

# The Insurance Market of Natural Hazards for Residential Properties in Italy

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## Abstract

**Insurance is an effective complementary countermeasure for unexpected losses brought about by natural hazards. Coverage can be a useful tool considering in particular that public funds available to compensate for damages are limited and the consequences of catastrophes are becoming more severe over the time. Bearing this in mind, the authors performed a study aiming to clear up the main aspects and limits of the insurance market of natural hazards for residential properties in Italy. The opening sections of the paper give an overview of both the historical extreme events in Europe and Italy, and the reasons for the low insurance penetration rate in Italy. After that, the paper goes to the core of the research casting light upon the insurance market in Italy and examining the features and possible drawbacks of the available insurance covers. In this paper, the geophysical (seismic and volcanic) and hydrological (landslide and flood) hazards are analysed, and the residential stock is taken as a reference. After deepening in the local insurance market, the research focuses on the possible suggestions to stakeholders of how to increase the insurance penetration rate by taking advantage of the international experiences.**

## Keywords

**Natural Hazards, Damages; Risk Perception, Risk Management, European Insurance Schemes**

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## 1. Introduction

Natural hazards are those events occurring by natural forces. They turn into disasters when their consequences are not easily recoverable such as loss of life or extreme damage to properties. Therefore, disasters threaten human society and its economic system and can lead to long-lasting financial and non-financial impact to the lives and the well-being of people affected [1]-[3]. This assertion is particularly suitable considering the dramatic

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global increase in the number of events as well as their severity, with the latter being affected by the movement of people to disaster-prone areas, such as flood plains and coastal areas, the real estate vulnerability, the ineffectiveness of flood mitigation actions, and probably the climate change [4]-[7].

Italy is among a number of countries hit by natural disasters with a severe social and financial impact: earthquakes, floods, and landslides are responsible for mean annual losses equal to 0.2% of the national Gross Domestic Product [7].

The need of making economic tools useful to guarantee protection against losses from natural hazards in Europe has given rise to insurance schemes based on five main models [9]. For Italy, a free market supported by *ex-post* assistance by government is in force.

Due to the high historic losses in Italy and the low insurance penetration rate, the policy bases a speech on the opportunity and/or necessity to introduce a compulsory (or semi-mandatory) insurance system to relieve the State from heavy expenditure for the reconstruction of affected properties. This issue has been politically debated and has also been the object of a few non-promulgated designs of laws over the last two decades, from 1998 [10]. After the 2009 L'Aquila and 2012 Emilia earthquakes, the ticklish question has become topical again and another attempt to introduce an insurance plan was performed through the article No. 2: "*Copertura assicurativa su base volontaria contro i rischi di danni derivanti da calamità naturali*" (Voluntary insurance coverage against damage caused by natural disasters) of the executive order No. 59/2012 dealing with "*Disposizioni urgenti per il riordino della protezione civile*" (Urgent provisions for the rearrangement of the National Civil Protection). The fundamental assumption of the article was to guarantee suitable, timely and uniform reparation and rebuilding actions considering that the State has limited economic resources to cope with the medium-long term consequences caused by natural hazards. However, the lack of an agreement between the policymakers in respect of the insurance scheme to be adopted (e.g. compulsory or semi-mandatory) has undermined the efforts.

Meanwhile these questions take up all the time of the policymakers. The private insurers follow with attention and fair caution the potential growth of the insurance market and put at customers' disposal a certain number of insurance policies "to protect" the house building from the consequences of natural hazards.

As being stated, the authors carried out a research aiming to cast light upon the features and limits of the insurance market for residential properties in Italy, in view of the establishment of a national insurance scheme possibly in the future. The lack of literature makes this study more important. As a matter of fact, we can only find glances for the Italian market in some papers or documents on the international insurance schemes [9] [11]-[13] or in some national studies (e.g. [14]) regarding the estimation of potential economic losses to the house buildings due to future earthquakes and floods, as well as regarding the analysis of possible insurance schemes to apply in Italy. Nevertheless, these studies do not exhaust the features of the situation in Italy; therefore it is necessary to go deeper. Bearing this in mind, this paper considers the policies available on the market comparatively, paying special attention to the typology of insurable perils, the insurability and exclusion rules, the premium to be paid to assure the properties, the use of incentive rules to obtain discounts on the premium, the amount of the deductibles, and the compensation time for damages. The analyzed hazards are the geophysical (seismic and volcanic) and hydrological (landslide and flood) ones. As for the real estate examined, we have considered the residential building (housings and condominiums).

The paper is divided into four main parts. The first provides an overview of the most important disasters and damage especially in Europe and Italy; the second deals with the analysis of the causes of the low insurance penetration rate in Italy with particular attention to the risk perception as well as the role of the Italian state aids; the third considers the features of the insurance market in Italy and the last examines the advantages and the drawbacks that the available coverings can imply and supply some possible policy suggestions for stakeholders (Italian institutions and insurance companies), also taking advantages of the international insurance schemes in force in other countries.

## 2. Disasters in Europe and Italy: Overview

In order to highlight the disaster's impact on human settlements in EU countries we briefly analyze some statistical data derived from one of the largest worldwide public databases on disasters: the Emergency Events Database (EM-DAT, Emergency Events Database, [www.emdat.be](http://www.emdat.be) last checked 10 September 2014).

EM-DAT covers a time span from 1900 to present and considers two disaster categories: natural and technological. The former one is subdivided into five subcategories: Geophysical (including seismic and volcanic),

Meteorological, Hydrological (including landslide and flood), Climatological and Biological. The database provides information on the impact of disasters to people such as the number of people killed, injured, affected, left homeless and on the damages in relation to the date in which the disaster occurred (un-inflated US\$).

The catastrophes recorded in the database are approximately 13,000, 12% of which happened in the EU countries. As a whole, the disasters killed around 33 million people, affected 7 billion people, and resulted in 170 million homeless and thousand billion of damages.

Comparing all the catastrophes that occurred over the last one hundred years in Europe, floods have been the most frequent among the extreme events with a mean frequency of around 5 events per year causing the highest percentage of homeless people (57% of the total, about 2 million people) and the greatest losses in economic terms (33%, about 112 billion of US\$).

The main cause of death is geophysical disasters, in particular earthquakes (280,000 people), followed by hydrological disasters (wet mass movements and floods) totally resulting in approximately 25,000 deaths. The earthquakes occurred in the Old Continent also caused 1,400,000 homeless and massive damages equivalent to 78 billion US\$.

Looking at a wider time-span of 2500 years, among the hundreds of strong earthquakes that caused heavy damages in Italy, three events that occurred during the 20th century are among the most relevant in terms of magnitude and number of people killed: on 28 December 1908 Calabria-Messina, 13 January 1915 Marsica and 23 November 1980 Irpinia earthquakes killed around a hundred thousand people in total [15].

The earthquake of 28 December 1908 ( $M_e = 7.1$ ) is the most devastating event of the past century and one of the strongest earthquakes in Italy. The event damaged the regions of Sicily and Calabria. Dozens of towns were destroyed among which those of Reggio Calabria and Messina. This disaster resulted in the death of a number of people varying between 58,000 and 65,000, an equal to 40% of the population estimated at that time [16]. Seven years after the great Messina earthquake, another massive earthquake ( $M_e = 7.0$ ) wreaked havoc on some villages of the Fucino basin and the surrounding areas, causing more than 30,000 deaths and the destruction of numerous towns. Damage to monuments and houses were also recorded in Rome [15]. On 23 November 1980 Irpinia-Basilicata (Southern Italy) ( $M_e = 6.7$ ) event caused serious damages in a wide area of the Campania and Basilicata regions causing approximately 2900 deaths. Fifteen locations were almost destroyed and dozens others suffered serious losses and housing damage [17].

Paying attention to the hydrological disasters (floods and wet mass movements) listed in the EM-DAT database, we can see that the EU countries mostly affected are: Russia, Italy and France followed by countries of Central and Eastern Europe. Italy, holds an adverse record of deaths (3,600) in Southern Europe and a devastating record in Europe in terms of economic losses (about 24 billion of US\$) and number of homeless people (about 1.5 million of people).

Speaking about floods, the event that resulted in the majority of casualties (322) was the flash flood on 25-26 October 1954 in Salerno (Southern Italy) [4]. The most recent severe flash flood occurred on 4-5 May 1998 in Sarno (Campania, Southern Italy) where 157 people were killed by the consequent mudflow [18]. In respect of mass movements, one of the most disastrous landslides that hit the Italian territory occurred on 9 October 1963 in the Vajont Valley (northern Italy): millions of cubic meters of rock and debris detached from one side of the Valley slipped into a dam lake. The rockslide generated water waves that overflowed the dam and the town of Longarone, and four villages were also shattered. This event led to almost 2000 people deaths and a large number of injuries [19] [20].

### 3. Reasons for the Low Insurance Penetration Rate in Italy

In spite of the severe consequences caused by natural disasters, insurance penetration is very low in most European countries, including Italy. While the penetration rate for storm is quite high in most states, the rate reduces for floods and earthquakes; penetration rate is high (90%) only in countries such as Belgium, Ireland, France, and the United Kingdom where coverage is a mandatory extension to the basic property policy. Italy, together with Bulgaria and Greece, stand out among the EU members due to the very low (<10%) insurance penetration rate [13]; in Italy, coverage is offered as an optional endorsement to fire insurance contracts (Table 1). To be more specific, the Italian regions where insurance companies are most exposed to natural catastrophes, as to businesses and residential properties, are the Northern ones where, therefore, the penetration rate is higher [21].

**Table 1.** Insurance plans on natural disasters in Europe and Turkey... (**Av** = Avalanche; **Cy** = Cyclone; **Dh** = Drought; **Eq** = Earthquake; **Fl** = Flood; **FF** = Forest Fire; **Fi** = Fire; **Fr** = Frost; **H/HS** = Hail/Hail Storm; **Ls** = Landslide; **Mt** = Meteorite; **Ss** = Subsidence; **St** = Storm; **SW** = Snow Weight; **Tn** = Tornado; **Ts** = Tsunami; **VE** = Volcanic Eruption; **OvR** = Overall Rate; -- = No data or not applicable). The last four columns report the penetration rate for some hazards or the rate estimated altogether for them. Data are drawn by the following sources [12]-[14] [25]-[32].

Country	Insurable risks	Insurance rules	Pricing	Compensation limits/ Deductibles	State role	Eq Rate (%)	Fl Rate (%)	St Rate (%)	OvR rate (%)
Austria	All hazards except volcanic eruptions	Optional. Protection against storm is included in households' insurances	The policy price is free and risk-based	Maximum indemnity up to 50% of the capital insured or a fixed amount ranging from 3.700€ to 10.000€ (F). Limit is about 7.500€ for household (Eq)	The <i>Disaster Fund</i> supports the Länder since 1966 in covering the losses	5	18	90	--
Belgium	Eq-Fl-H-Ls-Ss-St-SW	Semi-compulsory (fire insurance contracts)	The policy price is free except when intervenes the <i>Bureau de Tarification</i> . This was created to specify the rules to be followed to fix the premiums in case they are too high or in case of properties not covered by the market	Deductibles are indexed to inflation (1.114,45€ in 2010) (F, St, Eq)	A public-private partnership is active. The <i>Caisse Nationale des Calamites</i> guarantees the indemnity beyond the limits fixed by law	90	90	90	--
Bulgaria	Eq-Fl-H-Ls-St-SW	The coverage is offered as an optional extension in basic homeowners contracts	The policy price is free: flat for flood and storm, risk-based for earthquake for which the premium is about 70€	No limits (F, St); Deductibles do not exceed 2% of the insured value and many companies do not apply any deductible. Policies usually cover 85% of the insured value (Eq)	--	5	5	5	--
Cyprus	All, except Dh-Ls-Ss-SW	Optional. Covering as an add-on of fire policies	The policy price is free	--	None	--	--	--	--
Czech Republic	All	Policies are on voluntary basis. Insurance against floods is offered as an extension of property insurance. Insurances against earthquakes and storms are often bundled within a base contracts	The policy price is free and risk-based	Some contracts have compensation limit (F, Eq)	Losses for properties not covered by private insurance have often been covered by <i>ex-post</i> compensation by the State	50	50	50	--

## Continued

Denmark	Cy-Ff-FI-Fr-H- Ls-Ss-SW	Optional for all except for seawater flood which is semi-compulsory. Policies can be stipulated as an extension of fire or basic insurance contracts (Eq/FI)	Risk-based for earth-quake and storm, flat for floods	Deductible of the minimum 700 to a maximum of 1350€ as for 2010 depending on extension of the housings (F). Depends on the policies (St/Eq)	The State by <i>Storm Council</i> supplies a guarantee if the charge collected by the insures are insufficient to cover the losses caused by seawater flood.	--	--	90	--
Estonia	All, except Eq-Ls-VE	Optional	The price is free and risk-based		None	--	--	--	--
Finland	All, except Dr-Eq-Fr-VE-Ss-	Optional Storm risk is insured in most household content policies (St)	--	--	Prevention measures. Public funds were used to compensate losses caused by strong extreme events of the past. A recent law forbid the state to cover the losses	--	18	90	--
France	All	Semi-compulsory extension of basic policies (fire, and all properties damage, including car policies)	The policy price is calculated on a flat rates fixed by the State and depending on typology of real estates	No compensation limits but deductibles. For property of domestic use 380€. The deductibles may be increased depending on the number of claims over the years. (F, Eq, Dr)	The State founded the <i>Caisse Centrale de Reinsurance</i> to support the insurance companies to guarantee the natural risks (reinsurance). The <i>Caisse</i> offers to the private insurance market a flat reinsurances rate. The State guarantees with unlimited funds the financial capacity of the <i>Caisse</i>	90	90	90	--
Germany	All, except Dr	Optional extension of home insurance. Recently a proposal for a compulsory flood insurance was rejected by a committee of experts assembled by Conference of German Finance Ministers (FMK)	The policy price is free and risk-based. There are 4 risk zones.	No standard deductibles (Eq, F, St)	Germany compensated the losses with public funds in the past. Now, the State does not refund the losses, but allocates easy-terms loans	18	30	90	--
Greece	All, except Av-Dr	Optional extension of fire insurance contracts. There is a project to introduce a compulsory insurance against natural hazards	Risk-based (Flood and Storm)	Deductible min 10% loss (€500) (F, St) and 2% of the insured value (Eq)	<i>Ex-post</i> disaster relief	5	5	5	--

## Continued

Hungary	Fl-St	Owners pay a contribution to the <i>Fund</i> . It compensates the owners in case of losses (Fl). Storms are covered by every home policy	Based on property value	Reimbursement up to insured value. Deductibles depend on the policy. The mean value is 200 € (St)	<i>Fund for Flood and Inland Water Compensation</i> is guaranteed by the state. The state has refund the losses in case of uninsured properties (St)	--	--	--	--
Iceland	Av-Eq-Fl-Ls-VE-	Semi-compulsory, extension of fire policy	Single premium	--	A public-private partnership is active	--	--	--	--
Ireland	Eq-Fl-Fr-St	Optional. The household insurance contracts include the covering of damage caused by natural extreme events	Risk-based	--	The State does not pay the compensation for damage to insurers	90	90	90	--
Liechtenstein	All	If the building is localized in a site exposed to natural hazards, the insurance is mandatory. Private owners to avoid pay the premium should demonstrate that their home is not subject to any peril	The size of the premium is regulated by the state	--	--	--	--	--	100
Luxembourg	H-Fl-St-SW	Optional extension of base or multi-peril properties insurance policies	The policy price is free and risk-based	--	None	--	5	90	--
The Netherlands	All, Except Eq-VE-and major river flood	Eq and F risks are not insurable. Insure against storm is optional (extension of property damage)	The policy price is free and risk-based. 0.15% of the insured capital	Deductibles are 2% of insured capital (St)	Government refunds losses by the <i>Calamities Compensation Act</i> for uninsurable risks. Recently has been discussed a new flood insurance system as a public-private partnership	--	--	--	>75
Norway	Av-Cy-Eq-FF-Fl-Fr-H-Ls-St-VE	Semi-compulsory as an extension of fire policies	The policy price is based on a flat rate	--	The State does not guarantee the losses	--	--	--	>90
Poland	Dr-Eq-Fl- HI-Ls-St-SW	Optional (Eq-Fl-St)	The policy price is free and risk-based	--	Public funds are used to compensate for damages and mitigate the risks (Eq-Fl-St)	--	50	90	--

## Continued

Portugal	Cy-Eq-FF-Fl-Ls-Ss-St-VE	Optional. St and F coverage are included in basic policy. Earthquake insurance is offered as an extension of fire policy	The policy price is free and risk-based	Deductibles 10% of damage (F, St). Not uniform deductibles (Eq)	None	5	50	50	--
Romania	Eq-Fl-Ls	Compulsory insurance scheme (PRAC) is operative	Fixed, depending on the typology of the houses Type A= 20 € Type B= 10 €	Type A dwelling (reinforced concrete) = 20,000€ Type B (walls made of adobe) = 10,000€ (for F and Eq)	A public-private partnership is active. The State guarantees the losses and intervenes in case of extraordinary losses	5	50	5	--
Slovakia	Fl-St	No compulsory scheme	--	Variable limits (F)	Public funds were used in the past to compensate the losses caused by strong extreme events	--	--	--	--
Slovenia	Av-Eq-Fi-Fl-Fr-H-Ls-St	Optional Flood risk is insured in most household content policies. Coverage against St/Eq is possible as additional coverage of the buildings	Fixed, depending on the typology of the houses (Eq, Fl)	--	The Government intervenes in case of extraordinary losses (Eq, Fl)	50	50	90	--
Spain	Eq-Fl-Mt St-Tn-Ts- VE	Semi-compulsory extension of basic policies	The policy price is calculated on a flat rates fixed by the State and depending on typology of estates. Houses = (0.008% of the capital insured) (Eq, F, St)	Deductibles are not applied to condominium and dwellings. (Eq, F, St)	Policies are issued by insurance company or <i>Consortio de Compensacion de Suguros</i> . The policies issued by companies are transferred to the <i>Consortio</i> to be reinsured. The State guarantees all policies to be reassured in case of limited financial capacity of the <i>Consortio</i>	90	50	50	--
Sweden	All	Optional insurance	The policy price is calculated on a flat rates (Eq-Fl-St)	Limits equal to about 525,000€ (as for 2010) (Eq)	None	90	90	90	--
Switzerland	Av-Fl-H-Ls-St-SW	Two different systems. 1) Semi-compulsory as an extension of fire policies; 2) compulsory	The policy price is calculated on a flat rates	--	<i>Intercantonal Reinsurance</i> covers housings in most of cantons (19 of 26). In 7 cantons the private market of insurance exists. The State does not guarantee the losses	--	--	--	>97

Continued

Turkey	Eq	Compulsory	Premiums depends on hazard zone, local geological features, building type, extension of dwelling and range from 0.04 to 0.50% of the insured value	--	A public-private partner-ship is active. The State does not guarantee the losses	19.6%	--	--	--
United Kingdom	All, except Av-Dh-FF-VE	Coverage is included in building or home contents private insurance (Eq-FI-St). The availability of universal flood insurance started after UK 2000 floods	Risk based (FI-St)	Deductibles depend on the policy (F, St)	A public-private partner-ship is active (FI). The state does not supply compensation of the losses and reinsurance	90	90	90	--

In Italy as well as in other countries the low penetration rate can be explained in various ways. We would emphasize on the following: inadequate risk awareness, perception that natural hazards are events of low frequency, state relief or ex-post compensation taken for granted by the population, high insurance premiums, inexistence of legislation that would make insurance mandatory, lack of energies from private insurance market to promote the need for insurance in fear unexpected catastrophic losses [22]-[25]. All the above explain the low insurance penetration rate in Italy, but in the paragraphs to follow we would mostly focus on the wrong perception people have about natural hazards and the granted state aids.

### 3.1. Risk Perception

Risk perception entails the subjective assessment of the chance of a definite peril and how concerned the persons are with the effects. It influences people to take proper actions when dealing with natural hazards, including their decision in respect of buying insurance coverage. For instance, people who perceive a risk as “high” where they live are more likely to take suitable countermeasures, adapt strategies and sustain proper institution actions even if this requires new efforts [33] [34].

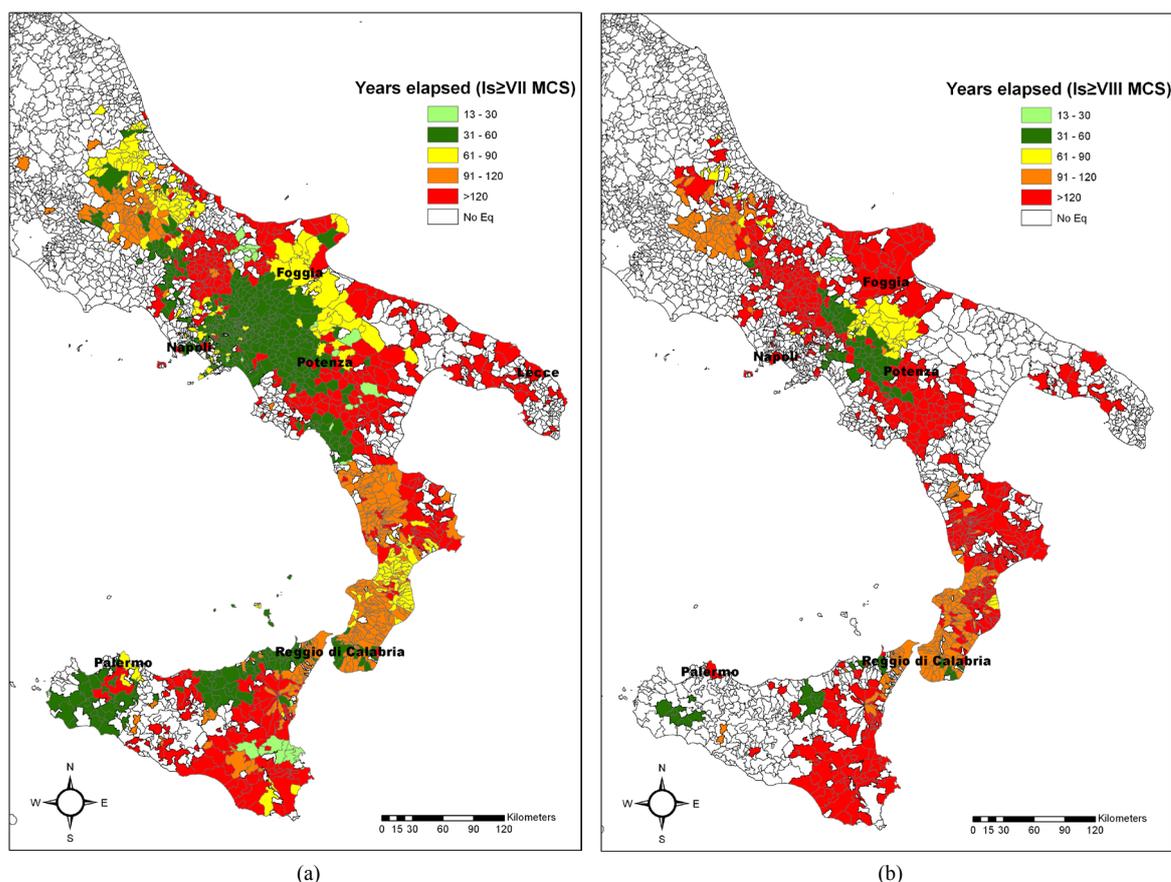
Since the 60’s, the research about the risk perception has led to the development of several theories such as the psychometric paradigm, that uses psychological scaling and factor analysis to obtain representations of risk perception [35], the cultural risk theory that pays attention to the importance of the cultural background and the influence that social community has on the individual aspects of risk perception [36], and the social amplification of risk framework (SARF) that focuses on psychological, institutional, social and cultural processes as factors of amplification or reduction of risk assessment [37] [38]. Amplification factors are represented, for example, by scientists involved in communicating the risk, the media, the cultural groups and the hazard experience [39]. In a word, these theories are useful in helping the experts who are engaged in encouraging suitable risk behavior for the communities, highlighting that the risk perception goes beyond the single person as it involves physiological, social and cultural aspects.

Studies focusing on the Italian context show that it is necessary to increase the risk perception. Marincioni *et al.* (2012) [40] who examined a sample of population involved in the 2009 L’Aquila earthquake (Mw = 6.3) conclude that the residents of the town had a low risk perception and no awareness of the structural performance of their own buildings. Crescimbene *et al.* (2014) [41] looking at the psychometric and the cultural theory approaches evaluated the seismic risk perception through the analysis of about 5000 on-line tests. The research shows that most of the Italians living in areas with high seismic hazard have either a low or incorrect risk perception, thus suggesting the need for new communication strategies. Recently, Salvati *et al.* (2014) [42] who analyzed the hydro-geological risk perception showed that the perception Italians have for technological risks is higher than that for natural risks and they consider the seismic events to be more dangerous than the geo-hy-

drogeological ones. Furthermore, the authors argue that earthquake have a longer lasting influence to the way people perceive risk compared to landslides and floods. The authors conclude that more actions are required to improve the population's knowledge of the hydro-geological hazards and the associated risks.

Obviously, personal experiences may influence the risk perception and also increase the chance to buy insurance against natural perils. However, once the awareness of the hazards fades, the incentives to take countermeasures are reducing [43]. Therefore, generally speaking more time has elapsed since the last hazard occurrence the lower the risk perception becomes. For example, when we consider the most recent and striking earthquakes (site intensity greater than or equal to VII—very strong or VIII—heavy on the Mercalli-Cancani-Sieberg-MCS-macroseismic scale) that shook the Southern Italy and Sicily towns, we notice that most of places were hit by seismic events dating back to a few decades or centuries ago. In particular, analyzing the data regarding the towns involved in an earthquake having a site intensity greater than or equal to VII MCS, we can see that 1.9% and 31.7% of the places were involved in events that happened up to 30 years or between 31 and 60 years ago, respectively (Figure 1(a)) and approximately 66.4% of the towns experienced the last strong earthquake between 61 and 900 years ago. Looking at the earthquakes with the higher site intensity, equal to or greater than VIII MCS (Figure 1(b)), we can see that the percentage of the towns where earthquakes occurred in the most remote past (61 - 900 years ago) increased to ~89%. In conclusion, these data indirectly shows that many people living in Southern Italy and Sicily, one of the highest seismic hazard zones of the country, [http://zonesismiche.mi.ingv.it/mappa\\_ps\\_apr04/italia.html](http://zonesismiche.mi.ingv.it/mappa_ps_apr04/italia.html) last checked 20 July 2015, had no earthquake experiences and, as a result, they cannot have direct memories of seismic events or such memories have faded, a fact that contributes to a lower risk perception.

As being stated, in order to instill confidence with natural hazards, institutions could be alive to know in detail *which* and *how many people* living in a certain site today might have a recollection of directly experienced past



**Figure 1.** Years elapsed since the last earthquake that hit the towns of Southern Italy and Sicily considering the site intensity greater than or equal VII (1a) and VIII (1b) on the MCS macroseismic scale. Data on the site intensity rise from [44].

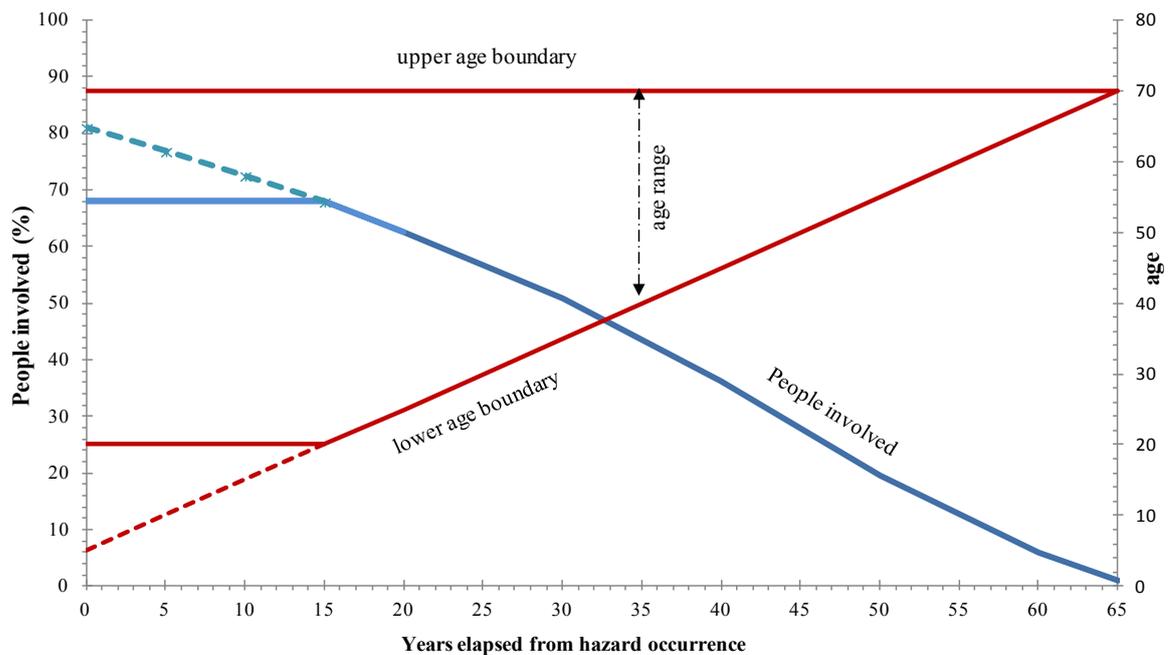
hazards and, at the same time, might be potentially interested in buying coverage. As a matter of fact, in order to awake the past experiences and increase the people's attitude to take mitigation and preparedness measures, including the proneness to buy insurance coverage, risk-oriented communication strategies should be addressed especially to these persons.

To identify these people we use a simplified model fixing three basic hypotheses (**Figure 2**). The first is the minimum age that a person should have had at the time of the earthquake occurrence to retain the memory of what he/she lived. This was assumed at 5, age from which people may start to remember the events they have lived [45]; the second concerns the minimum age that persons should have today to be able to subscribe and potentially interested in buying an insurance, which will not be less than 20, which represents the lower age level when young people start to enter the world of work with remunerated contracts,

[http://www3.istat.it/salastampa/comunicati/non\\_calendario/20100930\\_00/testointegrale20100930.pdf](http://www3.istat.it/salastampa/comunicati/non_calendario/20100930_00/testointegrale20100930.pdf)

last checked 20 July 2015; the third considers the maximum age that alive persons should have today to be interested in buying an insurance coverage, that was assumed at 70, the maximum age at which a person may be on active service in Italy today and after which the disposable personal income as well as the attention and hope in the future decrease, <http://www.funzionepubblica.gov.it/TestoPDF.aspx?d=27498> last checked 20 July 2015 [46].

Bearing these three hypotheses in mind, the age classes of people (*which people*) living in a certain site today that might have a recall of past real-life hazards and might be interested in buying a coverage can be put in relation with the time elapsed from the recent and damaging hazard occurrence(s) ( $\Delta t$ ) (**Figure 2**). In particular, considering the first two hypotheses discussed before, the people's ages will be between the minimum, estimated as constant and equal to 20 for  $\Delta t < 15$  and  $(5 + \Delta t)$  for  $15 \leq \Delta t \leq 65$ , and the maximum fixed as equal to 70 according to the third hypothesis (**Figure 2**, red curves, right ordinate axis).



**Figure 2.** Graph showing *which* and *how many people* may be involved, in a certain site, in the recollection of a natural peril and that might have interest in buying coverage. General red curves (*which*) indicate the uppermost (70) and the lowest ( $5 + \Delta t$ , for  $\Delta t \geq 15$  and 20 for  $\Delta t < 15$ ) people's age boundary (right ordinate axis) as a function of the years elapsed from the hazard occurrence. For  $\Delta t < 15$  the age classes of people involved changes in principle (broken line), but considering that the age of people involved is under the fixed threshold of 20, the trend is assumed to be constant (continuous line). From the curves we can see that the age classes of people living in Potenza town today involved in the 1980 earthquake (occurred 35 years ago) are 40 and older. The site-specific blue curve (*how many*) identifies the percentage of persons (left ordinate axis) living in a certain site and having the age classes as defined by the red curves. In particular, the blue curve shows the population distribution trend for the Potenza town: 40 and older persons correspond to about 40% of the population living today. Data on Potenza population are drawn by the Italian census (URL, last checked 24 July 2015, <http://www.tuttitalia.it/basilicata/71-potenza/statistiche/popolazione-eta-sesso-stato-civile-2015/>).

Regarding *how many people* might be involved, we consider the population census looking at the number of people living today in the site under consideration and belonging to the age levels included between the above-mentioned lowest and the uppermost age limits (**Figure 2**, blue curve, left ordinate axis).

To explain this better, we can take advantage of a case study regarding the high seismic hazard site of Potenza, the chief-town of the Basilicata Region, in Southern Italy (**Figure 2**).

Potenza is a town of about 67,000 inhabitants that throughout its history has suffered several strong earthquakes [47] of which the two most recent had a macroseismic site intensity equal to or beyond the building damage threshold (therefore potentially remained engraved on the people's memory). They occurred on 23 November 1980 (VII MCS) and 26 May 1991 (VI-VII MCS) [44].

Considering the oldest earthquake occurred, the persons living today that might be involved in the recollection and be potentially more interested than others in buying coverage can be estimated through the general red curves in **Figure 2** (*which*), that represents the age levels involved as a general function of the time elapsed from the hazard occurrence: considering that the earthquake happened 35 years ago, the people involved today might be 40 and older. Looking at the site-specific blue curve (how many), considering that the census-based percentage of the people living in Potenza today and falling in the age ranges as defined through the red curves, we can see that the age level of 40 and older persons is equal to about 40% (~27,000) of the current population. Considering the earthquake in 1991, the people involved today might be 29 and older equal to about 57% (~38,000) of the actual population (a portion of which experienced also the earthquake happened eleven years before). Especially these people might be preferably addressed a risk communication campaign aimed at increasing people's confidence with risk perception and natural hazard coverage. However, in order to increase people's peril perception, the government might also, in addition to information campaigns having the well-fixed people target, enact rules regarding general hazard disclosure [43]. For example, those interested in selling and managing residential properties, such as house sale agents and apartment house managers, might be requested to inform the buyers and homeowners on the seismic hazard of the site where the real estate is located, taking advantage of official documents and maps. All that might increase the people's confidence with mitigation risk countermeasures, including insurance against unexpected losses.

### 3.2. The Role of the Italian State after Past Disasters and the Growth of the Mutual Culture of Aid and Disaster Relief

Another significant cause that can be called into the question to explain the low penetration rate regards the role that the Italian state has had in relieving the citizens from losses over the time.

Firstly, it should be noticed that the government role in disaster relief may find its ideological roots in the solidarity and subsidiary principles from which the policy of the states of catholic culture, and especially Italy, take inspiration. On the one hand, solidarity considers the mutual care and respect between human beings indispensable; on the other hand, subsidiary can be seen as a guide to set up proper social actions [48]. These principles are already present in an embryonic form starting from the Late Middle Ages and have been systematically analyzed and developed since the late XIX century in the Church Social Doctrine [49]. The Treaty of Lisbon (the document that emended the two main treaties that founded the European Community) refers to these principles. It inserts a solidarity clause (on which the Solidarity Fund is based on) among the European Members in case of special events such as natural or man-made disasters [50]. Also the Italian Constitution (1948) cites, in article 2, that: "*La Repubblica riconosce e garantisce i diritti inviolabili dell'uomo, sia come singolo sia nelle formazioni sociali ove si svolge la sua personalità, e richiede l'adempimento dei doveri inderogabili di solidarietà politica, economica e sociale*" (The Republic recognizes and guarantees the inviolable rights of man, as an individual, and in the social groups in which [he] expresses [his] personality, and demands the fulfillment of the unalterable duties of political, economic, and social solidarity, <http://www.constitutionnet.org/files/Italy.Constitution.pdf> last checked 10 August 2015, thus identifying the solidarity principle as an important value to be taken as a reference point, even if the solidarity-inspired laws providing for the State to sustain people affected by disasters are not in force.

As being stated, in order to have a clearer picture of the role that the state has played in helping people and evaluating to what extent the state action can have influenced the citizens' behavior in coping with disasters, we will provide an overview of the main acts put into practice by the Italian governments throughout the XX century to relieve the population, paying particular attention to the seismic events, the natural peril that the Italians perceive more.

As introduced, it is worth highlighting that due to the lack of an *ex-ante* public disaster funds, such as those in force in Austria and Denmark to restore private real estate, the Italian government enacts *ad hoc* rules to sustain the rebuilding just in the aftermath and over the years/decades following a disaster so as to compensate for the losses through the state current resources or the tax-derived ones [9].

Actually, the intervention of the State after disasters finds its embryo in the actions put into field by the ancient states Italy was made of before its Unity (1861). As a matter of fact, through tax exemptions, tax reliefs, economic incentives (e.g. 1781 Romagna earthquake), fund-raising and distribution to poor people (e.g. 1851 and 1857 Basilicata earthquakes) the policy adopted by the ancient states managed to restore the real estate roughly, thus relieving the citizens from the hard post-disaster conditions. However, the action of the ancient states did not aim to extensive deeds in the areas affected by extreme events but was unsystematic, lacking in a planning and limited as regards the economic resources put at the community's disposal, with some exceptions such as the 1693 Sicily and the 1783 Calabria huge earthquakes, after which either the wide areas of Reggio Calabria and Messina were rebuilt or the population was moved to other places [47] [51].

From the beginning of the XX century the state started actions aimed at considering extreme events as an opportunity and a catalytic effect to free the people affected from atavistic living poverty, building and urban decay, and geographic isolation. To achieve these aims the state has invested huge economic resources [52].

The role played by the state in coping with calamities can be highlighted, for example, from the analysis of the digital historical archive (1861-2013) of the Italian Chamber of Deputies, one of the two branches of the Parliament, that shows about 7000 documents searched by the word "*terremoto*" (earthquake), the disaster that has caused the most casualties throughout the centuries, <http://storia.camera.it/> last checked 10 December 2014. Most of such results regard initiatives of the entire Chamber or single delegates to promote an economic obligation of the state in order to rebuild the public and private real-estate renew the economic activities of the areas affected and mitigate the discomforts caused to the people by the seismic events.

To examine the question from a close-up it emerges that the Messina-Reggio Calabria ravaging earthquake in 1908 represents a turn-point in the *ratio* of the laws enacted by the state to cope with the consequences of extreme natural events. So, after the earthquake in 1908 numerous laws were issued to finance the reconstruction of the areas damaged. The legislator focused the attention on four main points: the taxation of personal property and real estate to be transferred to the areas affected, tax exemption for real estate, grants and easy-term loans to give to the owners to carry out restoration, construction or the rebuilding of the housings damaged, a wide plan of construction through the drawing up of a town-planning scheme to be funded with easy-term loans, and tax relief to promote the development of industrial poles. To make the rebuilding faster, the grants were increased over the decades following the earthquake (e.g. Law n. 531 issued on 29 July 1949 regarding the increase of state subsidies to rebuild housings destroyed or damaged by earthquakes occurred between 1908 and 1936), testifying the government difficulties to recover the massive losses in a short time. In fact, the circumstance that one century after the earthquake about 12,000 people were still alive in the hovels built in the aftermath testifies that the *ex-post* interventions put into the field by the state have not been sufficient to relief the community from the huge disaster, <http://www.messinacittanegata.it/interroga.htm> last checked on 10 October 2014.

The principles inspiring the laws enacted after the earthquake in 1915 were quite similar to those that guided the choice made after the seismic event in 1908, but more attention was paid to the need to supply grants, and easy-term loans for the recovery of the urban, rural and industrial buildings. In order to make the economic recovery easier, more efficient measures were perfected to boost the birth of industrial plants and rural initiatives. Furthermore, the drawing up of the town-planning schemes was made easier and extended to many other towns so as to stimulate the building activities that had already taken advantage of the house subsidies put at the community's disposal by the government [15] [53].

After the Irpinia earthquake on 23 July 1930, that hit the inland towns of the Southern Apennines, the Government focused its attention both on wide reconstruction schemes and the urban growth of the sites more affected by the event. The State's policy aimed at putting at the community's disposal: emergency housings, that is to say masonry housings to be built in a short time so as to avoid, on the one hand, temporary houses such as sheds that had already proved to be an unsuitable solution after the Messina earthquake in 1908, on the other hand areas close to the urban centers where to reconstruct the damaged buildings, with the aim of creating new quarters [54]-[56].

The Irpinia earthquake on 21 August 1962 saw the issuing of laws whose principles were in line with those inspiring the laws promulgated after the earthquakes happened in the previous decades. Indeed, the government

invested money in the public and private building allocating great resources for the schemes aimed at financing the repair, rebuilding and building of private and public housings. Moreover, the Italian RAI-TV state television started a fund-raising to help the rebuilding on the towns affected. In spite of the significant economic support to the areas hit, the rebuilding has yet to see the end [57].

After the massive Friuli earthquake in 1976 numerous laws were issued. Most of them financed the rebuilding with the aim of improving the economic growth of the area affected by boosting the industrial and agricultural production to increase the employment. According to what was made after the 1962 earthquake, all the houses were admitted to the contributions, both the first and the other houses belonging to the same owner [15].

In consequences of the devastating earthquake on 23 November 1980 the State invested very huge economic resources in facilities, building reconstruction, industrial activity and university education. The direction that the lawmaker gave the intervention on the territory was that the rebuilding of the towns had to proceed at the same rate as the economic growth [58]. To do this, the main law enacted after the disaster, the Law n. 219 issued on 14 May 1981 regarding “*Ulteriori interventi in favore delle popolazioni colpite dagli eventi sismici del novembre 1980 e del febbraio 1981. Provvedimenti organici per la ricostruzione e lo sviluppo dei territori colpiti*” (Further interventions for people hit by seismic events happened on November 1980 and February 1981. Systematic rules for the reconstruction and development of the areas affected), allocated economic resources in order to: 1) adopt wide development schemes for the towns affected; 2) carried out industrialization schemes and industrial development; 3) guaranteed a system of grants to subsidy the rebuilding and the repairing of the housings also taking into account the need of strengthening interventions on the buildings. Also in this case, all the houses were admitted to be subsidized. About thirty laws aiming at financing or refinancing the state aids were issued from 1981 up to 2007, with an amount of investments of about 33 billion 2007/EUR that, however, they have not considered as exhaustive of the total capital appropriation by Italian State [59].

More recently, on 6 April 2009 the earthquake of magnitude 6.2 (Mw) struck the Abruzzo region bringing about 309 deaths, damage to 35,000 private and 1000 public buildings in the town of L’Aquila and the surrounding areas [60]. The public economic resources allocated amount to about EUR 10.5 2007/billion, of which 73% directed to interventions on public and private buildings through the concession of subsidies. The public funds also include the European Union Solidarity Fund [61] of about EUR 500 million that have been put at the community’s disposal by the EU mainly to draw up two schemes of house building (Progetto C.A.S.E. and Progetto M.A.P.). Italy has also benefited from the Fund for other five disasters, the latest was the Emilia-Romagna earthquake in May 2012 in consequence of which the biggest amount of aid (670 million €) was mobilized since the creation of the Fund itself. In addition to the earmarking of public funds, grants were given by foreign states, private citizens or associations [61] [62].

From this overview it emerges that the state and the donors perform a significant and surety role in relieving the citizens affected by the disasters. This has contributed to develop the individuals’ tendency not to insure or take any other mitigation measures, highlighting a problem known in literature as *charity hazard* or *forgiveness money* [24] [63].

Summarily, public or individual helps after disasters occurred in Italy over the time might have contributed to give rise to the misconstruction or expectation, not ratified by any Italian law or regulation, that the State has an *a priori* obligation to rebuild the private real estate after a disaster, in accordance with a broader sense of the mutual approach to sustain the losses. The citizens’ hope to receive grants, compensation and low-cost loans from local and central institutions after a disaster has rarely been questioned by the whole political class, worried about losing popularity or drawn on the temptation of significant political reward for *ad hoc* and *ex-post* compensations [64]. This can be especially true for public interventions in Southern Italy (where the penetration rate is the lowest of Italy) for which, despite the huge expenses, the economic and social questions and the development gap with the North of Italy has never been solved by the institutions [52]. In this context, any of these *ex-post* aids can be viewed by people as being “the right chance” to solve the atavist question and politicians could benefit from such community’s hope. All that can have contributed to discourage the request for insurance cover and, consequently, chock down the debate on this issue.

#### 4. The Italian Insurance Market of Natural Hazards

The need for a system that guarantees the loss cover caused by disasters has led to the drawing up of some insurance schemes throughout the EU Members. The schemes can provide a private market solution such as in

Germany, Ireland or Italy or a close public-private partnership such as in Spain, Belgium and France (**Table 1**). The Italian market, however, it still hasn't been explored so far and no studies dealing with detailed information about it are available in literature. Therefore, the authors performed a research aimed at casting light upon the private insurance market of geophysical and hydrological hazards having the residential coverage in mind.

#### 4.1. Methodology

Before starting the study it was necessary to have an overview of the complex Italian insurance system. This is divided into 33 groups, each of them is composed of the leader (an insurance or reinsurance enterprise or a company of insurance holding), the insurance branch enterprises and the instrumental company controlled by the group-leader. The groups are organized in 1225 insurance companies. Most of them (~80%) acts in the damage or damage and life insurance branch. The companies that have registered offices in Italy and are allowed to practice the activity in the Fire and Natural Elements branch are 645 (IVASS, <http://www.ivass.it> last checked 2 September 2013). Among these, fourteen offer insurance policies against geophysical and geo-hydrological perils, providing twenty commercial products for housings and/or condominiums.

There are seven insurance groups involved in the market, with a clear predominance of two groups (Generali and Unipol) in terms of both number of companies and commercial products put at the community's disposal.

Once selected the companies' active in supplying insurance, we analyzed in depth the pamphlets of each policy available on the market (see Reference Section and **Table 2**). Some additional information was gained through the policy contracts requested by the authors.

All that stated, also depending on the questions raised by official documents such as the Green Paper on the insurance of natural and man-made disasters [65], the data included in the policy documents allowed to pay attention to eight main issues: 1) insurable (and uninsurable) perils; 2) typology of policy (basic or extended); 3) type and form of policy; 4) features of the buildings insurable and uninsurable; 5) payouts; 6) indemnity limits; 7) deductibles and their amount ; 8) premiums to be paid (**Table 2**).

#### 4.2. Policy Features: State of Play

Firstly, it should be emphasized that according to the 1912 article of the Italian Civil Code entitled *Terremoto, guerra, insurrezione, tumulti popolari*, the insurance companies are not obliged to compensate for the losses caused by seismic events, wars, insurrections, and social riots. Therefore, the companies that supply the natural hazard coverage act making an exception to the Code.

Seven insurance groups, through thirteen companies with registered offices in Italy, and a company with a registered office in another EU member state supply coverage of residential buildings against natural hazards (analysis of the IVASS register updated to 30 November 2012, <http://www.ivass.it>).

In compliance with about half of the European countries, the coverage is offered as an optional add-on of the fire insurance policies, has term after one-year and automatically expires after that period as the implicit wage settlement is not usually applied.

After these general remarks, now the coverage features are taken into consideration from close-up, according to the main eight points listed above (**Table 2**).

As regarding the perils insured, all the fourteen companies supply policies against the damages to properties and their content due to seismic events, while five of them propose also the "protection" for floods, which is usually bundled with the earthquake coverage to reduce the risk accumulated in the policy due to the statistical independence of the two hazards [65].

No company supplies coverage against the damage caused both by landslides, intended as a first-trigger phenomenon, and volcanic eruptions. However, secondary causes of landslide triggers, such as earthquakes or floods, are covered by many companies.

Once discussed the perils covered, it is also important to cast light upon what the companies mean by each hazard. As for the earthquake, it is defined as a sudden tremor of the earth crust due to endogenous causes and, for contractual purpose, the aftershocks recorded within 72 hours from the main shake are considered to act as a single earthquake and the resulting damage is evaluated as a "single event". Obviously, such contractual definition given by the insurers might imply non-negligible differences between the payouts and the effective damage suffered by the building as the aftershock duration might be well over the 72 hours. This contractual earthquake definition is quite different from those in force in the other European countries. For example in Belgium, where

**Table 2.** Main features of the natural hazard policies in Italy. Data are drawn by the pamphlets supplemented by some estimated cost documents requested by the authors. **ID** = identification number of the pamphlet consulted as reported in the reference section; **E** = earthquake; **F** = Flood; **I** = Inundation; **ReC** = Replacement Cost; **FL** = First Loss; **TV** = Total Value; **TAS** = Time Accident Statement, **H** = Housing; **C** = Condominium; **B** = Basic coverage; **E** = Extended coverage; **ER** = Earthquake-resistant building; **T** = traditional (reinforced concrete) building; **M** = Masonry building; **GB** = Green Building; **FpM** = Fire-proof material; **Ch** = Chalet; **ND** = Not declared field; \* = according to the estimated cost document. All data listed in the table are updated to August 2013. Therefore, data included here might have undergone changes.

ID	Company	Insurance group	Perils covered	Policy type	Type/form of coverage (tolerance)	Assets covered	Insurable building type
1	Axa S.p.A.	Axa Italia	E	B/E	ReC/TV (20%)	H	ER-T-M; G.B.; Ch
2	FATA Assicurazioni Danni S.p.A.	Generali	E/F/I (bundled)	E	ReC/TV (20%)	H	FpM
3	Fondiaria-Sai S.p.A. (divisione SAI)	UNIPOL	E	B	ReC/TV (20%)	H	ER-T-M*
4	Fondiaria-Sai S.p.A. (divisione SAI)	UNIPOL	E	B	ReC/TV (20%)	C	N.D.
5	GENERALI ITALIA S.P.A.	GENERALI	E	B	ReC/TV (20%)	H	FpM
6	Genertel S.p.A.	Generali	E/F/I (bundled)	B	ReC/FL	H	FpM
7	Groupama Assicurazioni S.p.A.	GROUPAMA	E	B	ReC/TV (20%)	H	FpM/Ch/GB
8	Intesa Sanpaolo Assicura S.p.A.	Intesa San Paolo Vita	E	B	ReC/FL	H	Building conform to the anti-seismic regulations
9	ITAS MUTUA	ITAS ASSICURAZIONI	E/F/I	B	ReC/TV-FL (15%)		FpM
10	Llyod Italo (brand di Allenza Toro S.p.A.)	Generali	E	B/E	ReC/TV (20%)	H	FpM
11	Llyod Italo (brand di Allenza Toro S.p.A.)	Generali	E/F/I	B	ReC/TV	C	FpM
12	LLOYD'S	-	E/F/I/AE (bundled)	E	ReC/TV (10%)	H/C	M-T
13	Milano S.p.A.	UNIPOL	E	B	ReC/TV (20%)	H	ER-T-M*
14	Milano S.p.A.	UNIPOL	E	B	ReC/TV (20%)	C	ND
15	Milano S.p.A. (divisione SASA)	Unipol	E	B	ReC/TV (20%)	H	ER-T-M
16	Tua Assicurazioni S.p.A.	Cattolica Assicurazioni	E	B/E	ReC/TV (20%)	H	T-M- G.B. after the year 2000
17	Toro (brand di Alleanza Toro S.p.A.)	GENERALI	E	B/E	ReC/TV (20%)	H	FpM
18	Toro (brand di Alleanza Toro S.p.A.)	GENERALI	E/F/I	B	ReC/TV (20%)	C	FpM
19	Unipol Assicurazioni S.p.A.	UNIPOL	E	B	ReC/TV (20%)	H	ER-T-M
20	Unipol Assicurazioni S.p.A.	UNIPOL	E	B	ReC/TV (15%)	C	ER-T-M

ID	Uninsurable building type	TAS-(days)	Payment on account/timing	Payout timing	Indemnity limit (insured value) (%)	Deductibles
1	Buildings with a structure made up fully of masonry	7	50%. 90 days from TAS	30 gg. from administrative coverage check	50%*	5% of insured value*
2	ND	3	50%. 90 days	30 gg. From administrative check	ND	ND
3	GB	10	50%. 60 days	30 gg. From administrative check	50% or 70%*	5% of insured value (min. 10,000€) or 10% (min. 20,000€) depending on building type*
4	ND	10	50%. 60 days	30 gg. From administrative check	ND	ND
5	Building under construction	3	50%. 90 days	30 gg. From administrative check	ND	20% of indemnity (min. 20,000€)
6	Building under construction/Basements (F/I)	3	50%. 60 days	—	ND	Min 7500€ (F/I)
7	Building under construction	5	50%. 60 days	30 gg. From administrative check	ND	10% of insured value
8	Building under construction or bad conservation state	10	50%. 60 days	30 gg. From administrative check	50%	10% of indemnity (min. 2500€)
9	Buildings in flooding area; Building placed in the highest seismic risk categories (1 or 2) according to company's risk scheme	5	50%. 60 days	30 gg. From the liquidation act	10.000 €	250€ (I/A); 500€ (E)
10	Building under construction/Not fitting antiseismic/urbanistic laws	3	50%. 60 days	30 gg. From the liquidation act	ND	20% of insured value
11	ND	5	50%. 90 days	30 gg. From the liquidation act	50%	1% of indemnity, min 15,000€ (F/I); 1% of indemnity, min. 30,000€ (E)
12	ND	8	ND	30 gg. From the liquidation act	Insured value*	Min 10,000€ - Max 50,000€*
13	Not fitting urbanistic law, GB*	10	50%. 60 days	30 gg. From the liquidation act	50% or 70%	5% (min. 10,000) - 10% (min. 20,000) of insured value, depending on building type*
14	ND	10	50%. 60 days	30 gg. from the liquidation act	ND	ND
15	Building under construction/Not fitting antiseismic/urbanistic laws; GB	10	50%. 60 days	30 gg. from the liquidation act	ND	5%(min. 10,000) - 10% (min. 20,000) of insured value, depending on building type
16	Building under construction/Not fitting antiseismic/urbanistic laws	3	50%. 90 days	30 gg. from the liquidation act	Insured value	20% insured value
17	Building under construction/Not fitting antiseismic/urbanistic laws	5	50%. 60 days	30 gg. from the liquidation act	ND	20% insured value

## Continued

18	Building under construction	5	50%. 90 days	30 gg. from the liquidation act	50%	1% of indemnity, min 15.000€ (F/I) 1% of indemnity, min. 30,000€ (E)
19	Building under construction/Not fitting antiseismic/urbanistic laws, GB, Ch;	3	50% (max 250.000) 90 days	30 gg. from the liquidation act	50% or 70%	5% (min. 10,000) - 10% (min. 20,000) of insured value, depending on building type
20	Building under construction/Not fitting antiseismic/urbanistic laws, GB, Ch;	3	50%. 60 days	30 gg. from the liquidation act	50% or 70%	ER building: 3% of insured value for value until 5 M€ 150,000€ for building having value greater than 5 mln). Other buildings: 5% - 250,000€

a public-private partnership is active, the cover of losses starts when a minimum magnitude of 4 is reached and the damage is recorded within a radius of 10 km. In Germany, where a free market is in force, the definition is vaguer: the companies compensate for the losses if the earthquake causes damage in an area surrounding the site where the insured building is located and the building is in a good conservation and maintenance status [12].

Analyzing the floods, it is worth emphasizing that the definition is not always given in the informative report of the Italian insurance companies. However, most of the companies give a definition of flooding which is in a good agreement with that supplied by [66] and adopted in other European countries such as Germany and Spain: "...temporary covering of land by water as a result of surface waters escaping from their normal confines or as a result of heavy precipitation". Only one company gives a definition that is more in accordance with the broader meaning given by the [67]: "temporary covering by water of land not normally covered by water".

As for the typology of policies, most of them (14, 70%) are basic, that is they give cover only for the rebuilding or repair costs of assets. Some coverage (6, 30%) can be underwritten with the extended option which includes the reimbursement of expenses for increased temporary living costs, the value of the house content and the income loss due to a forced interruption of the business.

As regarding the guarantee type, the value of assets insured is evaluated by all the companies through the Replacement Costs, on which the premium is estimated. So, taking into account this guarantee, the value of properties is estimated on the basis of the costs required to replace them, not depending on the market value that includes also the rate of the soil on which the building itself is founded. The Total Value is the main insurance form usually coupled with the replacement cost guarantee type. This form makes the assumption that the insured declares the whole value of the property. This means that in case the consumer fails to do so and declares a value whose difference from the real one exceeds a fixed threshold (usually 20%); the compensation will be proportionally reduced on the basis of how much the ascertained value will be different from that declared in the contract. Therefore, the rebuilding costs and the proportional rule should be entertained adequately by the owners for them to be sure to have the right damage compensation in view of the rebuilding/repairing of the properties affected. Only three are the companies that consider the First Loss as the insurance form, that allows the customer to obtain an indemnity limits without running into indemnity reduction due to the application of the proportional rule. This form is usually made for the house content.

As regarding the residential assets covered by the policies, most of them (15) concern the houses and only few (6) policies schedule the condominium as insurable assets.

The house policy is designed for homeowners, both of detached houses and apartments in condominium. In case of dwellings the policy covers the entire residential property. On the contrary, in case of flat in a condominium the policy covers the apartment itself and the common parts of the buildings in proportion to the share of ownership of the building. As for the condominium coverage, it is addressed to the condominium administrators and it insures the whole building and each property located in it.

Taking into account the requirements that the buildings to be insured must have, a primary distinction should

be drawn between the companies (9) that consider as necessary only the incombustibility requisite, scheduled for the “mother” fire policy, and the companies (8) that fix in detail the features that the buildings must meet. As for the latter, three are the building categories considered: earthquake-proof (in accordance with the national seismic code—O.P.C.M. 3274/2003 and successive supplements and modifications), traditional (horizontal and vertical bearing structure made up of reinforced concrete) and masonry. In the light of this, deductibles raises proportionally with the increase of the building vulnerability from the earthquake-proof category to the masonry one. The house structures that are not in accordance with technical and town-planning laws are uninsurable. Furthermore, some companies also exclude the buildings made up entirely of masonry (both load-bearing walls and vaults) typical of Italian historical centers, as well as the constructions belonging to the green building category, which are gaining ground in Italy. However, the insurance companies do not require the proof of compliance with building codes or town-planning laws, but these data are declared by the homeowner on one's own responsibility and checked by the insurance companies in the event of accident report.

Another aspect to be stressed regards the procedure to liquidate the damages, based on three steps: the report of the accident, the estimation of the damage, and the payouts. The time accident statement is required by the homeowners within a time span ranging between three and ten days. The damages can be assessed by private contracts or experts appointed by the parties, and the payments are scheduled to be liquidated within 30 days from the agreement between the parties or the administrative check of the coverage. However, the householders can obtain an advance payment on damage claim amounting to a maximum of 50% of the expected indemnity.

As for the indemnity limits, almost all the companies about which we gained relevant information fix the indemnity limits less than the amount of the rebuilding value declared in the “fire” section of the policy. These limits, fixed by the companies or chosen by the clients with a premium that changes proportionally, fluctuate between a minimum of 50% and a maximum of 70% in case of housings, and between 30% and 50% when the insured property is a condominium.

The last point that deserves to be emphasized is the application of deductibles. As for the houses, most of companies (and policies) accommodate them in an amount variable from 5% to 20% of the value insured with an amount of deductibles not less than 10,000€: very a few (4) policies link the amount of deductibles to the building typology (earthquake-proof, traditional, masonry), while the others don't regard to the building structural performance. As for condominiums, the amount of deductibles is usually fixed as a percentage of the indemnity (1%) or as a percentage of the insured value (3%). However, the minimum amount of deductibles fixed for earthquake policies is greater than that scheduled for flood/inundation coverage.

### 4.3. Discussion of the Data

Once listed the main features of the policies, it is necessary to discuss the possible drawbacks, also in view of a potential future start of a national insurance scheme. Therefore, particular attention will be paid to five points.

The first considers the number of policies and companies on the market. The policies are twenty and only a small percentage of companies qualified as potentially able to supply policies against natural hazards consider the offer of this guarantee advantageous or possible. Indeed, the market sees the predominance of two insurance groups such as Generali and Unipol that, totally, cover about 70% of the market. This contributes to reduce the differentiation of the supply side and, therefore, the availability of a wider range of private insurance policy options which, however, can also be due to the lack of consumers' interest. As a matter of fact, the people who ignore the hazard of the place where they live, the exposure of themselves and their own vulnerable assets and rely on the post-disaster state relief do not stimulate the companies to compete and offer a higher number of policies among which to make a choice. Therefore, the role of an aware and active consumer might stimulate the companies that at present do not supply coverage to enter the insurance market with new products and new contract options in order to meet the needs and requirements of the insured (e.g. different deductibles, indemnity limits, installments of the insurance premium). As being stated, in order to develop the insurance market the role of amplification factors useful to raise the risk perception as predicted, for example, by the SARF theory should be properly considered. Therefore, government-supported risk communication campaigns should be engaged and should regard mainly the preparedness and preventive measures that have proved to be more useful than the knowledge of the physical features of the hazard itself [34]. Furthermore, government-aided information campaigns of risk communication should also include a notice to the public about the availability of the insurance policies to protect their own assets, putting into evidence the advantages and limits of such economic tool and its

long-established use in some European countries. The need of such a publically-funded promotion of hazard insurance purchase is necessary doubly so as companies fail to do that due to concerns about free riding from competitors [68].

The second aspect regards the perils that are covered and uncovered. The Italian insurance market supplies coverage against losses caused by hail, snow, frost, avalanches, as concerns the meteorological hazards, and floods and earthquakes as regarding the hydrological and geophysical hazards. As for the latter, it should be emphasized that the supply mainly regards policies covering earthquake damage. A few are the policies that insure properties against flood losses: about one third of the whole market is dedicated to them.

As for the perils uncovered by the market, there are the landslide and volcanic ones. As a matter of fact, Italy is one of the few EU countries together with Cyprus and Estonia (**Table 1**) where no policy assuring the real estate against landslides is available on the market. This is a significant limit what's more the peninsula is among the countries where this hazard is the highest as for the United Kingdom, France, and Norway where, however, the coverage is available [69]. Moreover, no company offers covering against an important geological hazard such as the volcanic one that in other EU countries, such as Spain and Norway, is covered through a compulsory extension of basic property policies (**Table 1**). One reason why the companies may not assuring such risk could be particularly relating to the problem of adverse selection [70] that is the fact that the demand for insurance might arise mainly from the large amount of the population resident in the high risk area surrounding the volcanoes, as for the Vesuvius "red zone" where ~700,000 people (~200,000 families) live [71]. In such a context, the insurers worried about huge claims (both in number and in exposed value) by a lot of insured concentrated in this area are induced to leave out this hazard from the coverage.

The third feature to take into consideration is the criteria in determining the amount of the premium to pay and the amount of the tariff itself. Firstly, the premium price is formed considering the rebuilding value assessed on the basis of how many square meters the house (or condominium) consists of. The premium is freely determined by the market and, as hoped for by international documents [65] [72], it is based on the underlying risk as for the most of the European countries, except Norway, Spain, and Switzerland, where a flat premium is in force (**Table 1**). However, the insurance market weakness can influence the premium formation, as happened after two recent seismic events that hit Southern and Northern Italy. As a matter of fact, our market analysis indicates that some insurers hurt by significant damages and losses to be compensated for the 2009 L'Aquila and 2012 Emilia earthquakes, after these events took conservative criteria resulting in a temporary withdrawal of the coverage or in an increase in premiums to properties located in sites characterized by a high seismic hazard.

As above indicated, some companies consider a diversification of the premium on the basis of the building typology (vulnerability). As for the earthquakes, this can imply significant differences in terms of premium: an owner of a masonry building can pay a premium which can be twice as high as the premium paid for an earthquake-proof building, under the same other conditions. The building typology is also considered by the companies in order to fix the deductibles and impose a penalty on the buildings with a poor structural performance. On the one hand, this insurance choice represents an incentive for owners to adopt mitigation risk measurements so as to contrast the moral hazard, that is, the individual's tendency to take more risks due to the fact that they are transferred to someone else [73]; on the other hand, some problems arise to insure the house building of historical centers characterized by a high vulnerability. A compulsory covering of this property might increase the abandonment phenomenon of the minor historical centers, thus further menacing their posterity.

As regarding the amount of the premium to be paid to cover properties against losses, from a swift glance at the market through the analysis of about ten estimates requested by the authors to the companies, it shows that the premium against earthquake losses fluctuates from 0.12% to 0.32% (inclusive of tax at 22.25% and entertainment expense) of the sum insured (rebuilding value), excluding the property content. The amount of such percentages may include the coverage against flood losses that is generally bundled with the earthquake insurance. These percentages mainly depend on the hazard-site, building vulnerability, and house typology (flat in condominium or detached house). Only one company seems to supply a flat premium that is a pricing unrelated to the risk (Lloyds', [www.assicurazioneeterremoto.it](http://www.assicurazioneeterremoto.it), last checked on 14 September 2015). Even if the amount of the premium does not seem to be particularly high when compared with those in force in other countries (e.g.: Turkey, see **Table 1**) it may still be perceived higher because the tax load on residential Italian properties is the highest among the European countries [74]. In addition, the pre-contractual documents do not provide information on how the insurance commercial premiums are made up, especially for what concerns the amount of the "risk premium" rate [68] and the other administrative and marketing expenses. The consumers' preliminary

knowledge of both the risk classes their home belongs to and how much the “risk premium” itself weighs up on the commercial premium might, in fact, increase the people’s risk perception and the confidence in the coverage, so as to make the premium more acceptable. This aspect should be properly considered by the companies. Bearing these aspects in mind and in order to increase the request for coverage, the companies might schedule for a partial refund or a discount of the premium for those who intend to renew the policy and haven’t claimed any losses within the term of the contract. This would help the consumers both to evaluate the underwriting of the contract and its renewal as favorable, thus escaping from the temptation to cancel it without claiming losses in a one-year or longer covering time span. In addition, to keep the premium lower, the insurance companies might stipulate preventive agreements with building firms to repair or rebuild the properties damaged with lower costs. In this way, the customers that instead of the damage compensation accept the restoration of the home to be made by the building contractor suggested by the companies might benefit from a lower premium and/or a deductible cut or higher compensation limits. The government might favor such agreements fixing tax relief for contractors (e.g. cut of the VAT on the building materials) entering automatically into force after the hazard occurrence.

The fourth aspect deals with the real compensation to be paid by the insurers and the time requested to compensate for the damage. The companies propose policies against earthquake losses with indemnity limits that can also be 50% in case of housings and 30% in case of condominiums. These values seem to be among the lowest in Europe. Only in Austria the limits are quite similar to those in force in the Italian market (**Table 1**). Furthermore, the joined application of the deductibles (among the highest in Europe), that can reach 20% of the value insured, and the low indemnity limits may not guarantee an adequate fulfillment of the property rebuilding or repairing especially for two typologies of damaged properties: those collapsed and those slightly affected. In the first case, the compensation limit fixed by the companies will be insufficient to rebuild the housings, in the second case; the low losses won’t be compensated for due to the application of deductibles. On the basis of this, a prompt simulation of the application of deductibles or indemnity limits on a large scale territory affected by a huge earthquake, such as the Irpinia one in 1980, suggests that the towns localized in the mesoseismic area are unlikely to be rebuilt only with the insurance compensation. Considering a medium-size house with a rebuilding value of 100,000 € and the deductibles and compensation limits as indicated above, we can see that the owners of housings affected by minor damage (e.g. ~20,000 €) or entirely collapsed would suffer the most significant impact of the restrictive insurance rules in terms of percentage of non-reimbursable losses. Indeed, the spread between the real economic damage and the effective insurance compensation will be high and equal to 100% of the economic damages in case of slight effects, and 50% in case of house collapse. In event of slight damage, the losses will be entirely within the deductibles, and the home owner will have to pay 20,000 € for repair work, in case of medium-degree damages amounting for example to 50,000 € the owner will have to pay the first 20,000 € for repair work before coverage kick in; in case of house collapse the half of the losses (50,000 €) will be non-remunerable due to the application of the indemnity limits. Therefore, the joint of premium expensive costs, the low indemnity limits and the significant level of deduction, to which the homeowners are attentive, may be an additional cause for which most of the homeowners are still reluctant to purchase insurance [30]. This may be particular relevant for the owners that have their own assets placed in low-risk areas: the customer might have no incentive in purchasing a cover as earthquake damage will rarely exceed the deductibles. Therefore, a reconsideration of the indemnity limit and deductible thresholds might meet the consumers’ needs and requirements. In this connection, even if the Italian market is highly unlikely to fit the French or Spanish rules in force in a short time, some hints can be drawn from these countries where the application of compensation limits or deductibles are not scheduled. For example, a deductible system adjusted considering the risk level as made for the premium price might help the meeting between the supply and the demand, thus allowing the reduction of the adverse selection and the increase in the capital accumulation in order to cope with the consequences of future hazard impact. Another solution might consist in the companies supplying an optional surcharge for the deductible, especially for the properties located in low-risk areas. In this case, the householders who are interested in insuring the deductibles should pay an extra-premium that will guarantee for slight damage.

As regarding the time span necessary to obtain the payouts, our data show that private compensation (and consequently the property rebuilding) might be by far faster than the compensation awarded by the government so as to contribute to a decrease in the use of public funds to provide homeless people with temporary housings. The companies might emphasize this aspect adequately when informing the potential customers, also putting into evidence that the time requested for the state to give the compensation can reach several decades. The im-

portance of coverage could be emphasized, for example, taking advantage of the past long-lasting rebuilding interventions made by the State after disasters due to insufficient grants and/or their division into installments over long or very long periods that can even reach one century or several decades (e.g. 1908 Calabria-Messina, 1962 and 1980 Irpinia earthquakes).

The fifth aspect regards the possibility of gaining (clear) information on the companies active on the market as well as the offerings by different sellers about prices, deductibles, and indemnity limits. As a matter of fact, in order to increase the customer's confidence and also compel the companies to compete in order to attract and retain new policy underwriters, clear information on features, advantages, limitations, and exclusions that is provided for by the policies should be guaranteed [43]. Despite this, from our analysis it emerges that the companies, so far, supply the customers with unclear information about the coverage, thus the consumers may find hard and discouraging to gain information about which companies and on what conditions the hazard coverage is offered. Furthermore, the insurance agency's staff were found to be inadequately skilled in the knowledge of the coverage features put at the consumer's disposal and, in some cases, they also ignored that their company offered the coverage for natural hazards.

From a general point of view, as for the pre-contractual information, each policy is accompanied by a pamphlet including information that varies rather greatly from an insurance company to another, and the head of the sections under which the information is reported lacks standardization. This rises from the fact that the three directives concerning the non-life insurances do not include specific rules to be followed by the insurance companies [65]. This implies that only a few companies include the policy information in hazard-dedicated independent section. In fact, the information regarding the coverage conditions frequently refers back to the general rules fixed for the basic (fire) coverage or directly to the policy contract (e.g. the indemnity limits, the deductibles, the type and form of coverage, the steps required to assess the damage), which the consumer could access only after asking for an estimation.

As for the content, the pamphlets do not usually include data regarding the occurrence probability of a certain hazard and the loss probability of the assets. This makes the consumers undertake efforts in the attempt of gaining such relevant knowledge, which may inhibit the policy purchase even if the consumer considers the premium cost affordable [23].

As regarding the information on the premium amount, almost all the companies require the client to go to the agency. However, once the customers have been to the agency they will be informed on the price only after the estimation approval by the company headquarter, which may require a few days. Only a company offers the consumers a web approach to obtain in a fast and easy way the estimated costs of the coverage (Lloyds', [www.assicurazioneterremoto.it](http://www.assicurazioneterremoto.it) last checked 1 September 2014).

Bearing all that in mind, the Italian government should make up for the lack of supranational rules for non-life insurance by fixing regulations for the companies to increase people's knowledge about the hazard insurance, and make the information standard and more accessible. For example, the companies might be requested to include clear information for prospective clients in the pre-contractual documents, also taking advantage of official documents available from the Italian institutions (e.g. Civil Protection). In this perspective, the information about the effects caused by historical strong natural extreme events might be of special interest for individuals as they would be confronted with the real damage their property might incur. Furthermore, the measures and actions that individual may be engaged in to reduce the losses of future hazard events (e.g. building reinforcements and public incentives to sustain them) will contribute to make the prospective client more confident with the risk and, therefore, more willing to take suitable countermeasures.

The companies might also be required to inform the customers (e.g. homeowners and apartment house managers) about the availability, the benefits, and the costs, and all the underwriting conditions of the hazard insurance when a request for property or fire coverage is received. Similar disclosure rules might be established when a homeowner purchases the property insurance in security of a mortgage loan, as experimented in the US [43]. In addition, a company's implicit promotion action of the coverage might be that of place at the customers' disposal the coupled selling of fire and hazard insurance. The companies might choose to promote such a selling in certain peninsula areas or in specific periods of the year with the support of the government policy that should favor this option through fiscal incentives. What's more, this coupled selling might also contribute both to dispel people's attitude to believe that if the hazard coverage is sold separately from the fire coverage, the probability to encounter the effects of a disaster in their life is definitely negligible and, consequently, increase the penetration rate [75].

Another disclosure rule might demand and/or incentive the insurance trade associations to supply the potential customers with ICT technology-based search tools. For example, a web page (or a mobile device APP) where to perform a cross-search for insures would be able both to inform the users about the companies active in supplying coverage of private assets and make a comparison between the premiums and policy conditions. The tool might be included in the quite common web search tool that supplies a comparison between companies active in other non-life insurance branches such as that for cars. In this way, a wider group of potential customers could be reached due to little search effort made by the users as well as the circumstance that both the calamity insurance well-disposed people and those who are in the dark about the coverage could obtain fast, useful and suitable information. Lastly, the use of the web could help the companies to control the commission and administrative costs with benefits for the premium prices.

## 5. Conclusions and Perspectives

The analysis in this article shows that the Italian private insurance market has some limits on the supply side, and in fact, the insurability is not guaranteed for all hazards and properties. The premium formation presents some drawbacks, and the compensation for the insured may not be sufficient to achieve the rebuilding/repairing aims. However, some of these weak points might be reduced if the demand for insurance coverage will be greater. To make that easier, the government might conceive a set of new activities, rules, and subscription incentives within a pre-established testing time span (e.g. 3 - 5 years) at the end of which the government will evaluate the results and decide which insurance plans to put in force.

In this period one of the government's prior engagements, which also involves the insurance companies and trade associations, should be the planning of a large-scale communication programme especially addressed to well-targeted people, identified also through the approach discussed in this article, and aimed at increasing people's risk perception and their knowledge about availability and features of hazard coverage.

A rule that the state might enact is a clause excluding those who fail to purchase insurance from public aids. Simultaneously, the same rule should take account of a safeguard clause to guarantee damage compensation by the government for uninsurable hazards or low-income householders' properties.

In order to sustain both the policy-holders and the insurers, the government might provide for fiscal incentives such as a tax relief on the premiums (22.5%) or the tax allowance of the premium with a scaling system depending on the owner income, house size and its use (e.g. main or second home). The claw back would result in a medium-term period due both to a cut in public expenditure for less damage compensation in consequence of future disaster and internal revenue due to an increase in the policy signature rate. Alternative fiscal incentives might also be scheduled in the renewal plan of the house local taxing system, aiming at reducing the tax burden on residential properties, which is being disputed by the Italian parliament in these months. A quote of such tax reduction could be reserved for those who sign an insurance policy. The town council should be assigned the authority to decide the amount of the tax cut on the basis of a scaling system depending on the risk level which affects the municipal territory.

In order to develop the market, the government rules might contemplate fiscal incentives for insurers who enter the market of natural hazards and/or disincentives for companies that fail to do so. The grant of fiscal incentives could be met once achieved the pre-fixed thresholds of new policy signatures. However, the government should also take actions to encourage the mutual risk retention by setting up insurance pools able to put aside sufficient resources to compensate for the damages adequately, so as to meet the requirement of European directives (e.g. Solvency II).

Once the testing period is expired, the government might evaluate whether the results are encouraging or completely unsatisfactory on the basis of the penetration rate. In case of persistent underinsurance, the government might establish a national scheme bearing in mind the European experiences according to which the penetration rate is among the highest in the countries where the insurance policy is based on semi-mandatory or obligatory schemes and/or the state does not compensate for damages. However, the adoption of one of these schemes would imply a leading role of the government, not only in the enactment of rules or incentives but also in acting as a public insurer or re-insurer. Under this perspective, further research should evaluate the technical feasibility, the benefits and the drawbacks of a national insurance design developed along two different lines over the Italian territory like the one which is in force in Switzerland (**Table 1**). As a matter of fact, the Italian regions/territories where the penetration rate will be considered adequate after the testing period should let the

market develop freely. On the contrary, for the regions with a negligible/unsatisfactory number of new under-written policies it might be necessary to evaluate the possibility for the State to take a monopolist role in a compulsory insurance system.

However, whatever the solution may be adopted in the future, the discussion about the approach to follow to cope with future hazard impacts is more and more necessary, as also hoped by the international institutions. The final aim is to guarantee suitable, timely and uniform levels of rebuilding after disasters considering both the pressing need imposed by the European institutions in controlling the national balance and the rise of natural disasters over the time.

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## Pamphlets Consulted (with ID Number—from 1 to 20—as for Table 2) (In Italian)

- 1-Protezione Familiare (Mod. 2126 ed. 12/2010) e Protezione Familiare per il terremoto (Mod. 2076 ed 12/2010-print 10/2012)
- 2-Soluzione Fata per la casa (Mod. 80/001-Ed. 07/2011)
- 3-Retailpiù Casa Classic (Cod. Prod. 11538 Ed. 03/2013)
- 4-Retail Più Fabbricati Classic (Cod. Prod. 11481 ed. 04/2013)
- 5-Casa Dolce Casa (Mod. 1541—Last update 01 July 2013) e Protezione Sisma (Mod. 11700 last update 17 March 2012)
- 6-Quality home (ed. 10/2012)
- 7-Qui Abito casa (Mod. 250064C-Ed. 01/2011 and Ed. 06/2012)
- 8-Polizza Abitazione & Famiglia (Mod. 185639 Ed. 08/2013)
- 9-Habitas+ (Mod. X2004.0-Ed. 05/2012)
- 10-Formula Casa Più (Mod. S01L-480-Ed. 06/2011 e Garanzia Terremoto Casa (Mod. S01L-508 ed. 11/2012)
- 11-Formula Immobili Più (Mod. S01L-490-Ed. 03/2011)
- 12-Nota Informativa Assicurazione Globale Abitazione Catastrofi Naturali (BDB-Ed. 12/2010)
- 13-Difesa Più Casa (Cod. Prod. 11556 ed. 03/2013)
- 14-Difesa Più Fabbricati Full (Cod. Prod. 11499 ed. 04/2013)
- 15-Nuova Casa & Cose SASA (Mod. SA1989/c- Ed. 04/2013)
- 16-Tua Famiglia (Mod. FASFAM 5 Ed. 06/2012)
- 17-Master Casa (PB59B300.D11 - 10307845 – Reprint March 2013) e Garanzia Terremoto Casa (Ed. 11/2012)
- 18-Master Fabbricati Progress (PB59G200.311 - 10311683 –Reprint May 2012)
- 19-You casa (Mod. 7261-Ed. 10/2012)
- 20-You Condominio (Mod. 7260-Ed. 15/03/2013)

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