks for a partial coverage have a much better level of information to support their decision.

### **3.9. Inflation**

Although the previous sections cover the majority of situations that lead to underinsurance, not always the problem of underinsurance is explained by actions that are produced by individuals. A particular case arises from the market dynamics of supply and demand, specifically when a major event, like a catastrophic natural disaster, occurs.

The occurrence of a great catastrophe can bring some inflation problems in rebuilding costs, causing an unexpected situation of underinsurance. This problem is explained by a pressure in prices that is caused by a quick increase in demand of goods used in rebuilding works, not compensated by the supply side. According to Australian Securities & Investments Comissions (2005) after the Camberra Great Bushfires, in 2003, as well as cyclones Tracy in 1974 and Larry, in 2006, or after the Newcastle earthquake, major raises in rebuilding costs were observed. For example, following Cyclone Tracy it was observed an increase in prices by 75%.

In theory, total rebuilding costs can only be determined when there is a total loss. So, only building reconstruction give us full information about the real value. If this doesn't really happen, underinsurance level is tested only against a hypothetical value. This estimate will be necessarily based in predictable factors and any posterior, unexpected and extraordinary increase at the cost level will put, very easily, the consumer in an underinsurance situation.

Although we know that the occurrence of large catastrophes can lead to periods of inflation, this is a particular form of underinsurance that should be understood in a different way because is not apparent in the moment of the purchase. We know that some geographic areas are very exposed to natural catastrophes, but even prudent policyholders cannot predict the need to increase the amount to insure in order to face an unexpected inflationary phenomenon.

## 4. Consequences

The existence of home underinsurance, either for building, contents or both, has some important implications that are important to be aware of. According to the literature, there are some major risks that economic agents face when they fall into “underinsurance trap”, and we can see that in extreme cases, its financial consequences can be either socially dramatic for families or highly affect the profitability of an insurer’s line of business.

In the next sections, we’ll present the greatest and most commonly referenced pitfalls in the view of three different economic agents: homeowners, insurers and governments which in some situations may appear not as a ruling organization, but more as the representative agent of the whole society.

### 4.1. Homeowners

Of course, there is an evident gain for the policyholder when one of his assets is underinsured, in the form of a premium saving. This issue was discussed in Chapter 3 as one of the biggest incentives to set a lower capital, under the hypothesis of a constant rate: if homeowners decide to underinsure their assets (being or not aware) and assuming no claims happen, a part of their budget can be transferred to other activities that can produce a higher level of satisfaction.

Nonetheless, many authors, researchers and several institutions, including insurance companies, alert to the great financial risk that individuals face when underinsured and to its consequences in people’s lives and businesses. For example, Oswald D.P., *et al* (2005), alert to the difficulties that individuals may face in getting the services or the

goods they'll need if a serious problem occurs. In this sense, we would like to emphasize three specific situations that are related in literature:

- Besides the trauma inherent to the claim (although not very common, it can represent a total loss), policyholder can find that his insurance is not sufficient to rebuild his house. - Australian Securities & Investments Comissions (2005);
- Wealth is not always based in liquid assets. Using nonliquid or scarce liquid assets may have complicated consequences and individuals may have to incur more debt. – Blankenau, J. *et al.* (2009)
- There is also a potential failure of business if this kind of loss can cause business interruption – Jones (2007).

In addition to the issues related above, strictly connected to problems of financial nature and to its major consequences, there is also the case of having higher prices caused by high levels of underinsurance which can affect individuals. According to Jones (2007):

- If sums insured are lower than the optimal level, insurers will be under pressure to cover risk exposure and thus, there will be an impact on premiums to those who choose to insure correctly;
- If profitability declines due to this problem, it may result in that some insurers will withdraw from this insurance class, causing less competition and consequently, higher prices.

## **4.2. Insurers**

Although literature is more focused on consumers' problems and in what could happen if they don't insure properly, some authors have done some work centered in the implications for insurance companies.

As we saw in the last section, the work of Jones (2007) mentions the danger of having problems in profitability. But besides that, a report from an Australian government organization, Department of Planning and Community Development (2009), points out some other major implications for insurers:

- Underinsurance is seen as a gap that can distort the insurers' perception about the market and can lead to a wrong pricing policy;
- If buildings and contents are underinsured, in the insurers' point of view there is a decrease in the size of the market.

## **4.3. Governments**

In our research we also found several authors that give some attention to the effects that underinsurance can have in societies and, consequently to the impact it can cause on governments' budgets and plans. In fact, a considerable part of the specialized literature related to his subject, particularly from Australia, is written and issued by governmental institutions that have large experience in dealing to problems arising after great catastrophes and natural disasters.

Jones (2007) concluded that governments are one of the stakeholders that can suffer from the impact of underinsurance, in the sense that taxes over premiums, in absolute terms, are lower when insurers underwrite undervalued assets, since premiums are a function of sums insured. This conclusion is also addressed by the article of Department



of Planning and Community Development (2009). But Jones (2007) also refers an effect for society that can be transferred to government, at least in some extension: economic impact from natural disasters and the inefficiencies of risks transfers between insurers and individuals.

It seems to exist a general consensus on the fact that there is a burden for the public sector, as many authors and institutions, wrote about this (for example, the Department of Planning and Community Development (2009)), not only within household theme, but also about health insurance (the work of Oswald D.P., Bodurtha J.N., Broadus C.H., *et al* (2005), for example). This idea seems to be directly connected to the subject introduced in Section 3.5, when we analyzed free-riding problems.

## **5. Discussion on causes and consequences**

This chapter aims to analyze the causes and consequences presented in previous chapters, providing, where possible, a critical view on some of the issues presented by literature available. Besides the idea of getting a statistical support to the presented aspects, we think it's important to:

- i) Give these questions a quantitative dimension;
- ii) Design an analysis framework allowing a better understand of these issues.

Another goal we pretend to achieve in the following sections of this chapter is to understand what is happening in the Portuguese market and to see if some of the ideas that were written by American or Australian authors and authorities can be translated to the Portuguese insurance industry.

### **5.1. Brokers Survey**

We conducted a survey to measure some of the aspects presented in this work as causes of underinsurance. Our choice of interviewing insurance brokers was based on the principle that they act as consultants, guiding consumers through a considerable part of the decision-making process. That way, they can be close enough to them to understand some of their major motivations.

A total of 100 Portuguese insurance brokers were anonymously surveyed, from a group of 1.100 members of APROSE (Associação Portuguesa dos Produtores Profissionais de Seguros), a Portuguese broker association, who were asked by *e-mail* to answer a survey about underinsurance, available online. Questions are also available in Appendix A.

Table 5.1 presents absolute frequencies. Before entering into details of each question, it's interesting to see that, although some of the answers results (that can vary from *Very Low* to *Very High*, with a five-level scale) appear to be around average values, some are more concentrated on the extremes. Another interesting result is that none of the surveyed brokers found that policyholders' will to quantify or to revise sum insured for contents is very high or that the number of policyholders affected by the feeling of invulnerability when facing non-compulsory insurance policies is very low.

	Nr. of Responses					Sum
	Very Low	Low	Average	High	Very high	
<i>Question 1</i>	31	53	11	3	2	100
<i>Question 2</i>	2	13	33	41	11	100
<i>Question 3</i>	10	53	35	2	0	100
<i>Question 4</i>	0	6	19	52	23	100
<i>Question 5</i>	9	35	29	21	6	100
<i>Question 6</i>	6	17	42	31	4	100
<i>Question 7</i>	3	18	24	42	13	100

Table 5.1 Survey absolute frequencies

With the purpose of understanding the role of information on underinsurance, Table 5.2 provides an indication about how brokers percept policyholders' knowledge of insurance contracts. The results derive from Question 1: How large is the number of policyholders knowing the existence and the effects of the Average Clause? Results confirm the idea of a poor level of knowledge, showing that 84% of the brokers think that only a small part of the market (*Low* and *Very Low*) knows the existence of such an important rule like the Average Clause.

Nr. of policyholders that are aware of the existence and the effects of the Average Clause					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	31%	53%	11%	3%	2%

Table 5.2 Distribution of Portuguese broker's opinions about knowledge of insurance contracts

Although there's a general consensus on the idea that low incomes, on average, lead to low levels of education and information, we tried to understand the view of Portuguese brokers about correlation between social and economic background and level of knowledge (Question 6). Even if results in Table 5.3 are not perfectly clear, there's a bias to the right indicating that the majority of the brokers believe that this fact is relevant.

Correlation level between policyholders' social and economic background and their knowledge about insurance policies					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	6%	17%	42%	31%	4%

Table 5.3 Distribution of Portuguese brokers' opinions about correlation between knowledge and  
economical background

In Chapter 4 we presented some factors that could turn valuations in difficult tasks to do, namely because of its cost and some behavioural aspects like inertia. Without specifying the reasons behind it, Table 5.4 shows the distribution of Portuguese broker's opinion about the will to quantify or to revise sum insured, in terms of the number of policyholders that are interested in doing it (Question 3). In this case, figures are very clear and confirm that valuations are not attractive. Only 2% of the surveyed brokers

think that policyholders' will is greater than *Moderate*, although 63% find it *Low* or *Very Low*.

Policyholders' will to quantify or to revise sum insured for contents					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	10%	53%	35%	2%	0%

Table 5.4 Distribution of Portuguese brokers' opinions about the propensity of consumers to quantify or to revise capital for contents

Table 5.5 illustrates the opinion of Portuguese brokers about the frequency of underinsurance correlated with financial issues (Question 2). In other words, we wanted to know if the number of cases in which individuals with financial problems try to reduce capitals to get a smaller premium is high. It's interesting to notice that only 15% of the surveyed brokers think that is not significant (*Low* and *Very Low*) the number of situations where financial problems lead to attempts of underinsurance. So, a considerable part of this group of professionals seems to deal quite frequently with this kind of issues.

A deeper analysis, centered in specific causes, would be needed to understand how and in what extent, this behaviour can be motivated by other factors such as unemployment, increase in tax levels (Section 3.3) or competitiveness reasons (Section 3.5).

Nr. of situations where diminishing power purchasing leads to attempts of underinsurance in order to reduce premium to pay					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	2%	13%	33%	41%	11%

Table 5.5 Distribution of Portuguese brokers' opinions about correlation between financial problems and underinsurance

We can find one of the clearest results of this survey in answers to question 4, where we wanted to know how brokers perceive their customers in terms of invulnerability beliefs (Question 4). Figures in Table 5.6 indicate that brokers think that their clients have this kind of feelings, even when they're not dealing with compulsory policies. Data shows that only 6% of the brokers believe that this is a behaviour of small group (*Low* and *Very Low*), but the majority (75%) thinks that the number of clients that act like nothing bad will ever happen (*High* and *Very High*) is significant.

Again, we would have to make a deeper research in order to calculate the correlation between sense of invulnerability and underinsurance level to see whether it could lead to negligent attitudes (*nothing bad will happen* - Section 3.7) or to free-riding (*someone will pay* - Section 3.4). However, results of the survey indicate that this type of behaviour seems to be frequent to the eyes of insurance brokers.

Nr. of policyholders affected by the feeling of invulnerability ( <i>nothing bad will happen</i> ) when facing non-compulsory insurance policies					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	0%	6%	19%	52%	23%

Table 5.6 Distribution of Portuguese brokers' opinions about the policyholders' feeling of invulnerability

In Section 3.8 we saw that, according to some authors, there are individuals who consciously seek for a partial coverage. So, we formulated Question 5 to see how Portuguese brokers see this issue.

Results in Table 5.7 are not clear enough to conclude if it's high the number of individuals who make this kind of options, but the bias to the left indicates that brokers' perception is that the number should not be very high. However it's also important to notice that only 9% of the brokers see this question as almost irrelevant (*Very Low*). This may mean that there are some individuals who consciously underinsure.

Nr. of policyholders that, in a conscient and informed way, are willing to self-insure or to underinsure in order to reduce premium to pay					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	9%	35%	29%	21%	6%

Table 5.7 Distribution of Portuguese brokers' opinions about level of risk aversion

Since premium seems to be a key element that can influence consumers in their decisions, we would like to get a quantitative measure about this influence. So, we asked Portuguese brokers about what could be the risk of losing a business if there was an increase in premium caused by an increase of the sum insured (Question 7).

Results in Table 5.8 show that brokers see demand as price sensitive, independently of the cause behind price increases. More than a half thinks that risk of lapsing is *High* or *Very High*. This is an important result, as we're facing a great number of consumers who apparently don't care if the price increase is a result of an adjustment of the value of their assets to reality, and not as a consequence of a rates review.

Level of risk that insurance companies face, in terms of lapsing likelihood, by increasing premiums, as a consequence of the increase of the sum insured					
	Very Low	Low	Moderate	High	Very High
Opinions distribution	3%	18%	24%	42%	13%

Table 5.8 Distribution of Portuguese brokers' opinions about risk of rate increases in terms of lapsing likelihood

## 5.2. Consequences analysis

Here, we present our proposal for a framework based on some simple modeling, that will help us to better understand what may be the consequences of underinsurance for the two sides of an insurance contract: insurers and policyholders (in this section we won't extend the analysis to government bodies). Also based on Portuguese statistics, this framework should provide some quantitative indicators about how extent could be the consequences of underinsurance for the two agents, in the context of the Portuguese market.

The following sub-sections should also give us some information that could allow us to make a critical review on literature about underinsurance, particularly, about its consequences for insurers and customers.

### 5.2.1. Homeowners

#### i. Savings

Just like is reported on the literature about the subject, the most obvious gain for the policyholder is the amount of premium he can save by setting a low sum insured.

In order to better understand the relationship between underinsurance and higher levels of satisfaction, through savings, we start defining premium. We will assume the



existence of underinsurance. Denote the premium as  $w_u$  and the percentage of underinsurance as  $\delta$ . We should also recall  $r$  as the policy rate and  $c$  as the sum insured.

$$w_u = rc(1 - \delta)$$

Then, we'll also define savings, denoted as  $S$ , as the difference between what would be the premium with and without underinsurance:

$$S(\delta) = w - w_u = rc - rc(1 - \delta) = rc\delta,$$

where  $r$  and  $c$  are given constants. If consumers have the power to artificially reduce the sum to insure, they should expect to save an extra amount of money.

Now let  $n$  represent the number of years in which policyholders have their assets underinsured and, assuming there are no changes in rates, sum insured and underinsurance level, we'll have annual savings being multiplied by the number of years underinsured.  $S_i$  represents the savings in year  $i$ .

$$\sum_{i=1}^n S_i = rc\delta n$$

Along the years, policyholders will see the amounts saved being increased, just like it's represented in Figure 5.1 for three different scenarios: one, five and fifteen years.

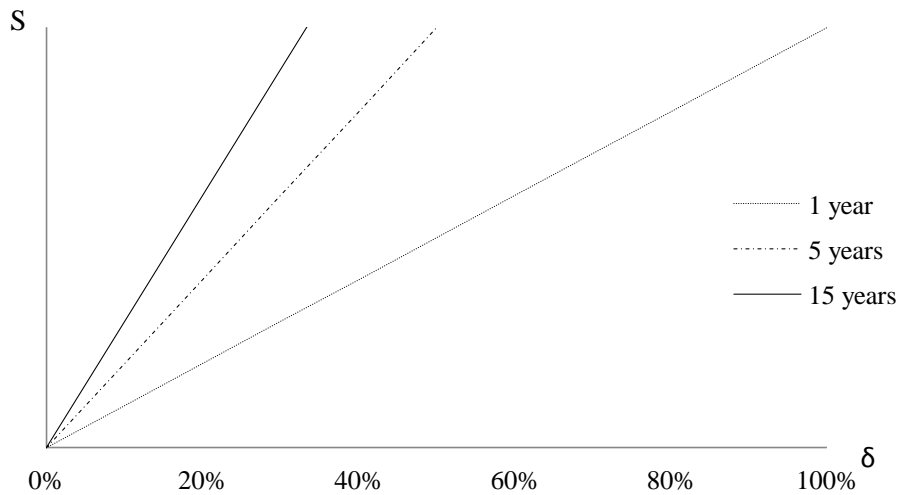


Figure 5.1 Evolution of savings

This work will not focus the discussion around consumers' utility function or any dynamics in their choices of consumption, even knowing that would be important to understand their motivation to insure correctly or not. However, this analysis shows that, independently on the valuation given to insurance or any other alternative, there is the possibility of get some savings that, theoretically, could be better applied elsewhere.

## ii. Financial losses

Underinsurance usually brings two types of problems after the occurrence of a claim:

- Even without average clause, the claim paid by the insurer (limited to the sum insured) may not be sufficient, especially when a total loss occurs, to rebuild the house or to replace the contents lost.
- Considering average clause, policyholders will not get anything from insurers for the proportion uninsured.

Since great or even total losses are not the most frequent situations, the average clause is possibly the most important source of financial problems. But before starting to explain in detail the reason why average clause, together with underinsurance, can produce unwanted effects, it is crucial to make a distinction between different forms of underinsurance:

- Level of real underinsurance that corresponds to the difference between real value and capital insured and that is determined by policyholders, even if it's not really a conscious and rational process.
- Level of underinsurance determined by insurers. After the claim, insurance companies may decide to hire a loss adjuster that can observe some differences between their perception of the asset's value and the sum insured in the policy schedule.

For the purpose of this discussion, we'll consider the second type, under the hypothesis that it is the value that will be decisive in claims' settlement, no matter what is the real underinsurance value or the figure determined by individuals in the moment of subscription.

In order to better understand the financial impact we will calculate the burden that policyholders face when they underinsure. So, let  $\alpha$  represents the percentage of loss, in respect to the real value of the asset, previously to the claim. The burden that policyholders have to bear for not taking all the risk is  $B$ , where:

$$B = \alpha c \delta$$

We should note that the financial impact for policyholders, in absolute terms, will positively depend on the size of the loss, the capital insured and the percentage of

underinsurance. Other variables that could influence this sum, like deductibles, for example, will not be taken into account.

We can get a relative measure for the impact of  $B$  in customers' budgets, we decided to calculate an indicator that should answer the following question: *in case of a claim where the assets are underinsured, how much time will it take to pay  $B$ , without a significant change in consumption patterns?* In other words, this indicator should provide us the number of yearly savings ( $N$ ) that would be necessary to pay the claim that should be paid by an insurance company, if everything was properly insured.

Defining  $S_h$  as the household's annual savings,  $m$  as the household's net income and  $\mu$  as the savings rate, then  $N$  is given by:

$$N = \frac{B}{S_h} = \frac{\alpha c \delta}{m \mu}$$

It's easy to understand that the burden to consumers in terms of the number of years to pay the claim, is not only positively dependent on assets' value, percentage of loss and level of underinsurance, but is also negatively dependent on the families' pattern of savings. As a result, the idea presented by Blankenau, J. *et al.* (2009) that underinsured individuals may have to incur more debt, seems to be reasonable, especially on those who have not liquid savings.

We can simulate some scenarios with different levels for our variables, in such a way we can obtain a good understanding of  $N$ . Again, we chose to use Portuguese data to run the simulations, so we could see what could be the impact over the average Portuguese household. Data is related with building rather than with contents, but this focus is more a consequence of the availability of data than a choice motivated for any other aspects, even if we know that the analysis of the building component may be more

significant, due to his social importance and to the fact that, in terms of insured household assets, there are much more buildings than contents. The inexistence of a generalized benchmark for contents in the Portuguese market, like we can found on the case of buildings (rebuilding costs per geographical region), induces us to think that may be a large problem of underinsurance in contents and that, as a consequence, it would be important to get some quantitative measure of financial impact caused by a loss in contents. Nonetheless, using the same framework, we could do the exact same analysis for contents that we will do for buildings..

Basically, we aimed to simulate different results for  $N$ , basing our calculations in Portuguese average values for the area of a house, its rebuilding costs, savings rate and households' income. Using these values we simulated  $N$  for different percentages of loss and underinsurance to see the extension of impacts in function of these two variables. Full details about formulas and figures used in Appendix B.

Figure 5.2 shows that the impact on household's savings can achieve very different levels of magnitude, depending on the combination of claim severity ( $\alpha$ ) with the percentage of underinsurance ( $\delta$ ).

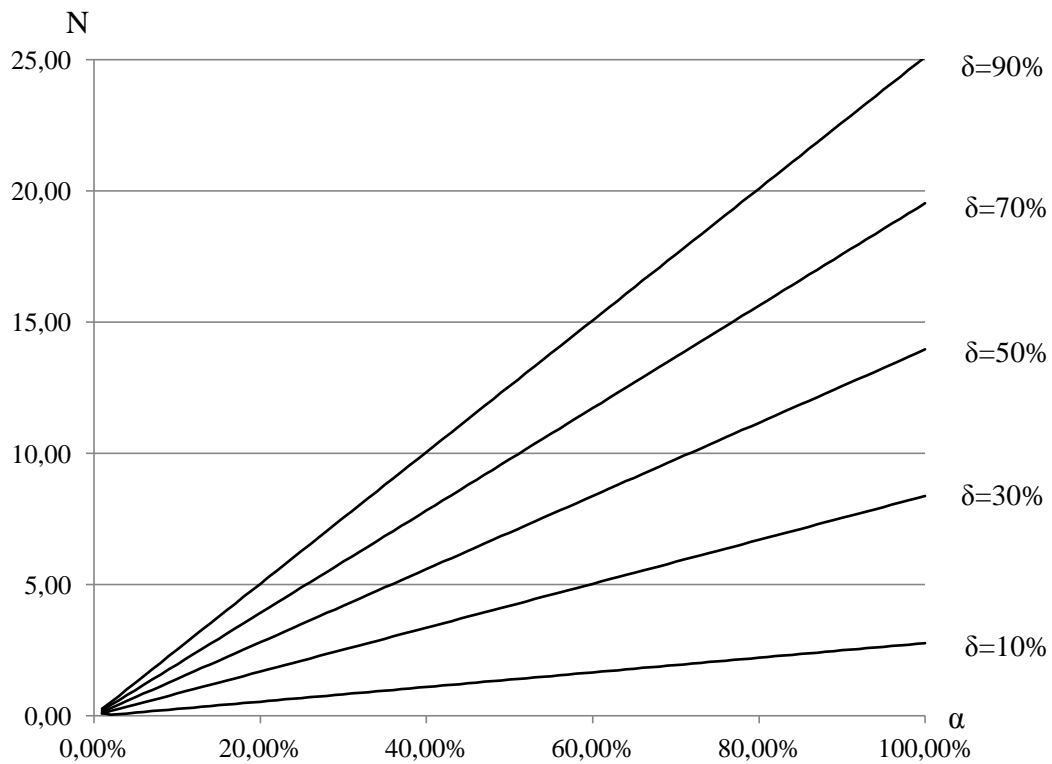


Figure 5.2 Impact of underinsurance on households' savings (with average clause)

Although we cannot actually find data about average levels of underinsurance for the Portuguese market, for the sake of this discussion we will use some benchmarks in order to get a picture of the problem. Surveys that were made in Australia in the first half of the last decade, according to a study made by the Australian Securities & Investments Commission (2005), reported a range of average levels of underinsurance, from 10% to 40%, approximately, depending on the study. We will also separate the type of claims according to the following classification, in terms of  $\alpha$ . Even without a formal classification, the objective is to separate claims by its severity.

- i) [0%, 5%]
- ii) [5%, 50%]
- iii) [50%, 100%]

Then, for a given level of 30% of underinsurance, households may have to spend 1 to 5 months of their savings in case of having a claim of type i), 6 months to 4 years in the case of having a type ii), and from 4 to 8 years when a type iii) occurs.

Even though we'll not make a deep analysis over it, it would be interesting to measure opportunity costs in terms of consumers' utility function. For example, when a consumer allocates all his savings to rebuild his home, he cannot spend his money in activities that would produce higher levels of satisfaction.

Interpretation of these results shall consider that typology of claims depend not only on severity, but also on frequency. Since there is empirical evidence of a higher frequency in claims of type i), it means that from a social and economical point of view, this is an important sort of claims in terms of the consumers' will to buy insurance. Thus, it's important to consider the impact of these claims, even if financial consequences are not catastrophic. On the other hand, it's crucial to see what can happen to  $N$  in case of a large claim or a total loss, even if the likelihood of this kind of occurrence is very low. However, history has been showing that, from time to time, some large catastrophe or natural disaster cause very large losses, leaving homeless a considerable number of people. Madeira floods, in 2010, represented the greatest impact ever, over the Portuguese insurance industry, caused by a natural disaster. Two months later, insurance companies reported an average cost per claim of € 8.278,00. However, it's known that a lot of people, with or without insurance, completely lost their homes. Considering the same figure used above for total rebuilding costs and, again, with

buildings being underinsured by 30%, on average, Madeira's inhabitants would have to dedicate one year of their savings to the reconstruction of their own homes.

Independently of each type of claim we are considering, an insurance policy would be worthless if after the claim settlement, policyholders still have a high financial burden over his shoulders.

At a first look, we'll see the effects on household's savings in cases where insurers waive average clause. When this happens insurers will always settle the claim as a *First Loss*, without caring about the sum insured and its approximation to reality.

From Figure 5.3 it's possible to observe that losses for policyholders only occurs when  $\alpha > (1 - \delta)$ , to say when percentage of real loss is greater than the capital insured. In this case, there is a threshold at the point where real loss equals total capital insured. Under that value, policyholder does not share any risk with the insured and is always on a safe ground. Thus, there's only a high risk of compromising future savings in cases where there are large losses and/or large amounts underinsured.



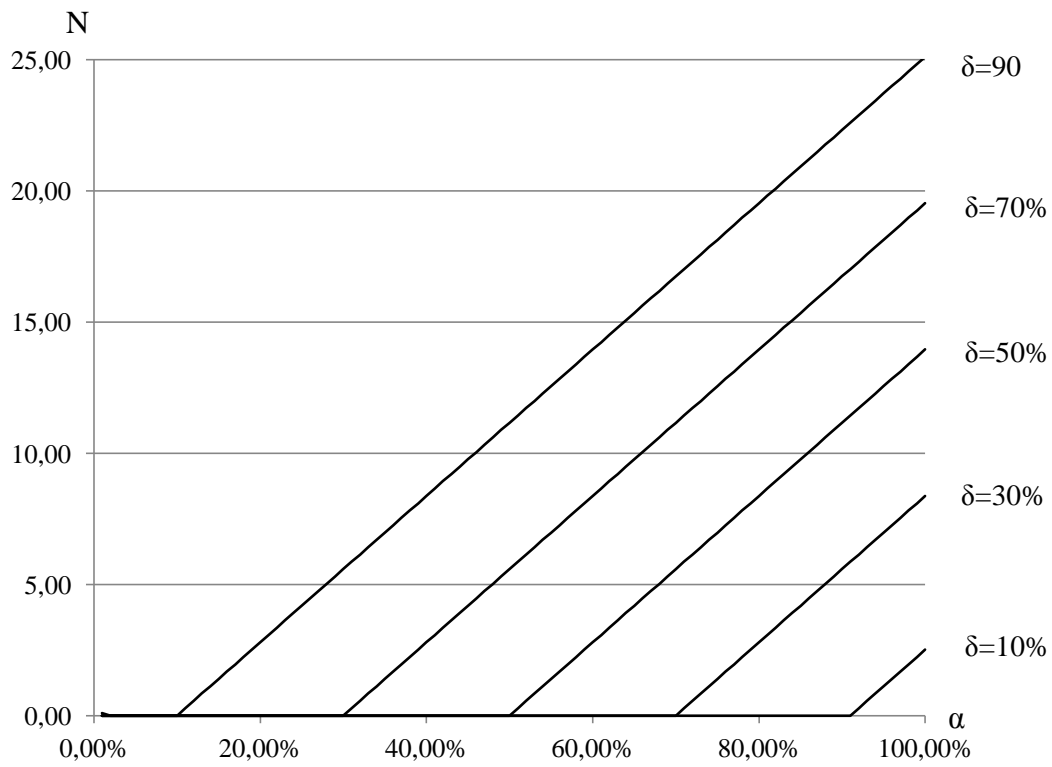


Figure 5.3 Impact of underinsurance on households' savings (without average clause)

Moreover, as we can see in Figure 5.4, in any case policyholders are worse with “no average clause” policies than when average clause is applied, what means that the average clause plays a fundamental role in the process of quantifying the financial risk for consumers.

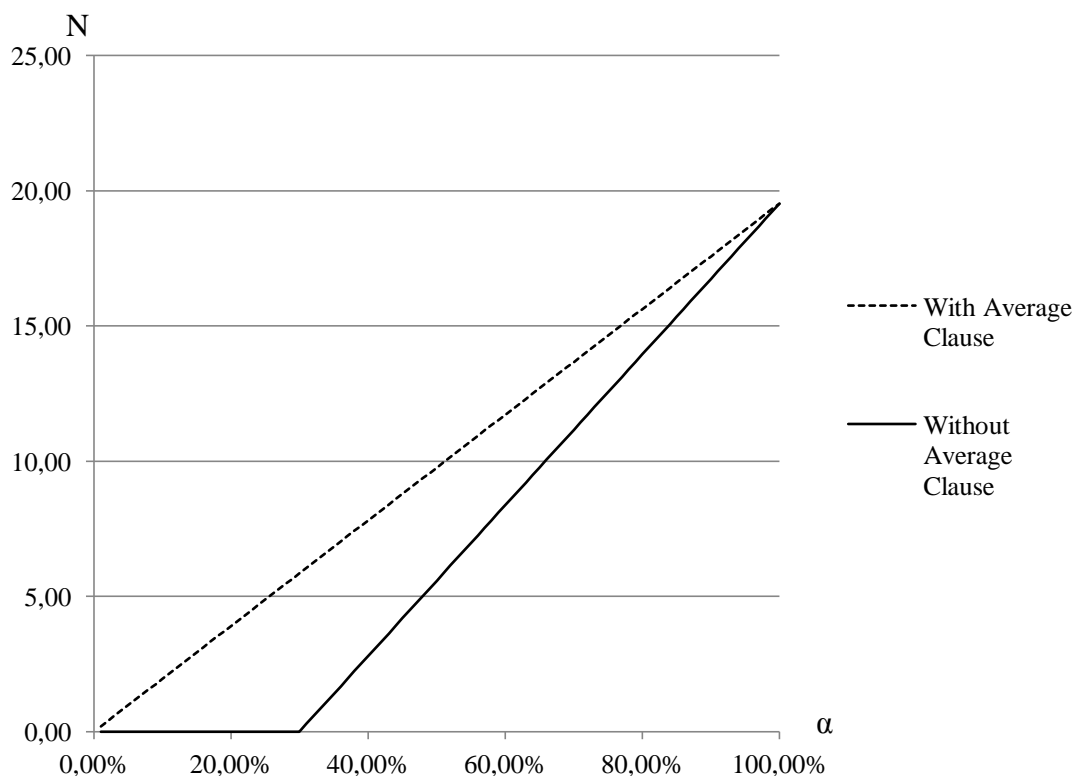


Figure 5.4 Comparison between policies with average clause and without average clause

The average clause is designed to get a compromise from policyholders, since it reduces insurers' exposure to the exact proportion of the capital insured with respect to the real value. Since it is included in the great majority of the Portuguese insurance policies, in general, policyholders should be aware that, by not compromising themselves in making an effort to achieve an optimal level of insurance, they can face serious financial consequences.

### 5.2.2. Insurance companies

In this section we'll try to understand how insurance companies can be affected by underinsurance and how this issue can lead to a wrong pricing policy, just like we saw in the literature. Even though some authors described impacts of underinsurance for insurance companies in several domains (strategic, commercial, etc) we'll focus our

attention in financial consequences. In the same line of the explanation given for policyholders, our analysis for insurers will also take into account the role of the average clause, as well as other aspects.

a. Consequences – with average clause

First, we'll construct our framework assuming that insurance companies have the average clause in their policy wordings. Second, it's important to underline that our analysis will be centered on the Loss Ratio (*LR*), as is one of most used key performance indicators in insurance industry, to assess technical performance of insurers.

Defining *y* as incurred claims and recalling that insurance premiums are represented by *w*, calculation of *LR* is given by the following formula:

$$LR = \frac{y}{w}$$

It's important to see whether average clause can influence *LR* and to measure how large is that effect. Once again we will base our calculations in average values for Portugal, to get a sense of reality in this particular market.

In Section 5.2.1, we explained the effect of the application of the average clause over policyholders' budgets and we saw that, after a claim, the level of underinsurance determined by the client (real underinsurance level) can differ from the one perceived by insurers, through the eyes of loss adjusters.

If we choose to develop our analysis using just one single figure (for instance, the real insurance level), we will have the following effect in *LR*:

$$LR = \frac{y}{w} = \frac{y(1 - \delta)}{w(1 - \delta)} = \frac{y}{w}$$

By observing results above, we can see that average clause neutralizes the decrease in premiums caused by underinsurance, as claims payments are reduced for the same relative amount. Thus, relationship between premium and incurred claims keeps the same. Though, we should understand that this is only valid when we have a single  $\delta$ , both in numerator and denominator. In other words, insurers, by the time of claims' settlement, would have to determine the right exact amount of underinsurance that would eliminate the loss of premium effect.

In real world, when we combine actions produced by the two sides of the relationship, insurers and policyholders, we think it's not reasonable to consider just one single  $\delta$ . Optimizing  $\delta$  to prepare the application of the average clause, would mean that for every single case, insurers would have to know the exact value of assets in order to calculate effect of underinsurance in premiums. Due to the fact this is not a very reasonable hypothesis, there will normally be a gap between real underinsurance and underinsurance level determined by insurance companies. Maybe, the only situation where insurance companies receive enough information to do a very good valuation is when a total loss occurs because in this case, it's easier to see that the capital defined in the policy is not sufficient to rebuild or to replace the asset lost. However, in household business, total losses are quite rare, as we have a much larger proportion of partial losses where this calculation is much more difficult.

In order to integrate this gap in our analysis, we'll define  $\rho$  as a measure to the capability of insurance companies to detect underinsurance in an accurate way, where  $\rho$  is the ratio between underinsurance perceived by the insurer and the real underinsurance level. This way, calculation of  $LR$  is now given by the following formula:

$$LR = \frac{y(1 - \delta\rho)}{w(1 - \delta)}$$

We should underline that is reasonable to think that  $\rho$  can be less or greater than 1, whenever insurers underrate or overrate their perception of underinsurance. Then, if:

$$\left\{ \begin{array}{l} \rho = 1 \rightarrow \text{Loss ratio remains equal} \\ \rho < 1 \rightarrow \text{Loss ratio increases} \\ \rho > 1 \rightarrow \text{Loss ratio decreases} \end{array} \right.$$

So, Loss Ratio is dependent on the quality of the assets valuation after claims, as insurers with high skills in this matter or very strict on applying average clause will pay less claims in proportion to its liabilities. In contrast, when  $\rho$  is too small, the usage of the average clause will be very limited and thus, LR will rise.

Figure 5.5 shows how the  $LR$  vary according to underinsurance and different levels of  $\rho$ . The analysis starts from a hypothetical point where:

- Insurance companies achieve a 55%  $LR$ , an average value for the Portuguese market - Associação Portuguesa de Seguradores (2010));
- Underinsurance level is 20%;
- $\rho$  is 95%.

Although the analysis of movements and directions wouldn't change significantly, a deeper investigation about the market values for  $\delta$  and  $\rho$  would be important to get a precise measure of the impacts.

We've determined what happens when:

- a) Insurers adopt measures to fight underinsurance or relax about this issue (changes in  $\delta$ )
- b) Insurers decide to be tougher in applying the average clause or use it more accurately, or when its usage become more distant from real levels of underinsurance (changes in  $\rho$ )

Observing the graph we see that insurers can improve their loss ratios when they adopt both a) and/or b) in order to reduce underinsurance. However, from the starting point considered above, there are only a few gains in adopting those type of measures (the most insurers can gain is an absolute decrease of 0,7%) because underinsurance levels are not very high and  $\rho$  is close to its optimum. But, as we're moving to the right, where underinsurance levels are higher the gap between different levels of  $\rho$ , is also larger in absolute terms.

It's also possible to see that, along  $\rho = 100\%$ , it doesn't matter how underinsured policyholders are, since insurers can perfectly apply the average clause. On the other side, with smaller levels of  $\rho$ , especially when mixed with great levels of underinsurance, insurance companies have an extra incentive to control the problem.

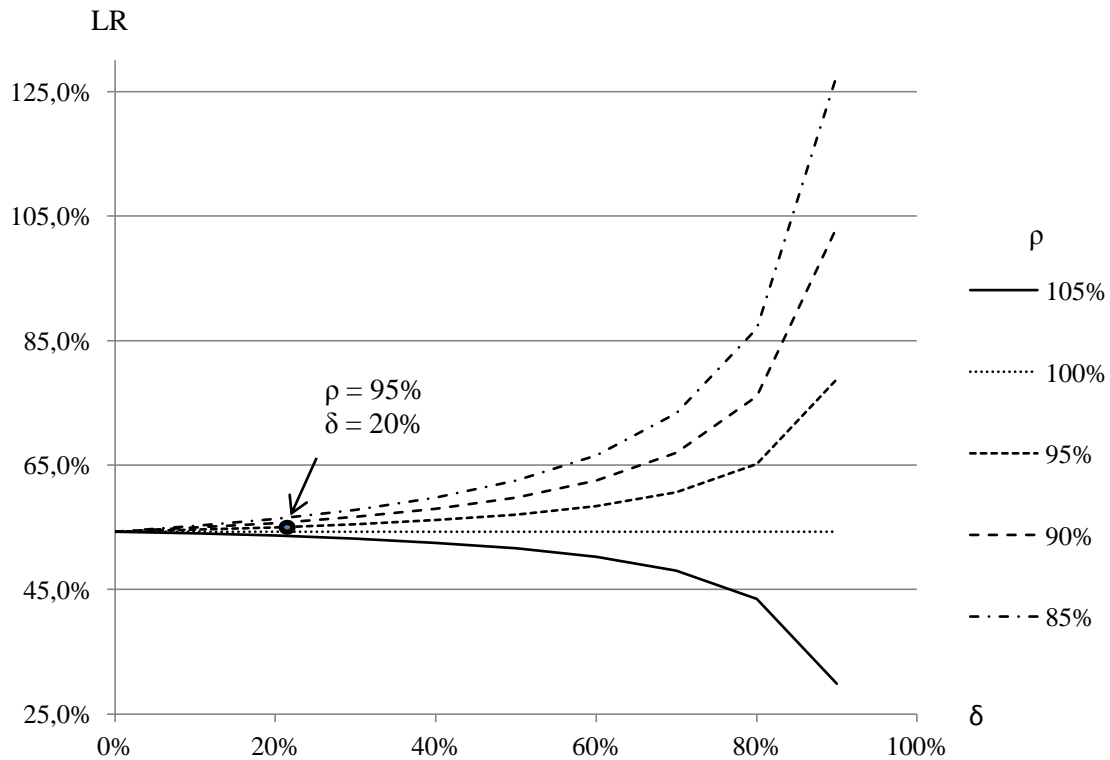


Figure 5.5 Impacts of  $\rho$  and  $\delta$  on the Loss Ratio

b. Consequences – without average clause

Nowadays, it's possible to find some insurance companies that, mainly for commercial and marketing motivations, waive average clause from their wordings. In Section 5.2 we saw that the impact on consumers' wealth is much lower when there's no average clause. So it's reasonable to presume that the average clause waive can be transformed into a valid sales argument. On the other way, we also observed that this clause can smooth the impact of underinsurance in loss ratios, by adjusting claims to pay to the amount of premium that is collected, in the same proportion of capital insured in comparison to its real value. As a result, it seems to be important the assessment of the price of this kind of commercial initiative, through the analysis of what may happen when insurers let the clause fall down.

Without an average clause, insurers don't have the power to balance the two components of loss ratio, since incurred claims ( $y$ ) are not reduced in the same proportion of premium ( $w$ ), when assets are underinsured. The following formula for the loss ratio is different from the situation when average clause is applicable, in the sense that incurred claims are not multiplied by  $(1 - \delta)$  anymore. So we'll have:

$$LR = \frac{y}{w(1 - \delta)}$$

This way, we can see that loss ratio will increase much quicker when underinsurance becomes more severe, as decrease in premiums caused by underinsurance is not compensated in incurred claims' side.

Again, for our analysis of the impacts we assumed that:

- Insurers have a  $LR$  of 55%,
- On average, the assets are underinsured by 20%

The first interesting result is that, to achieve the same  $LR$ , we'll need to have our premiums 23,5% higher, approximately, with respect to the situation where average clause is applied (considering  $\rho = 0,95$ ). Naturally, this variation in premiums will vary according to different values of  $\rho$ : Table 5.9 shows the difference in premiums to achieve the same  $LR$  of 55% with 20% of underinsurance, but based in different values of  $\rho$ .



$\rho$	<b>95,0%</b>	<b>92,5%</b>	<b>90,0%</b>	<b>87,5%</b>	<b>85,0%</b>	<b>82,5%</b>
a) Premium (with average clause)	101,3	101,9	102,5	103,1	103,8	104,4
b) Premium (without average clause)	125,0					
Dif: a) - b)	23,5%	22,7%	22,0%	21,2%	20,5%	19,8%

Table 5.9 Differences in premium to achieve the same results

As premium without average clause must be substantially higher, we may conclude that any strategic, commercial or underwriting decision that goes in the direction of waiving this clause, should be aware of the high impact in premium necessary to keep the same level of *LR* and all its consequences (we have seen, for example, that a pressure in prices could lead to higher levels of underinsurance).

Besides the impact in premiums, we will see what the impact is over *LR*, when there is a variation of  $\delta$ , whose results can be observed in Figure 5.6. Once more, we're starting from the same underinsurance level ( $\delta = 20\%$ ) and contrary to what happens when an average clause is put in place (we're considering  $\rho = 0,95$ ), now we have much greater deviations from a *LR* of 55% when underinsurance levels increase. This means that insurers are much more exposed to this problem when they don't have a clause to protect them and to smooth their relative losses. The graph allows a comparison between the two curves and it's interesting to see that to the left of the starting point, the curve "without average clause" is below the other one, which means that the gains can be also higher. This happens because premiums remain in high standards, at the same level as before, when they were designed to balance a higher underinsurance level. However, the main conclusion lays on the right side of the graph, where is obvious the potential difference in results we may find by applying or not the average clause.

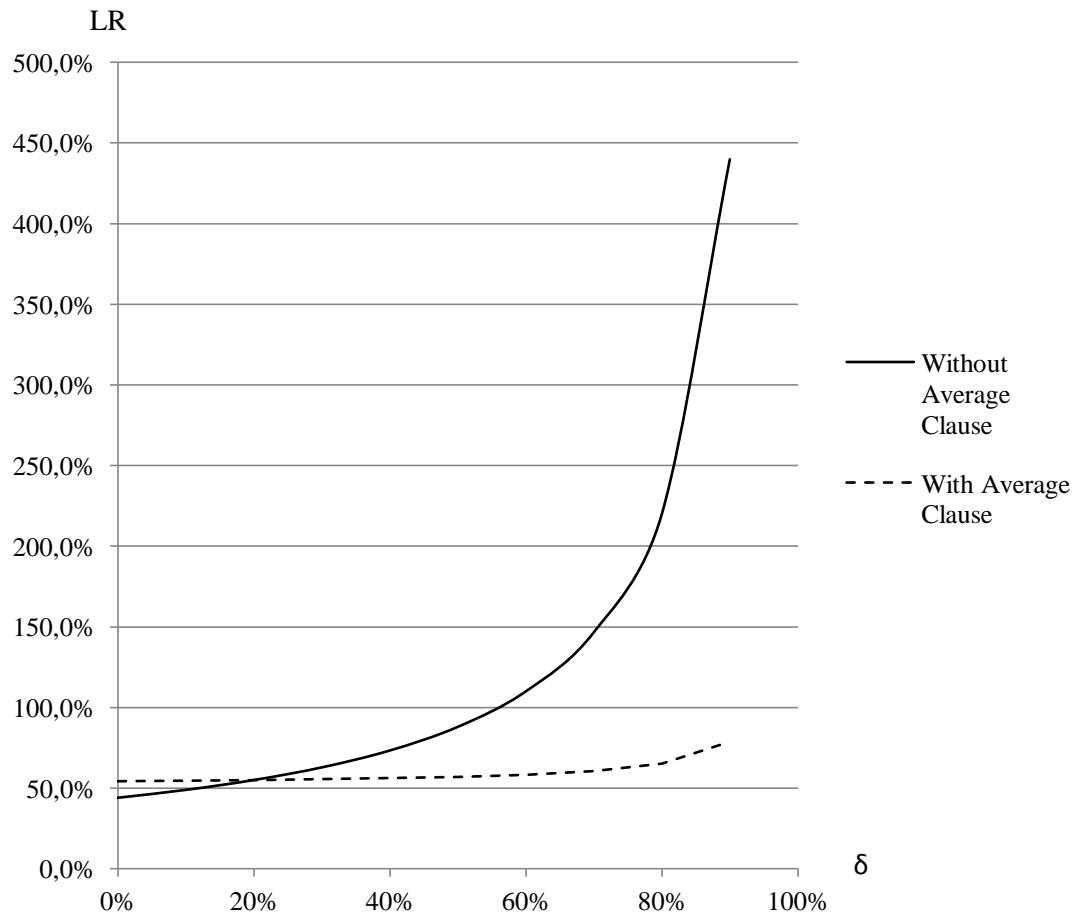


Figure 5.6 Impacts depending on the application of the average clause

## **6. A proposal for solving underinsurance issues**

This section aims to build a solution framework for insurance companies, through the presentation of some guidelines that could be followed in order to avoid underinsurance.

It would be interesting to have a proposal that could achieve all the groups that are affected and at the same time struggle against underinsurance, consumers, insurers or government authorities. Along the last sections, we have focused our attention in just two of these – consumers and insurers – but in this chapter we will deal with these issues only through the eyes of the insurer. Our choice is based on the belief that insurers are the ones who really have real capabilities and enough information to put changes in place and to create and develop new processes.

Our proposal will be mainly centered on broader strategic decisions, rather than in very specific and quantified measures. Moreover, we will take into account what we understand as the most crucial aspects to consider:

- Causes of underinsurance - It's important to understand upon which facts and behaviours, insurers can develop their work, in such a way they could interact with the market in a more efficient way.
- Consequences of underinsurance – Only after the quantification of the impacts over P&L (Profit and Loss Account) account, the insurers can plan any action designed to fight underinsurance.

As we've been introducing along the work, there are a couple of questions that require further investigation. One of those questions that we first should be able to

answer is: how can we detect and measure underinsurance? In fact, it doesn't make much sense that insurance companies start to invest in combat measures if there are no real means to detect it and in what extent. In our view, there are three main ways of detecting it, each of them representing a moment of a policy lifetime (see Figure 6.1), with its unique characteristics:

- i. Underwriting – During the first stage of the relationship between insurers and policyholders, when risks are analyzed for the first time and terms of the contract can be properly defined.
- ii. Claim settlement – After a claim and during its settlement, insurers have the opportunity to meet their clients and the risks they're taking, namely to see if values are correct.
- iii. Assessment / Data mining – Along the lifetime of a policy, risks can be assessed, either by a case-to-case analysis or through management information systems. Renewals are normally the best time to put necessary changes in place.

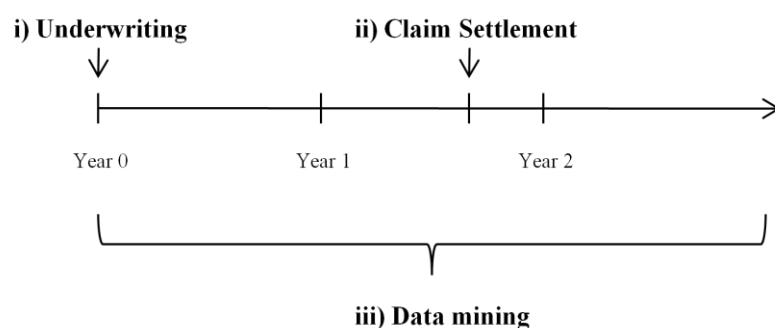


Figure 6.1 Fighting underinsurance along the lifetime of a policy

Detecting underinsurance is the first step of the problem resolution and excellence in executing the tasks above is certainly a good way not only to detect but also to prevent

and to correct possible situations of underinsurance. In many cases this will imply a strong investment in training, human resources, information systems, marketing and communication, etc. Besides opportunity costs, the amount of resources to be allocated to this matter will depend also on the expected direct benefit of the efforts related to the decrease of underinsurance levels. So, insurers should themselves make their own cost-benefit analysis and check what's the extent of their underinsurance issues, what could be the benefits of fighting against the problem in terms of the effects in their P&L and what would be the costs of implementing this type of planning. In Section 5.2 we presented a framework that can be used in order to understand the potential benefits, but as we have seen, it's fundamental to know where we're starting in terms of underinsurance level and/or capability to use the average clause.

Depending on the type of actions that can be done, expected costs and benefits can be, in some cases, more difficult to predict as the impact in P&L account, for medium and long term, is not always clear. For example, an insurer should not expect that direct benefits from an investment in staff training have the same time horizon that a correction made in capitals insured after a claim.

In the following sections we will present what we see as possible tools that can be used, in order to build a strategic and solution framework, designed to solve this kind of problems. By the end of this Chapter, namely in Figure 6.2, we will present a graphical summary of our framework.

Where possible, we will also support our ideas with results of previous experiences conducted by insurers or other type of organizations.

## 6.1. Communication

It was presented before that lack of information was one of the reasons behind underinsurance, as policyholders were not aware of some essential topics about insurance, like the average clause. This way, it's seems reasonable to think that some extra investment in communication that could increase these awareness, could definitely help of reducing the number of assets underinsured.

Efforts made in this field could imply an important investment and could also have a return only in the long term. So, they should be made with tight criteria and designed to achieve specific goals and groups. Australian Securities & Investments Comissions (2005) reported that insurers were trying to educate consumers in these matters, using different educational measures, including:

- Targeted messages, encouraging homeowners to check their level of cover, in “mail outs”, renewal letters, on websites;
- Research about behaviour of clients, based on surveys and claims data, in order to target messages that consumers are more likely to respond to.

Research that take into account behavioural aspects are fundamental and messages should be drawn to overwhelm issues like inertia or sense of invulnerability that can act as obstacles during communication efforts. Additionally, it's also important to shape and to adapt the type of information to the characteristics of some critical moments of the policy lifetime, just like we saw in Figure 6.1. For example, it makes sense to think that policyholders are more willing to accept any kind of advice related to underinsurance, after a claim where insurers have got very strong evidence of underinsurance than in an ordinary renewal.

A study from Hilgert *et al.* (2003), showed that financial knowledge was statistically linked to financial practices, what confirms the importance of a good communication between insurers and consumers. These authors also concluded that increases in knowledge and experience could lead to improvements in this field and that more important than sharing information, is to create the right combination of information, skill-building and motivation to make the desired changes in behaviours. Learning from the experiences of others (classes, seminars or through conversations with family and friends) is also seen as a good source of knowledge. If we apply these principles to the underinsurance theme, insurers should build their communication plans upon some critical principles:

- i. Providing information about the theme: consequences and possible solutions
- ii. Promoting share of experiences
- iii. Designing motivational strategies

Besides external information, provided to consumers, we think it might be useful in many cases to invest in internal information and training, in order to capture the attention of those who work in insurance companies (underwriters, claims underwriters, sales people, management information departments, etc.) and that may deal with this subject. This way, insurers will be more capable, not only to detect underinsured assets, as also to better understand its consequences and to deal with the problem. Moreover, investment in quality of human resources will allow insurers to explain to consumers what costs are covered by their policies and the extent of those costs. In other words, we think that the framework present in the paragraph above will only be applicable if there are the right skills to do it, inside companies. One example of that type of investments comes from Australia, where it was launched, in July 2005, a General Insurance Code

of Practice that should have a role in reducing the risk of underinsurance, by providing better and clearer information to consumers.

## **6.2. Calculators and benchmarks**

If one of the named causes for underinsurance was the cost of obtaining a valuation, it makes sense to think that helping consumers to evaluate their assets may be a possible way out. One tool that may be used for this purpose is a calculator and, in fact, nowadays it's possible to find web-based devices in many insurers' websites, especially in regions where these subjects have been studied more intensively like the United Kingdom or Australia. Basically, calculators are a type of software that models rebuilding and/or replacement costs, according to a number of specific variables: type of house, area, geographical location, number of rooms, number of residents, quality of the furniture, etc. Since variance in possible results can be large, calculators are often a mix of closed questions and open fields where users can adjust results.

The main benefit of developing these tools seems to be the simplification of the quantification process and the expectation that this can involve the consumers in the process, by inducing them to spend some time in the valuation of their own assets. However, as we're dealing in most cases with simple models, it's important to keep in mind that results may not be truly accurate. A report from Australian Securities & Investments Comissions (2005) found significant inconsistencies in the figures generated by calculators of the ten biggest insurers in Australia, with high degrees of variation for the same house (differences between the lowest and the highest estimate, from 42% to 169%). But developing these models to make them more reliable, can imply a high investment in information systems and technology and can also have a perverse effect, since it seems to be a trade-off between complexity of calculators and



consumers' willing to use them. According to Microsoft Corporation (2000), people tend to like highly usable products.

Although we can find some Portuguese insurers' websites where a guide is available for doing a contents inventory, we cannot find a real simulator for contents and building just like we can easily find in the case of Australian insurance companies. With the purpose to see the type of variables that are used more often, Table 6.1 shows which ones are used by six Australian companies in their simulators. It's clear that most of them consider 9 different variables for the estimation of rebuilding cost and at least 5 variables for the contents value.

	Commonwealth Bank	AA insurance	QBE insurance	Suncorp Insurance	Allianz	NRMA Insurance
<b>Building</b>						
Area (sq.m.)	x		x	x	x	x
Geographical zone	x		x	x	x	x
Type of material	x		x	x	x	x
Adjustements (improvements)	x					
Adjustements (nr. and type of rooms)	x		x	x	x	x
Year of construction			x		x	x
Quality of construction			x	x	x	x
Floor slope			x	x	x	x
Nr. Floors			x	x	x	x
Height			x		x	x
Type of house				x		
Occupation				x		
<b>Contents</b>						
Inventory per division and for special items	x					
Inventory per division		x				
Geographical zone			x	x	x	x
Nr. and type of rooms			x	x	x	x
Quality of the contents			x	x	x	x
Age of the residents			x	x	x	x
Inventory for special items			x	x	x	x
Quantity of contents				x	x	x

Table 6.1 Variables used by Australian insurers in building and contents simulators

Comparing to this method, Portuguese approach for the buildings, very much based on the annual values for rebuilding costs given by the Government, seems to be too simplistic since it just uses two variables: area and geographical zone (dividing the country in 3 zones, only).

We can present benchmarks as the first stage of the simulator creation, in the sense that we need to build the model upon some variables based on average values for certain aspects, just like we saw before. It could be possible to find many cases where it's not realistic to suppose that policyholders will quantify their assets in a formal and accurate way, through calculators, professional evaluators or similar ways. Thus, once again, one way to fight the problem may reside in simplification, but having the guarantee that, although simpler, the process will go in the right direction. It's fundamental to get the proper data and to use it correctly.

We can find some benchmarks commonly used in underwriting, that act as tools in the attempt of quantifying building and contents. Portuguese insurers, for example, when underwriting buildings, normally use values given by the Government that are updated in an annual basis. Table 6.2 presents the value for each of the three zones defined and the respective regions. Although this method can be a good starting point to orientate individuals, its generalized use can be dangerous as it is too simplistic, just like we saw in the last section. Evidence suggests that for each area, there is a wide range of values, depending on the quality of construction, as it's normal to find luxury neighborhoods and social housing areas in the same city or region. Again, we can learn from the experience of Australian Securities & Investments Comissions (2005) in this area: consumers using calculators that apply cost per square meter are at a greater risk of being underinsured.

	Zone I	Zone II	Zone III
Rebuilding cost per sq.m.	€ 741,48	€ 648,15	€ 587,22
Regions / Local Councils	District capitals and Almada, Amadora, Barreiro, Cascais, Gondomar, Loures, Maia, Matosinhos, Moita, Montijo, Odivelas, Oeiras, Póvoa do Varzim, Seixal, Sintra, Valongo, Vila do Conde, Vila Franca de Xira and Vila Nova de Gaia.	Abrantes, Albufeira, Alenquer, Caldas da Rainha, Chaves, Covilhã, Elvas, Entroncamento, Espinho, Estremoz, Figueira da Foz, Guimarães, Ílhavo, Lagos, Loulé, Olhão, Palmela, Peniche, Peso da Régua, Portimão, Santiago do Cacém, São João da Madeira, Sesimbra, Silves, Sines, Tomar, Torres Novas, Torres Vedras, Vila Real de Santo António and Vizela.	Other local councils.

Table 6.2 Portuguese rebuilding costs per square meter

If there's no existing data for the market or for specific issues, it's fundamental the work to be developed in statistics and management information in order to provide the right tools to people that will work on these matters. In some cases it's possible that reliable and relevant data has been produced already, namely by government authorities and statistical offices, but it's also possible that insurers have to finance their own projects to get very specific data.

### 6.3. Indexation

Considering existing books, it's also fundamental to put some measures in place in order to combat underinsurance. In that sense, it's important that consumers and insurers regularly update the sum insured to avoid becoming underinsured. Even if there's no additional purchases or improvements made, homeowners shall keep in mind that rebuilding and replacements costs increase every year due to inflation.

Based on the Portuguese inflation rate for the period 2000-2009, Table 6.3 shows what can happen to the financial protection of a group of assets, within a period of 10 years, if a policyholder does not index his contents, for example. This way, policyholders would be progressively underinsuring their contents and in 10 years, the insurance company and its client could have to face the consequences of having contents underinsured by 22,6%.

<b>Year</b>	<b>Inflation Rate</b>	<b>Indexed Contents</b>	<b>Non-indexed contents</b>	<b>% Underinsured</b>
2000	2,9%	100.000	100.000	0,0%
2001	4,4%	102.900	100.000	-2,8%
2002	3,6%	107.428	100.000	-6,9%
2003	3,3%	111.295	100.000	-10,1%
2004	2,3%	114.968	100.000	-13,0%
2005	2,3%	117.612	100.000	-15,0%
2006	3,1%	120.317	100.000	-16,9%
2007	2,5%	124.047	100.000	-19,4%
2008	2,6%	127.148	100.000	-21,4%
2009	-0,9%	130.454	100.000	-23,3%
2010		129.280	100.000	-22,6%

Table 6.3 Simulation of Non-indexed contents for a 10-year period

If it's expected that inertia and procrastination can be a barrier that will difficult a conscious decision by the consumer to update sum insured, insurers should take care of the problem. One of the possible solutions, commonly used in renewals and also very specific to this stage of policies' lifetime, is an automatic indexation of capitals. Essentially, this consists on applying a rate to the sum insured that is normally based on

inflation or on the price evolution of certain goods. In terms of investment, it doesn't require a great effort from insurers since it's just an application of a rate over the book.

According to a survey conducted by Australian Securities & Investments Comissions (2005), most insurers increase the sum insured according to a consumer price index, a building price index, or an index based on discussions with professionals. In Portugal, insurers support their capital indexation in three indexes (building, contents and both) provided by supervisory and regulatory authorities, Instituto de Seguros de Portugal, even if consumers are free to decide on their own annual indexes.

Once again, we should underline that, although it's a good tool to maintain a regular update of values, insurers should be careful in conducting application of indexes. In theory, and following Australian Securities & Investments Comissions' approach (2005), any increase in the sum insured should take into account several factors, such as: improvements to the property, increases in material and labour costs, increases in costs due to changes in local councils or building code requirements and increases in supplementary costs.

#### **6.4. *Ad-hoc* increases**

In cases where insurers feel that underinsurance is negatively affecting operating results, there's a need to find some solutions to balance Loss Ratio components. It can happen that insurers feel that there's no point or particular benefit in involving consumers in the process (due to strong barriers to communication, for example) or in developing the necessary infrastructures to avoid the problem in a very accurate way because of the high costs that it would represent. If that happens, one possible approach may be just pulling the right strings on the insurance premium formula.

Considering changes in premium, insurers have to decide whether they will act on the sum insured or in rates, in such a way they can adjust premiums to their liabilities. If the decision lays in the sum insured, then, insurers will have to find an optimal level for increases in  $c$ . One option may be to simply impose an average increase in  $c$  (via indexation, for example) that is necessary, *ceteris paribus*, to achieve the desired  $LR$ , instead of trying to optimize accuracy of sums insurance in an individual way. In the terms of premium collection only, this could have the same effect of an increase in taxes.

Theoretically, the greatest benefit is that desired results can be achieved, by collecting a larger amount of premium through a well calculated increase in capitals. Once again, this measure will only be productive and accurate if insurers know exactly what they have in terms of  $\delta$ , in an individual basis or for the whole book, and consequently the necessary increase in capitals.

Insurance companies can justify their decision in the sense they would be charging a higher premium due to an adjustment in their liabilities, reflecting the real value of the assets. However, if this type of indexation is seen as unrealistic or is seen as unjustified (or if demand is not sufficiently inelastic), insurers may face a lack of tolerance of the demand side to an extra increase in the insurance premium. In this case, any barriers to communication that could have taken the insurance company to decide for this type of increase could represent another problem, in the sense that it would be more difficult for the insurer to deal with consumers' dissatisfaction.

## **6.5. Risk Survey**

When insurers decide to improve capitals calculation methods, they can also decide to apply more accurate methods, comparing to the possible solutions we have seen in

the previous paragraphs. One possible way to determine the right amount to insure with the maximum precision possible is to visit the house that's insured, or that will be insured, doing a risk survey. This way, especially in cases where there is a help from skilled professionals, insurers can observe assets in detail and determine rebuilding and/or replacement costs. These values will probably be closer to the real value than the amounts that would result from calculators, benchmarking, indexations, etc.

Typically, risk surveys are made before policy subscription since it could be a fundamental tool for the underwriter in terms of the risk analysis. Besides the assessment issue that can determine or not the policy subscription, it can be also a good opportunity to quantify capitals to insure in a precise and professional way. Nonetheless, these surveys can be made at any point of the policy lifetime, since there is the right justification for doing it and if its benefit exceeds its costs. For example, whenever there is a suspicion of having an undervalued home, insurers can conduct a risk survey and if necessary they can negotiate different terms at renewal time. Recalling the framework implicit to Figure 6.1, they can also reassess the risk during claims settlement.

A report from Australian Securities & Investments Comissions (2008) refers a survey that indicates insurers as not being in a position to provide consumers with individual advice, but an alternative option may be to recommend a licensed builder or surveyor. In fact, these visits are conducted by professional risk surveyors that can accurately calculate rebuilding costs and, in many cases, replacement costs for the contents. However, valuation of contents may in most cases quite complex, depending on the type of assets, and can require the help from specialized valuers. As a result, high costs associated with this preventive measure will only be profitable when compensated by a certain increase in  $c$ , or in other words, when the survey proves that, in fact, assets



were undervalued (there may be also some gains if the survey conducts to the conclusion that there are some dangerous risks that should not be insured, but this issue is out of the scope of this work). Only a cost-benefit analysis using portfolio and P&L figures will told insurers in what extent they can use this tool. Risks surveys can be an expensive and risky solution if there is, for example, a high combined ratio or if the portfolio is based on very small risks (due to associated fixed costs that can be high).

Even if the cost of a risk survey can be paid along several years, depending on the level of the increase in premium and the number of years the policy is in force without lapsing, another important issue is that insurers must get some kind of compromise from their clients or at least a good expectation that the rise in  $c$  will not produce the wrong results. The problem is that, since premium increase could difficult insurance purchase, there's always the risk that consumers refuse to pay the premium after the survey and then, insurers' investment would be pointless.

In order to put these measures in place, insurers should also look at two of the issues seen in Chapter 3 (causes) as possible obstacles: time and confidentiality. Visiting a house requires the availability of its owner but also the need to look and gather all the information required, which may be seen as an overcomplicated process or a lack of privacy.

Once again, effectiveness of communication in giving professional and specialized advice should play a very important role or otherwise, policyholders will not perceive it as a financial service upgrade.

## **6.6. Rates**

It's possible that insurance companies have poor operating results without knowing the exact reason why their performance is below expectations. In most cases, bad loss

ratios are a consequence and, at the same time, a measure of several problems. But even when insurers think that underinsurance is one of the problems behind bad performances in home insurance products, they may not have the capability to assess and measure its impact on the P&L. By not having the power to define the extension of the problem, it would be difficult to apply and to justify the type of corrections in capitals insured, just like we saw in last paragraphs. In parallel, it can also happen that insurers know exactly what are the problems and the correct solutions, but knowing at the same time that it's not possible to increase  $c$ .

Consequently, one possible way out is correcting Loss Ratio through a rates review, in order to achieve the targeted loss ratio (using  $w$  to compensate the loss of  $c$ ). This measure can be equivalent to the one presented in Section 6.5, as it's designed to obtain a change in received premiums. And in the same way, we should note again that without proper communication, this measure will be seen just as a normal premium increase, causing the usual sort of effects that increases in premiums cause. One of them is a higher probability of having undervalued assets in new policies and in existing ones in medium and long term. It's expected that policyholders, for example, could be tempted to avoid correct indexation in renewals if they feel that price is too high.

Another option that insurers can adopt when designing their tariffs is to structure their rates to be proportionally decreased for higher sums. According to Australian Securities & Investments Comissions (2008), consumers may be able to obtain a higher level of cover for less than they think.

### **6.7. Average Clause**

Methodology followed in Chapter 5 is mainly based on the hypothesis of having or not the average clause and it was demonstrated that by not having this clause in the

wordings, insurers face a much higher risk of losses in operating results, for the same level of underinsurance.

Thus, at this point, it should be obvious that inclusion of average clause in wordings, for those companies that don't have it, could be an important measure to avoid or decrease the risk of underinsurance. Although, this adjustment can endanger the value that policyholder attribute to the product, because average clause has also a huge effect in the consumers' side.

For insurers who already have this clause in their wordings, the question is not to apply it or not, but the quality and the accuracy of that application. Recalling notation used above, it's a question of getting a higher  $\rho$  that turns average clause more effective. This increase in effectiveness will imply a choice between two types of strategic views:

- i) A scientific approach – This will imply a strong investment in Research & Development and in the quality of means used in claims' settlement, namely sophisticated Information Technology Systems and top-skilled professionals.
- ii) A tighter view on the clause application - There may be a trade-off between reduction in incurred claims in the short-term (through a more aggressive application of average clause) and a loss in premiums in the long-term if consumers start to perceive average clause application as too ambitious.

### **6.8. Sub-limits**

The same way it works in cases where the average clause is applied, some changes in cover can be imposed to induce individuals to change their behaviour and, consequently to reduce the risk of underinsurance, at the same time it reduces insurers' exposure.

One possible good solution to achieve that goal is the introduction of limits in the sum insured, particularly, in those areas where the risk of facing underinsurance is higher. In practice, this will make sense in cases where insurers have some doubts about the sum insured or in those assets that can normally achieve a wide range of values (just like in previous paragraphs, there are other reasons for using this method that won't be considered here).

For certain type of items such as fine art pieces, antiques or jewellery, it's very common to find, in home insurance policy wordings, restricted limits of indemnity for non-listed items. This means that in case of a claim, the insurer will not paid more than a fixed amount of money for those type of items that weren't previously listed and valued. By setting this, insurers may benefit from two types of effects:

- Consumers will be more willing to accept to review their assets' values, since they'll probably feel that they won't be protected in case of a claim;
- Just like in average clause, insurers will be setting a limit to the amounts they'll have to pay in case of a damage or loss of those types of pieces.

#### **6.9. Minimum limits for capital**

Along the years, insurance companies have collected an amount of relevant information about the market, trends, consumers' behaviours, rebuilding values per region, etc. This accumulated experience is an intangible asset that should not be forgotten and that must be used in underwriting to optimize results. Another possible solution to correct underinsurance deviations we'd like to present is a work to be done in underwriting that consists on imposing some limits in areas where there is a strong knowledge about reality.

Let's present two examples, one for buildings and other of contents:

- Do not accept, at least without a very consistent argumentation, a rebuilding cost per squared meters less than a certain level, in situations where it's unlikely to have such a value (depending on the geographical area, type of construction, client's wealth, etc.).
- Do not accept, at least without a very consistent argumentation, a capital insured for contents less than a certain value, in situations where it's very unlikely to have such a value (depending on the size of the building, existence of fine art or jewellery, type of house in terms of its usage, etc.).

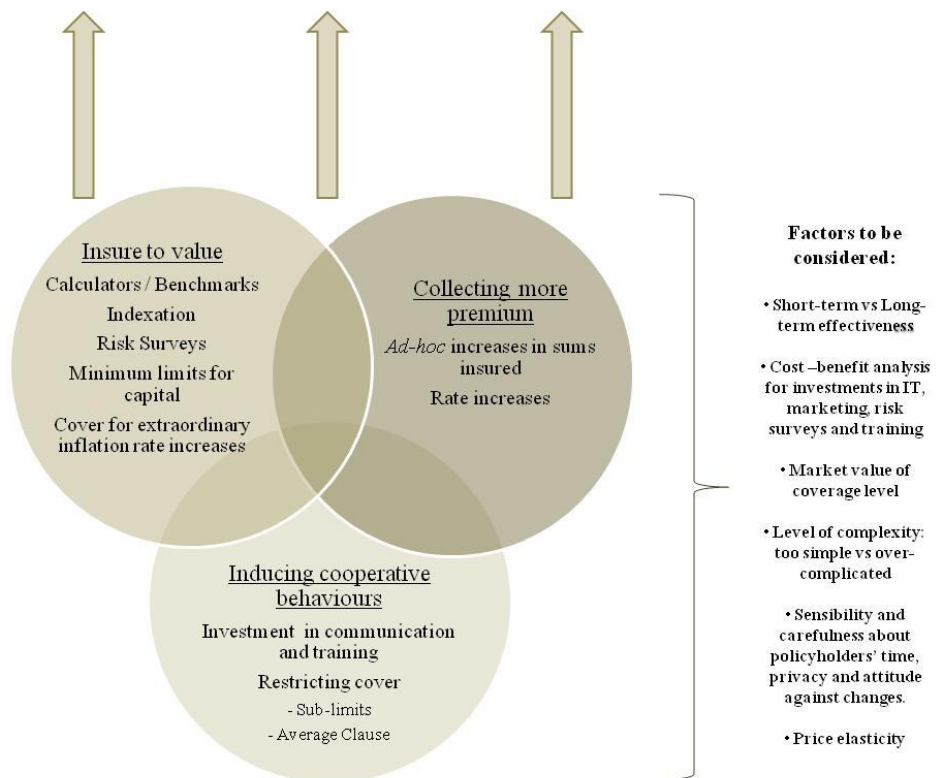
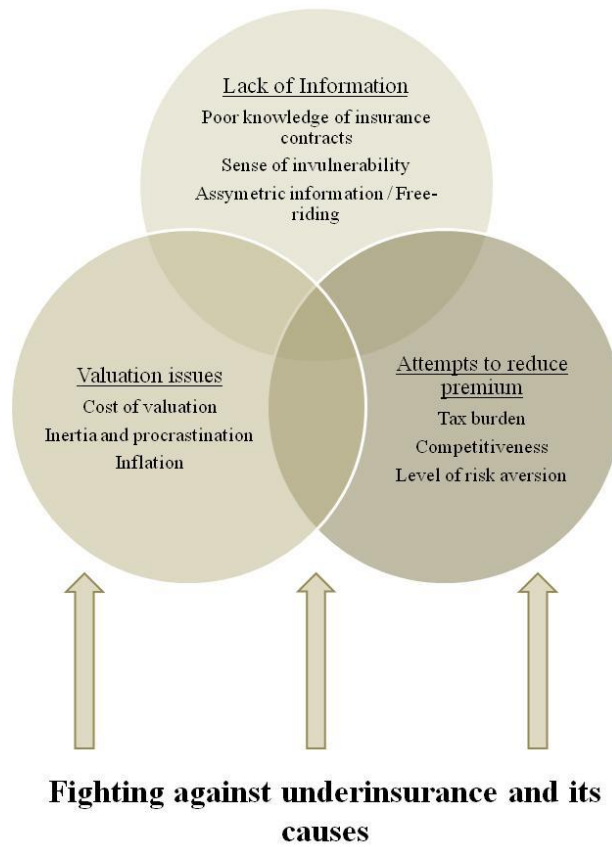
#### **6.10. Total or extended replacement policies**

Even though the most common type of policies are the “sum insured policies”, where the insurer's liability is capped at the amount specified by the consumer, there are other kinds of insurance policies setting out different types of liabilities. According to Insurance Council of Australia (2005), it's possible to find in countries like Australia, USA or New Zealand, insurance policies with a broader cover in terms of the sum insured. Two examples:

- Total replacement policy – The sum insured is not fixed or capped, as the insurer agrees to pay the full cost of rebuilding, regardless of changes in building costs;
- Extended replacement policy – There is an agreed value to pay in case of a total loss, but there is an additional amount up to a certain percentage above the sum insured specified in the policy.

As we saw before, when the sum insured is capped, consumers may be not properly insured when there is a sudden and unpredictable surge in building prices. So, the risk

of underinsurance caused by that unforeseeable inflation could be reduced if these types of policies become more available.



## Solution Framework

Figure 6.2 A solution framework for insurers

## 7. Conclusion

It's clear that underinsurance impacts an economy and particularly, an insurance market, through its effects in consumers' welfare and in performance of insurance companies. Society and governments are also affected by the problem, in the sense that individuals behave in such a way that, by underinsuring or not even insuring their homes, can produce negative externalities that will have to be paid by the community.

Trying to give an overview of the reasons behind the subject, we focused our attention in what happens to policyholders and insurers when households' assets are undervalued and we concluded that, despite some positive aspects that derive from the problem – an easier access to the market might be the strongest one – there are some reasons that justify the concern around the issue. In the case of policyholders, we have seen that having buildings and/or contents underinsured, insurance will not probably play its role after a claim, as insurers' liability may be limited. That gap will have to be financially supported by the policyholder with a burden that can last for years. Consequences in budget constraints or in social welfare can be serious, especially in those cases in which very large losses occur. For an insurance company, underinsurance represents a threat to its performance since it can damage the optimal balance between premium and claims. In both cases we've seen that the existence or inexistence of the average clause is a key question in the sense that will determine how serious can be the consequences. Apart from governments, not included in the analysis, insurers are for many reasons the most capable economical agents to lead the fight against underinsurance and to put in place some measures that could reduce or avoid the problem.



However, any efforts designed to achieve this purpose should be based on a large but detailed strategy that has, first of all, to have the support of different departments: underwriters, claims managers, IT, actuaries, etc. Then, we must consider that there are always some trade-offs, in the sense that benefits will probably imply some direct costs to implement actions and some risks that may reflect only in the long-term, such as a deterioration in the relationship with the clients in hard underwriting, for example. Finally, it's crucial to have a good understanding of how to put necessary measures in place, achieving expected results without compromising too much existing resources and relationships. That won't certainly happen if actions designed to combat underinsurance don't take into account the main reasons why individuals underinsure their assets. So, when applying a single measure or a set of measures, insurers must know very well whether the reasons are based on lack of information, reluctance to pay higher premiums, risk perception or lack of interest and time to discuss insurance issues.

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## Appendix A

### 1) METHOD

A group of 1.000 insurance brokers received an invitation by e-mail to answer a short survey about underinsurance, available online. The invitation process was conducted through APROSE (Portuguese Insurance Brokers Association) and it was told to their associates that the survey was being made in the context of an academic project.

### 2) SURVEY

According to your professional experience, do you think that...

1. In the context of home insurance, the number of consumers that knows the existence and consequences of the Average Clause is:
  - a. Very High
  - b. High
  - c. Average
  - d. Low
  - e. Very Low
  
2. The number of situations in which diminishing purchasing power leads to attempts of underinsurance, in order to reduce premium to pay, is:
  - a. Very High
  - b. High
  - c. Average
  - d. Low
  - e. Very Low

3. Policyholders' will to quantify or to revise sum insured for contents is:
  - a. Very High
  - b. High
  - c. Average
  - d. Low
  - e. Very Low
  
4. The number of policyholders affected by the feeling of invulnerability (“nothing bad will happen”), when facing non-compulsory insurance policies, is:
  - a. Very High
  - b. High
  - c. Average
  - d. Low
  - e. Very Low
  
5. The number of policyholders that, in a conscientious and informed way, are willing to self-insure or to underinsure, in order to reduce premium to pay, is:
  - a. Very High
  - b. High
  - c. Average
  - d. Low
  - e. Very Low
  
6. Correlation level between policyholders' social and economic background and their knowledge about insurance policies, is:

- a. Very High
- b. High
- c. Average
- d. Low
- e. Very Low

7. Level of risk that insurance companies face in terms of lapse likelihood, by increasing premiums as a consequence of the increase of the sum insured, is:

- a. Very High
- b. High
- c. Average
- d. Low
- e. Very Low

## Appendix B

### I. Burden to policyholders

With average clause:  $B = (\alpha c) - [\alpha c(1 - \delta)] = \alpha c\delta$

Without average clause:  $B = \alpha c - \min(\alpha c; c(1 - \delta))$

### II. Nr. of years to pay the burden

$$N = \frac{B}{S_h} = \frac{\alpha c\delta}{m\mu}$$

### III. Capital Insured

$$c = \text{area} \times \text{rebuilding cost}$$

- i. Area: average value (in sq.m.) for the area of new homes, in Portugal, between 1994 and 2008 – Instituto Nacional de Estatística (2010).
- ii. Rebuilding cost: Rebuilding cost for all the district capitals, in Portugal - Portaria n.º 1240/2008 de 31 de Outubro.

### IV. Households' Savings

$$S_h = m\mu$$

- i.  $m$ : Average household income in Portugal - Gabinete de Estratégia e Planeamento, Ministério do Trabalho e da Solidariedade Social (2010)
- iii.  $\mu$ : Portuguese savings rate - Instituto Nacional de Estatística (2010).