Insurance Against Natural Disasters and the Development of the Insurance Market in Bulgaria

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Posted Date: 6 March 2025

doi: 10.20944/preprints202503.0427.v1

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 doi:10.20944/preprints202503.0427.v1

Article

Insurance Against Natural Disasters and the Development of the Insurance Market in Bulgaria

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Abstract: This article presents the problems related to insurance against natural disasters and the role and development of the insurance market in Bulgaria. The study focuses on the insurance market, as the insurance market plays a crucial role in the overall stability and functioning of modern economies, serving as a risk management tool. The review of the development of the insurance market in the country in this paper focuses primarily on property insurance against fire and other catastrophes, as the aim of this paper is to outline the challenges facing the development of the insurance market in terms of climate change and the fact that Bulgaria is in the top 10 countries most affected by climate change in 2022 in the world.

Keywords: insurance; insurance market; climate change; natural risks and disasters

1. Introduction

The result of ever-increasing climate change internationally and regionally is causing countries around the world to struggle with the effects of natural disasters and seek means to rebuild affected areas. Identifying the problems and challenges in the development of the insurance market in the country implies tracking the comprehensive insurance solutions offered and the formation of sound policies and measures taken by insurance companies and government institutions to mitigate the financial impact of natural disasters on the different administrative-territorial units in the country. In recent years, the deterioration of the natural environment and growing human activities have increased the level of damage caused by natural disasters, and the economic losses incurred have been on the rise. According to the Sigma Catastrophe Database, the global catastrophe data during 1970–2021 show that the frequency of catastrophes has generally risen over the past fifty years. The same goes for losses, with 90% of all losses over the last decade being in the tens of billions of dollars or more, placing a heavy burden on insurance companies, government finances, and society (Tang, Y. et. al. 2023). This article will present some peculiarities in the implementation of insurance against natural disasters in the country. New trends will be reviewed, and some necessary changes in the regulatory framework in the country that are shaping the insurance market will be outlined. In addition, we will frame the ways in which adaptation of the insurance services offered to the challenges posed by natural disasters, some of which are also a result of climate change, is being implemented. Increasing risks of natural and environmental disasters to the population and the territory are linked to climate change, and the increasing frequency of devastating natural events such as floods and fires suggest the need to develop a robust insurance framework that provides options to reduce potential losses. Because „the rising costs of underwriting are transferred to insurers, which ultimately could trigger higher premiums for natural catastrophe (NatCat) insurance worldwide "(Tesselaar, M. et. al. 2020). Studies on the possible impacts of climate change on the risk of adverse events and natural disasters in Bulgaria have been made by different authors and have been made for different periods of observation, with expectations related to an increase in the risk of droughts and floods (Nikolova, M., 2023). Climate change scenarios developed for the country show

 doi:10.20944/preprints202503.0427.v1

that in less than 60 years, today's mild droughts are likely to turn into severe droughts, and the western and southeastern parts of the country will be the most affected (MOEW, 2018). Furthermore, it has been found that "the average values of the SPEI drought index with a 48-month step, has been negative for each of the last four decades for the territory of Bulgaria" (Nikolova, M., 2023). The noted changes affect the occurring changes in ecosystems and their distribution ranges, and this means that serious consequences are possible for biodiversity as well as agriculture and forestry. Furthermore, it was confirmed that changes in the ranges of climate types and subtypes took place between two reference periods (1961-1990 and 1991-2020), with hotter and drier temperate climate subtypes expanding their range in Bulgaria and a decrease in the range of the Cfb climate subtype and an expansion of the Cfa climate subtype by 30.6% between the two periods studied (Malcheva,K. Bocheva, L. 2023). The climate in the Cfa range is characterised by the majority of the country's lowland hilly and lowland hypsometric belt, where agriculture and forestry are developed. Changes in temperature and rainfall characteristics are a threat to health, infrastructure and the functioning and urban environment. In large cities, because of the presence of more intense and prolonged heat waves, the so-called "heat island" is formed, where the adverse effects of hot weather are multiplied (Dimitrov et al., 2020; Sarafova, 2022). A significant proportion of the country's cities are vulnerable because of the increasing risk of extreme rainfall and flooding. As the sewerage network is inadequate for the new conditions, the extent of green areas has been significantly reduced in places, and in addition, there are large, sealed areas that lack the necessary conditions for the infiltration of rainwater into them. In the new conditions, as a result of climate change, it is possible that flooding will become more and more frequent, causing damage of varying extent and scale in urban areas, which again confirms the need to take measures both to improve the adjacent infrastructure and to insure it, so that potential losses can be covered and the burden on the public budget in recovering them reduced. Increasing attention should be paid in spatial planning processes to the features of the topography in the urban environment, as these further amplify the intensity of rainfall in particular regions (Nojarov et al. 2023). During the period 1991 - 2019, precipitation events of 60 mm/24 h increased by 42% in temperate-continental climate regions and by 32% in those with a continental-Mediterranean climate compared to the period 1961-1990, except for southwestern Bulgaria, where precipitation events decreased by about 25% compared to the same period (Bocheva et al., 2020). Risk assessment and insurance premium setting by insurance companies should consider the risk in the territories of the country where similar cases with and with more extreme daily rainfall of more than 100 mm/24 h are observed. These are also a factor in increasing the risk of catastrophic flooding and related other natural disasters, such as the intensification of landslides, collapses, etc. It should be noted that in Eastern Bulgaria, as well as along the Black Sea coast, a statistically significant increase in the average annual number of days with extreme precipitation of more than 100 mm/24 h has been found. In addition, the concentration of cases with precipitation of more than 200 mm/24 h is also increasing in this part of the country (Bocheva et al. (2014). The increasing number of hydrological, climatic and meteorological disasters in Europe is influenced by climate change (IPCC, 2012). In Bulgaria, between 2010 and 2020. In the period 2020-2020, most damages were suffered by floods (45%), landslides (39%), storms (9%), hailstorms (3%) and earthquakes (3%), while damages from snowfall and snowstorms (0.6%), icing and freezing (0.3%) and drought (0.1%) had a very small relative share in this period, but these hazardous events have a great potential to generate losses and destabilise socio-economic systems (Nikolova, M., 2023). But, climate change requires improvements to be made, both in the area of improving local insurance mechanisms and in the area of increasing cooperation between EU member states, where the aim should be aimed at creating a mechanism to pool risks and increase 'adapting to climate change is a social, environmental and economic imperative' regardless, that the damages are usually inflicted within a localised setting, their effects are felt across member states, pointing to a strong rationale for EU-level coordination and cooperation in building climate resilience(Giuli, M. et. al., 2020). Trends in the development of the insurance market, both in Bulgaria and in any other country, are inextricably linked to the broad socio-economic transformations in each country or region. On the one hand, it is possible to observe an approach of

 doi:10.20944/preprints202503.0427.v1

domination of state structures in the field of insurance, leading to a lack of competitive practices and a narrowness in the products and services offered. The promotion of foreign investment in a region can also be seen as a prerequisite for the introduction of a variety of insurance products. Increasing vulnerability to disasters because of climate change is increasingly leading to the development of specialised insurance against natural disasters. From an evolutionary perspective, insurance regulations and practices are undergoing a significant transformation because of increasing environmental uncertainty and the creation of proactive risk management strategies reflecting the processes of climate change and catastrophic events. This process requires the integration of insurance and its adoption as a critical tool for managing the long-term economic consequences of natural disasters that occur or have the potential to occur. The state of natural catastrophe insurance and the development of the natural catastrophe insurance market are a function of the ever-increasing awareness of the population of the climatic risks resulting from climate change, leading to an increase in the frequency and severity of potential and actual extreme weather events in each territory. The need to develop structured risk management frameworks to reduce financial losses from catastrophic events should be noted. By integrating adaptation strategies within existing insurance frameworks, it can be seen as a guarantee that financial instruments will enable future risks arising from natural disasters to be addressed, and by strengthening the market for insurance services against natural disasters, the opportunity will be created to increase resilience and adaptability in the face of unpredictable climate challenges in different regions. The need to create a better regulated and, at the same time, profitable insurance environment will support the perception of increased consumer protection and, on the other hand ensure the relative sustainability of the insurance market and the services offered related to the protection of natural disaster risks. Undertaking a detailed study of natural catastrophe insurance in Bulgaria implies analysing the complex interrelationship between the risk management process and, on the other hand, examining and presenting market developments in the context of expected climate change-related natural catastrophe risks. Bulgaria faces numerous risks from natural disasters, including floods, storms and droughts, which can have a major impact both on the state and development of the agricultural sector and on the social and economic stability of the country's threatened regions. A solution in this direction is linked to the integration of effective insurance mechanisms towards territories vulnerable to climatic fluctuations. This process implies accumulating knowledge about potential natural disasters and threatened territories to develop the necessary individual insurance solutions. As each region in the country has its specific regional challenges related to risk management and potential threats from fast-moving natural disasters. The very development of the insurance market is, on the one hand, a function of the overall understanding of risks, and on the other hand, it is linked to increased cooperation between all stakeholders. As climate change continues to exacerbate the frequency and severity of natural disasters, the insurance market in Bulgaria is poised for significant developments around natural disaster coverage, as the need to adapt insurance models to take account of the extent of the increase in risks that result from climate change is increasingly being recognised. In the insurance market, changes linked to innovation and the development of information and communication technologies can be expected, with improved underwriting processes, where improved tools for analysing available data and predictive modelling can be incorporated, based on which proposals can be made to improve the regulatory frameworks in place, to increase, on the one hand, the transparency and, on the other, the stability of the country's insurance sector. On the one hand, significant efforts should also be directed towards raising public awareness of the financial implications of natural disasters because of climate change, as this could increase consumer demand for comprehensive insurance products, including property insurance in the country, which is not at the level required and desired. Integrated strategies need to be developed to, on the one hand, improve the awareness of the population and, on the other hand, encourage consumers to increase their insurance activity to increase their certainty about the growing challenges and hazards associated with climate change and the occurrence of adverse events within the country. We should note that „in the contemporary insurance landscape, accurately measuring and managing claims risk

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is important for ensuring financial stability and operational efficiency" (Surya, H.A. et. al. 2024). Four distinct institutional frameworks for community-based casualty insurance (CBCI) can be presented to illustrate the different roles and responsibilities of the community and its partners, namely a Facilitator Model, a Group Policy Model, an Aggregator Model, and a Community Captive Model, where the level of involvement and accountability of the community increases progressively from the first to the fourth model, but in all scenarios, the community could offer coverage that property owners can choose to purchase voluntarily, but when coverage is voluntary, though, the community would likely need to introduce incentives to encourage the widespread adoption of insurance (Purwandari, T. et. al, 2024). Insurance companies must choose a model that suits the characteristics of their claims data, such as distribution, dependency, and heterogeneity. Insurance companies must also periodically validate and evaluate models to ensure that they are still relevant to current conditions (Purwandari, T. et. al. 2024). The objective of insurance companies is to absorb potential individual losses by spreading the risk over time and space, i.e., the risk of an insurance company becoming insolvent is reduced given the geographical spread of policyholders, which in practice creates a larger risk pool with lower correlated risk. The objective of insurance companies is to calculate the average risk over time so that the potentially large financial shock that would result from a catastrophic event can be transformed, but we should also bear in mind that climate change and potential catastrophic events across the country are more local in nature. Notwithstanding that the ability of the primary insurer in allocating its risk is geographically determined by the specific administrative boundaries in place, in the event of a potential large-scale natural catastrophe, the insurer could transfer a portion of its risk portfolio to a reinsurer to cover the potential excess loss if a certain claims threshold is made. The role of the reinsurer is associated with the potential most extreme risks, and these are potential events possessing an extremely low probability of occurrence but would cause a huge impact. The process of maintaining a manageable risk portfolio assumes that the reinsurer operates on a global level where the reinsurance market is dominated by a few firms compared to the primary insurance market, because of the limited number of reinsurance companies and the competition that exists the value of reinsurance premiums can be several times the actuarial cost of the risk underwritten. Climate change results in a significant change in the average temperature, i.e., the modelling process of fiscal impacts must be carried out based on the resulting temperature changes, from which the risks can be determined, and the potential damage and costs required to mitigate or adapt to the new conditions can be considered. Of course, the physical impacts of climate change vary from region to region, and the risks faced by local populations can vary from, for example, an increase in heart disease as a result of a warmer climate, a reduction in agricultural yields due to prolonged droughts, to strong regional impacts on leading sectors in particular regions, such as a reduction in the length of months for skiing, to A series of research studies have addressed a range of issues such as identifying the likelihood of specific risks occurring in particular regions, developing different multifaceted scenarios related to taking effective action to mitigate and/or adapt to new conditions and potential risks, identifying the role of responsible actors in deciding on actions when potential risks arise. The insurance market should be seen as a form of organization of monetary relations in which the process of creation and distribution of an insurance fund is carried out, which is intended to cover losses from the occurrence of accidental events or in the search for an opportunity for the consumer to secure additional income in the event of the occurrence of certain events. On the one hand, the insurance market is seen as an opportunity in which the contacts between insurance companies and their customers take place, and on the other hand, the insurance market is seen as an economic space in which the supply and demand for insurance protection meet and the formation of the insurance premium by the insurer takes place based on the factors involved in its formation, such as the assessment of the probability of the occurrence of an alleged insurance event. Most often, the insurance market is understood as the set of all potential entities such as potential consumers of insurance services, insurance companies, intermediaries, legal norms regulating the market, public institutions and business and non-profit organizations forming, regulating and influencing the behavior of all participating entities in the market. The insurance

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market today plays a critical role in the overall stability and functioning of modern economies, serving as a risk management tool that allows individuals and businesses to mitigate unforeseen financial losses. This market not only protects against accidents, health problems and property damage but also promotes economic growth by enabling investment through increased consumer confidence. Stable insurance markets encourage entrepreneurial activities as entrepreneurs can take calculated risks. In addition, the insurance sector contributes significantly to financial stability as it manages vast pools of capital that can be used for investment, thereby helping to finance critical infrastructure and development projects. With the recent complexities introduced by financial globalization, as noted in the expansion of financial systems, there is a growing need for effective regulation and supervision to ensure that the insurance industry remains resilient and responsive to both market demands and economic changes (Beck, Th. et. al. 2024).

2. Materials and Methods

For the purpose of the study different data sources were used, as well as scientific publications and reports of national and international institutions, as the searched and analyzed data are open access and high reliability for the development of the insurance market in Bulgaria, where the aim is to extract the necessary information outlining the main issues related to climate change and the development of the insurance market in the country. To present the development of the insurance market in the country, as well as to outline possible trends, a series of publications have been used, most of which have been published in scientific journals indexed in world databases. The source of the data on the funds spent on crisis events is the National Statistical Institute (NSI), and for the insurance market, the Financial Supervisory Commission (FSC). Our scientific hypothesis is that based on the increasing danger as a result of climate change of the occurrence of an extreme weather or climate event and the extent of development of the insurance market in the country, it is not only necessary to take measures to reduce vulnerability and risk to it and/or to adapt to the changes, but should also consider and make the necessary changes to increase the number of insured residential properties and create the necessary regulatory conditions to increase the number of insured But, it should be kept in mind that "the relationship between climate change and the risk of extreme hydro-climatic events is not unambiguous, but it is undeniable" (Nikolova, M. 2023).

The research methodology is determined by the object, which is the insurance market. Considering that the processes taking place in the insurance market can possess positive and negative results. From the methodological point of view, the insurance market has its own framework that characterizes it and potential for development, which is determined on the one hand by the regulatory framework in the country, and on the other hand by other factors affecting its development, such as the socio-economic development of the country and individual regions, we can also add the role and importance of climate change, which can outline a new direction of development of the insurance market in the country. The article presents partial processes or phenomena that may influence the insurance market and at the same time, change the overall picture in the future. The use of such an approach implies being institutionally regulated with the development of the necessary indicator framework for the conditions of the development of the insurance market in the country so that an overall picture of the situation in the insurance market in the country can be obtained through indicators. The idea of the authors is to examine the insurance market trends and opportunities for its development in the context of climate change by assessing its condition and identifying the challenges resulting from the need to adapt policies and take disaster risk reduction measures in the country. The management of the system for prevention and counteraction of climate change risks implies determining the state and development of the insurance market in Bulgaria. The use of this approach can also show the state of development of the insurance market in other parts of the European Union and determine the need to take the necessary measures at the regional level. The approach implies looking at key regulatory documents, as well as incorporating data on demographics, climate, the history of disasters in the region, etc., and analyzing

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the crises that have occurred in the country and in individual localities because of climate change. The main objective of the authors is to analyze the insurance market and propose options to reduce the financial burden of potentially affected individuals in coping with crises of a different nature resulting from climate change in the country. The objective thus set will be achieved by using various approaches and methods including causal relationship analysis, statistical, descriptive and analytical methods, induction and deduction and analysis of regulatory documents.

3. Results

When looking at the development of the insurance market in the country, we should pay attention to the intra-European cross-border insurance market, which is related to the insurance activities carried out within the European Union (EU) and involves the movement of people, goods and capital across national borders. At the same time, it has a significant role to play in promoting regional economic growth, creating opportunities to facilitate trade relations and strengthening social cohesion between the Member States of the European Union. Undertaking an analysis of the insurance market implies a review of the dynamics of the intra-European cross-border insurance market, in the context of which Bulgaria's role and place in it should be examined and analyzed, and on the other hand, challenges should be outlined, identifying the problem areas facing our country. The particularities of the intra-European cross-border insurance market are determined by the ever-increasing mobility of people, goods and services, especially given that around 18 million citizens live in a Member State other than their own and around 3.5 million businesses operate in another Member State, it is precisely the increasing migration flows that are one of the reasons for the growing demand for cross-border insurance products and services, whose purpose is to help populations and businesses manage the potential and actual risks associated with their current activities. A look at the products offered by the cross-border insurance market highlights on the one hand the variety of products offered, including car insurance, property insurance, health insurance and travel insurance. On the other hand, the process of cross-border trade stimulates and encourages competition between insurers, which has an impact on the terms and conditions offered and the reduction of the price for end consumers. The market is regulated by European Union regulations through the Insurance Mediation Directive (IMD) and the Insurance Distribution Products Directive (IDPD), which aim to provide consumer protection while ensuring a level playing field for all insurance market participants. Challenges in the cross-border insurance market relate to the existence of some specific regulatory differences as well as a lack of awareness among consumers of the cross-border insurance options available to them. It can be seen from the data in the following table that the insurance market in the country is dominated by gross written premiums around movable property (motor insurance), which accounts for 69.45% of the total gross written premiums in the country for 2023, according to the Financial Supervision Commission. (https://www.fsc.bg/zastrahovatelna-deynost/statistika/obshto-zastrahovane/2023-2/). The share of property insurance against fire and other catastrophes was nearly 11.94% of the total gross premiums written during the period. The disproportion shown in the market reflects on the one hand the existence of regulations that oblige owners of motor vehicles to have the necessary third party liability insurance in order to be able to use the motor vehicle they own, and on the other hand also show the attitude of the country's population towards property insurance, since this 11.94% is overwhelmingly attributable to compulsory property insurance as a result of the credit received by the population from financial institutions Moreover, another worrying fact should not be overlooked, namely, that related to the observed reduction at the end of 2023 of property insurance against fire and other catastrophes, which already occupies a share of nearly "12.0% of gross premium income, compared to a share of 13.6% at the end of 2022", regardless of the fact that "the realized premium income on these insurances amounts to "438 million BGN, with a reported year-on-year growth of 9.8%" and for 2021 is "£399 million with a reported year-on-year growth of 18%".

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Table 1. Gross written premiums as at the end of 2023 non-life insurance in BGN and percentage of all gross written premiums by the types of insurance.

Type of insurance	Total	Inward reinsurance	Percentage of all Gross written premiums by the types of insurance
Medical expense insurance	128 143 199,85 BGN	4 540 609,26 BGN	3,50%
Income protection insurance	50 123 719,08 BGN	0,00 BGN	1,37%
Workers' compensation insurance	21 794 372,06 BGN	1 626 345,56 BGN	0,60%
Motor vehicle liability insurance	**1 539 648 737,92 BGN**	**173 332 821,10 BGN**	**42,03%**
Other motor insurance	**1 004 287 425,59 BGN**	**3 493 103,40 BGN**	**27,42%**
Marine, aviation and transport insurance	95 802 065,62 BGN	17 177 559,75 BGN	2,62%
Fire and other damage to property insurance	**437 513 838,05 BGN**	**5 957 857,12 BGN**	**11,94%**
General liability insurance	66 572 489,93 BGN	165 571,29 BGN	1,82%
Credit and suretyship insurance	204 258 307,82 BGN	391 850,48 BGN	5,58%
Legal expenses insurance	3 369 782,15 BGN	0,00 BGN	0,09%
Assistance	82 794 554,90 BGN	2 425 506,64 BGN	2,26%
Miscellaneous financial loss	28 305 191,85 BGN	0,00 BGN	0,77%
Health	13 999,38 BGN	13 999,38 BGN	0,00%
Casualty	229 783,39 BGN	229 783,39 BGN	0,01%
Marine, aviation, transport	0,00 BGN	0,00 BGN	0,00%
Property	20 278,04 BGN	20 278,04 BGN	0,00%
Total	3 662 877 745,62 BGN	209 375 285,40 BGN	100%

Source: Data by The Financial Supervision Commission (FSC) available at https://www.fsc.bg/en/insurance-activity/statistics/non-life-insurance/2023-2/, and calculations by the authors.

As of 2023, the total number of licensed insurance companies domiciled in the Republic of Bulgaria is 35, and the above table includes data from the 24 general insurance companies, as there

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are 10 insurance companies licensed in life insurance and 1 reinsurer licensed to conduct general insurance and life reinsurance business. Out of all 35 licensed companies in the country, 33 companies have the right to access the European Union market, while the remaining 2 companies do not have the right to access the single market. The information provided by the Financial Supervision Commission in its annual report (The Annual Report of the Financial Supervision Commission, 2023) shows that:

- gross premium income as at 31.12.2023 is BGN 4 369 million with a reported growth of 26% year on year;
- the Bulgarian insurance market (life and non-life insurance) was allocated in a 83% to 17% ratio for the benefit of the premiums written by non-life insurers;
- insurance penetration, calculated based on gross premium income as a percentage of GDP, 35is estimated at 2.38% at the end of 2023 compared to 2.06% at the end of the previous year;
- the insurance density calculated as gross premium income per capita36 increases to BGN 536 at the end of 2022 to BGN 678 at the end of 2023.

The insurance market in Bulgaria is characterised by a high degree of state intervention. The need for state regulation is justified by the great importance of insurance for the economy and society. The state regulates the insurance market by setting the regulatory framework for insurance activity and by exercising state insurance supervision. The Insurance Code, which regulates insurance and reinsurance, insurance and reinsurance intermediation, the legal and organisational form of insurance, the conditions for commencing, conducting, reconstructing and terminating insurance business, the actuarial services of insurance companies, the activities of insurance companies and intermediaries abroad, the activities of foreign insurance companies and intermediaries in c By adopting the above-mentioned normative act, the State aims to ensure the protection of the interests of consumers of insurance services, as well as to ensure the creation of conditions for the development of a stable, transparent and efficient insurance market. According to the Insurance Code, state insurance supervision is carried out by the Financial Supervision Commission (FSC) and the Deputy Head of the Insurance Supervision Department of the FSC. The FSC is a unified, specialized state body that carries out the regulation and financial supervision of the capital market, the insurance market, the supplementary pension insurance market and the voluntary health insurance market (i.e., over non-bank financial institutions in the country) (Vasilev, V. et. al. 2023).

Looking at the insurance market in the country, it is important to note the significantly low levels of catastrophe insurance and in this regard, one of the priorities of the National Strategy for Disaster Risk Reduction is related to the development of appropriate risk financing mechanisms, as both existing legislation such as the EU Regulations and the EU Climate Change Adaptation Strategy highlight the essential role of catastrophe insurance. Through the development of appropriate mechanisms offered by the insurance market, the recovery process after a disaster can be significantly assisted and, on the other hand, will significantly alleviate government contingency liabilities. Looking at the insurance market in the country, it should be noted that out of a total of 20 insurers providing general insurance, 19 insurers provide coverage against the risk of flood. For some of the insurers, this risk is included in the basic coverage under fire and natural catastrophes insurance (7 insurers), while another part of the insurers covers it against payment of an additional premium (12 insurers). The insurers including the risk of flood as an additional cover (12 insurers) combine it with the following risks: storm, hail, heavy rain, damage by gravity from natural accumulation of snow or ice, landslide and collapse of the ground surface. In the case of earthquake risk, some insurers also include this risk in their basic fire and natural catastrophe cover, while others cover it for an additional premium, and it is notable that two insurers include earthquake risk in their basic cover at the same time as flood risk, while seventeen insurers include earthquake risk as an additional cover. Insurers also offer the earthquake risk on its own, while one insurer combines it with the flood risk.

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Table 2. Ratio of insured dwellings against flood and earthquake risks to the total number of dwellings in the country in 2021.

Total number of housing units 2021	Total number of residential properties insured against flood risk	Total number of residential properties insured against earthquake risk	Percentage of housing insured against flood risk	Percentage of housing insured against the earthquake risk
4261454	373161	*313 983*	8,76%	7,38%

Source: Source: Financial Supervision Commission (FSC), National Statistical Institute (NSI), author's calcultions.

Despite the benefits, insurance against catastrophic risks is still at a very early stage of development in Bulgaria, with only 8.76% of the total number of dwellings insured against flood risk and 7.38% of households insured against earthquake risk. Furthermore, it should be considered that most of the property insurances taken out are for the benefit of banks, as the same property insurances are compulsory when purchasing a home with a mortgage loan. Under Article 12 of the Law on State Property, built-up properties which are public state property must be insured, and for this purpose, the budgets of the state authorities which administer the properties provide the necessary funds for the payment of insurance premiums. It remains an open question as to what extent this legal requirement is implemented in its entirety. The overall development of the insurance market against catastrophic risks in Bulgaria faces various challenges. On the one hand, there is a lack of demand, which reflects the absence of a culture of insurance, and in most cases, the population expects state support after the occurrence of a disaster. The introduction of compulsory property insurance to cover the risks of natural disasters would be perceived by citizens as yet another tax and could hardly be accepted. A country-appropriate approach could be to make use of pre-planning mechanisms by taking and implementing preventive measures and actions or financing mechanisms set up and put into practice before disasters occur in regions where elevated levels of natural disaster risks have been identified because of climate change. The use of upstream approaches related to the implementation of prevention activities would be significantly more cost-effective and would lead to better results for beneficiaries. Increasing and improving the activities and coordination of the institutions of the Unified Rescue System in Bulgaria both to enhance disaster preparedness and prevention activities will support the recovery process and have an impact on reducing potential losses to the population. Our country is facing several challenges; one of them is in the field of agriculture, where insurance levels need to be increased as crop insurance schemes are still not widely enough used. Bulgaria, as a Member State of the European Union, applies the Common Agricultural Policy, because of which farmers have access both to direct payments and to other types of funding, which can indirectly protect their income. In terms of climate change and the impact on agriculture, one of the challenges relates to the development and implementation of a system of compensation and support for the sectors affected, where the aim should be to reduce the negative economic impact of drought, which also increases the risk of forest fires. An appropriate approach would be to implement regular campaigns to raise awareness, as well as capacity building, by organising regular training for organisations and the public on risk management in a changing external environment and increasing vulnerability because of climate change. As shown in the data presented in Table 2, the coverage options for natural disasters remain insufficient and limited given the low rate of home insurance in the country. Moreover, a significant proportion of the insurance products offered do not include specific conditions and limitations for coverage of damage from natural events, which is particularly worrying against the backdrop of the increasing frequency of catastrophes such as floods and earthquakes. Here we can also add increasing periods of drought, which increase the potential risk of fires. In terms of flooding, which we can consider to be one of the

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most widespread and destructive natural disasters, the analyses that are carried out should cover existing structures along river courses, as well as the concentration of population around potential flood areas, since the potential damage caused by flooding will increase continuously. Moreover, considering that the total number of flood events has increased about tenfold in the last five decades, as a result, flooding is seen as one of the major threats and both a challenge for those affected and stakeholders such as structural engineers, insurers, businesses, politicians and governments. Structural and non-structural measures can be used to address flood risk. Structural measures include a set of activities related to the reduction of one or more hydraulic parameters such as runoff, volume, peak runoff, water level rise, flood duration, flow velocity, etc. While the application of non-structural measures implies taking a wide range of measures to reduce flood risk through the development and application of forecasting and early warning systems, updating existing contingency plans to incorporate new changing conditions as a result of climate change. A balance must be sought in the planning process for structural and non-structural measures and in the planning of remedial measures linked to the search for opportunities to reduce vulnerability before harm occurs. In terms of flood risk, vulnerability is expressed as a fraction of the ground floor height, and the maximum flood level submerges the building to at most, the ground and first floor level, and in this respect, strengthening activities should be planned to avoid possible damage to new or existing structures during floods. Very often, structural flood risk management measures remain on the back burner, and insufficient awareness and proactive policy on the part of insurers limit access to appropriate solutions (Sanket S et al., 2023). In addition, studies have shown that property owners' insurance behaviour is influenced by low awareness of the importance of the policy and its protection options (Pauly, M., 2023). Naturally, it is necessary to develop new, more flexible and affordable insurance solutions that reflect, on the one hand, the changing real risks as a result of climate change and, on the other hand, meet the needs of Bulgarian citizens for security in recovery from potential natural disasters. Obstacles to the improvement of insurance services are the existence of regulatory barriers, which have a significant impact on the effectiveness of insurance schemes, especially in the context of natural risks in Bulgaria. On the one hand, we should highlight the lack of adequate legal frameworks and risk assessment standards, which hinder the operating insurers in offering transparent and competitive products to the Bulgarian citizens. On the other hand, the realization of insurance products among Bulgarian citizens is in direct dependence on the economic well-being of citizens, including the instability of the local economy, as a result of which in the country in some regions citizens have low income levels even in most cases up to the minimum wage for the country, which was approved by a decision of the Council of Ministers at BGN 1,077 (EUR 550) as of 01.01.2025, which further limits access to insurance services for the general public. Moreover, according to the Confederation of Independent Trade Unions in Bulgaria (KNSB), a person living independently needs a net of BGN 1,453 (EUR 743) for 2024, and on the other hand, about one-third of the working population has net wages of up to BGN 1,000. On the other hand, over the years, there has also been a considerable distrust of insurance companies on the part of citizens, which, coupled with the existence of insufficient information, plays a significant role in preventing the acceptance of insurance policies that are not binding on the local population. The factors listed above significantly hinder the development of credible insurance schemes and significantly reduce their effectiveness in managing natural risks in the country. On the one hand, the low incomes of a significant part of the population make it necessary for them to rebalance their spending towards meeting their needs for necessities, and in terms of insurance, the local population prioritises insuring their cars, as motor third-party liability insurance is compulsory. Based on the findings and conclusions so far, it is felt that a coordinated effort between government institutions, insurance companies and the public is needed to increase the share of property insurance in the country. From the point of view of the executive and the legislature, the necessary legislative changes could be made, for example, by setting up an insurance fund to cover the damage caused by natural disasters, given that it is the State that has so far assessed and covered part of the damage caused by natural disasters, a practice that has been left over from the past and on which the citizens of the country rely for help in the event of a

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disaster. To reduce the social responsibility of the State, an appropriate mechanism could be developed and implemented to reduce the financial burden on the State and institutions in recovering from natural disasters. For example, by introducing a minimum property insurance for all residential properties in the state, with the insurance premium determined according to the tax valuation of the property. An approach by which institutions could reduce the financial burden of rebuilding infrastructure after natural disasters. Consideration of an appropriate insurance mechanism that, on the one hand, is compulsory, like taxation, and on the other hand, provides residential property owners with the option to additionally insure their property against natural disasters. Precisely given the increasing natural risks because of climate change, the insurance sector in Bulgaria is facing serious challenges, and from the point of view of voluntary insurance, this is the distrust of the population towards insurance, which leads to a low level of coverage and insufficient financial security in case of natural disasters. Against the backdrop of escalating natural disasters amplified by climate change, accurately assessing risks and setting insurance rates in disaster-prone areas present significant challenges for the insurance industry, which consequently influence insurance decisions and strategies (Dongling Fu et al., 2024). Climate change is increasing the risks, frequency and intensity of disasters associated with extreme weather events, which is why disaster insurance is very often proposed as a potential financial instrument related to disaster risks, and the need for the use of public-private partnerships as well as the development of new insurance models can be highlighted, especially in developing countries (Maduro, C., T. Fontainha, T.C., 2023). In the country, the resilience of the Bulgarian insurance industry is confirmed when assessing the financial stability of individual insurance companies and the entire insurance sector in the country. The stability of the insurance market is also confirmed by the author's research using the CARMEL model (Capital adequacy, Asset quality, Reinsurance and actuarial issues, Management soundness, Earnings and profitability, Liquidity) carried out by Ventsislav Vasilev (Vasilev, V. 2023), which shows the stability of the market with average values falling within the recommended norms of good practice, both for individual insurance companies and for the market as a whole. These factors exacerbate the resilience of the Bulgarian insurance industry, challenging it to innovate and improve services to cope with growing natural threats.

Table 3. Framework presenting the main barriers to the implementation of insurance schemes in Bulgaria by insurance companies.

Regulatory restrictions	Economic barriers	Social barriers	Impact on efficiency
Weak regulatory framework	High insurance costs	Low public awareness	Decreased participation in insurance schemes
Bureaucratic processes	Limited access to financing for insurers	Cultural distrust in insurance	Inefficiency in claim processing
Inconsistent policy enforcement	High levels of informal economic activity	Lack of education on risk management	Low uptake of natural risk insurance
Insufficient government support	Economic instability	Perceived low benefits of insurance	Inhibited market growth
Complex licensing requirements	Slow economic recovery	Limited engagement from youth	Challenges in innovation of insurance products

It should be noted that the number of crisis events (disasters, accidents, incidents and crises) in 2023 is 14,850, increasing by 1.0% compared to 2022, with the highest relative share of fires with

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resulting material damage, which in the period 2021 - 2023 is about 50%, followed by road traffic accidents (incidents) with injured persons, which is also about 47%.

Table 4. The number of crisis events for the period 2021- 2023.

Year	Total number of events	Fires	Road traffic accidents	Other events
2023	14850	7464 (50,3%)	6993 (47,1%)	393 (2,6%)
2022	14707	7783 (52,9%)	6609 (45%)	315 (2,1%)
2021	14041	7484 (53,3%)	6080 (43,30%)	477 (3,4%)

Sources: National Statistical Institute (NSI).

The total number of persons killed due to disasters, accidents, incidents and crises in 2023 is 667, of which 546 persons died in transport accidents and 113 persons died in fires. Regionally, the districts with the highest number of deaths are Sofia City with 57 persons and Plovdiv with 50 persons, while Pernik and Smolyan districts have the lowest number of deaths with 4 persons each in 2023. The number of injured for 2023 is 9,415 in total, of which 9,125 persons were injured in transport accidents and 289 persons in fires. At the regional level, the highest number of victims is in the districts of Plovdiv with 1 132 persons, Sofia-city (capital) - 905 persons, and Varna - 871 persons. We will pay attention to the number of crisis events in the country for which a state of emergency has been declared. where in 2023, the number of crisis events with a state of emergency declared is 104 compared to 49 crisis events with a state of emergency declared for 2022. The highest number of declared states of calamity in 2023 is as a result of disasters related to floods, storms, severe winter conditions and forest fires, comparatively, it should be noted that compared to 2022, declared states of calamity as a result of floods increased by 62.5% and those related to forest fires increased by 85.7%. One of the potential reasons for the significant increase is climate change, as a result of which we can expect to see significant increases in the number of floods and forest fires across the country in the coming years. The number of affected municipalities in the country in 2023 is 88, or almost 1/3 of the country's 265 municipalities, and the total population in the disaster-affected areas is 1 321 253, which is about 20% of the country's total population.

It should be noted that Bulgaria is in the ranking of the top 10 countries most affected by climate change in 2022, according to the latest edition of the Climate Risk Index 2025, which analyses the extent to which countries have been affected by extreme weather events between 1993 and 2022 (Report for Climate risk index 2025, available to https://www.germanwatch.org/sites/default/files/2025-02/Climate%20Risk%20Index%202025.pdf on 24.02.2025) The available statistics in the following table show that the costs of crisis events in 2023 are significantly reduced compared to 2021 and 2022. Of course, it should be borne in mind that 2021 and 2022 account for spending related to containing the COVID-19 pandemic, as well as the crisis resulting from the military conflict in Ukraine in 2022. As in 2023, out of the total reported expenditures in the year, the largest share of funds was spent on preparedness (78.6%) and prevention (12.7%), while in 2021 and 2022, the largest share of funds was spent on recovery and response, which is the result of the two large-scale crises, namely the COVID-19 pandemic and the war in Ukraine.

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Table 5. Spending on crisis events by area and as a percentage of GDP for the period 2021-2023.

	2021			2022			2023		
Directions	**BGN thousand**	**%**	**% of GDP**	**BGN thousand**	**%**	**% of GDP**	**BGN thousand**	**%**	**% of GDP**
Total	**7345395**	**100.0**	**5,27**	**3081222**	**100.0**	**1,82**	**850977**	**100.0**	**0,46**
Prevention	349455	4.8	0,25	361672	11.7	0,21	107713	12.7	0,06
Preparedness	599656	8.2	0,43	679947	22.1	0,40	669083	78.6	0,36
Response	888632	12.1	0,64	866888	28.1	0,51	971	0.1	0,00
Recovery	5507652	75.0	3,95	1172715	38.1	0,70	73210	8.6	0,04

Sources: National Statistical Institute (NSI).

Furthermore, in structural terms, the distribution of expenditure between the central executive and local governments shows that in 2023, 695 077 thousand leva of the total funds for crisis events were spent by the central executive, while local authorities accounted for 155 900 thousand leva of the total expenditure (data presented in the following table). The considerably higher relative share of the funds spent by the central executive is the result of the expenditure incurred in the preparedness area - BGN 627,526 thousand, including fire protection activities, management of the state reserve and wartime stocks, etc. In the case of municipalities, the most funds were spent on the "reconstruction" - BGN 65 420 thousand and "prevention" - BGN 48 654 thousand.

Table 6. Spending by central government and local authorities in 2023 (BGN thousand).

Directions	**Total**	Central government	**local authorities**
Total	**850977**	**695077**	**155900**
Prevention	107713	59059	48654
Preparedness	669083	627526	41557
Response	971	702	269
Recovery	73210	7790	65420

Sources: National Statistical Institute (NSI).

The main part of the funds in 2023 amounting to 98.2% of the funds spent on crisis events are provided by the state budget and the remaining 1.8% by the European Union, and it should be noted that most of the funds provided by the EU are spent under the "preparedness" heading. Whereas, comparatively, in 2022, more than half of the funds allocated by the European Union were spent on the 'response' strand, and more than two thirds on the 'recovery' strand in 2021. In 2023, BGN 163 591 thousand, or 19.2% of the total expenditure on crisis events (BGN 850 977 thousand), was spent on activities related to the protection of the population in the event of natural disasters and accidents. Spending on protection of the population in the event of natural disasters and accidents increased by 6.3% compared to the previous year and by 10.8% compared to 2021.

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4. Discussion

The results of this study have practical applications for the formulation of national priorities and measures related to the effects of climate change in different parts of the country. As it should be borne in mind that in the future it is possible that there is a positive spatial spread in the average cost of homeowners insurance may be associated with a change in homeowners insurance rates outside the affected region. On the other hand, considerable attention needs to be paid to the low proportion of insured residential properties and the possible similarity in the profile of homeowners who have not insured their homes, with the majority being people whose homes are not mortgaged and therefore not insured. In addition, setting insurance rates according to geographical diversification and the ever-increasing range of regions affected by climate change will be essential. In addition, insurers may increase the cost of insurance coverage for homeowners living in regions identified as having a high risk of adverse natural events resulting from climate change. Striking a balance related to the affordability and availability of homeowners insurance coverage, major homeowner's insurers may consider mitigating losses caused by climate risk through risk transfer. A potential solution is to implement a combination of private and public insurance.

Of interest here is the proposal to develop a similar mechanism for "climate risk mitigation, for example through a climate risk mega-loss reinsurance program in which the government serves as the climate risk reinsurer of last resort. Historically, when the loss associated with a peril is so large that such a risk (e.g., terrorism risk) becomes uninsurable in the private insurance market, public insurance can supplement the private insurance market through risk transfer. For example, after the attacks of September 11, 2001, the U.S. Congress passed the Terrorism Risk Insurance Act (TRIA), which provides shared public and private compensation for insured losses resulting from acts of terrorism, in 2002, which has been renewed and extended numerous times and remains in effect today"(Sun, T., 2025) Given the low level of property insurance in the country, it would be appropriate to look for opportunities to develop programs that would provide significant relief to the government budget when adverse events and occurrences affecting a significant portion of a region's population occur. In addition, it would be possible to contribute significantly to faster recovery after a disaster.

On the other hand, insurance companies, in addition to taking into account the factors influencing the supply and demand for insurance services in the insurance market, also have to choose an appropriate model to match the characteristics of their claims data by periodically validating and evaluating the models to determine insurance premiums reflecting potential risks, such as the type of natural disaster, location or characteristics of the insured site. In addition, insurance companies should ensure that they have sufficient reserves for claims, using appropriate statistical or actuarial methods for estimation, to cover claims that may arise in the future. The most used approaches relate to the diversification of insurance products offered and reinsurance. By diversifying the portfolio of insurance products, the revenues and profitability of insurance companies can be increased and, in combination with reinsurance, which increases solvency, insurance companies can overcome the risk of non-payment of claims that are brought as a result of extreme events or natural disasters covering a larger number of insured persons. In developing regional models, the rate of economic growth in the region can also be considered and included in the calculation of insurance premiums. It should also be borne in mind that regions where frequent natural disasters and phenomenon occur affecting the local population and adjacent areas of the region will possess fewer conditions to generate faster economic recovery and development. The determination of the value of insurance premiums will depend on both the extent of the potential natural disaster index and the rate of economic growth. Here, the role of the state could be related to the development of an appropriate system of measures to support the development and implementation of the natural disaster insurance system, which would be further consulted with insurance market participants when calculating insurance premiums against natural disasters, but would also have to be linked to the implementation of the necessary legislative changes, through

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which the level of insured objects from natural disasters would be increased, especially in the lagging regions of the country, where the population on the one hand has low incomes, and on the other hand there are certain territories with a high level of risks for the occurrence of natural disasters as a result of climate change. (Purwandari, T. et. al. 2024). The need to consider and implement legislative changes to increase the total number of insured homes is confirmed not only by the low percentage of homes insured against catastrophic risks (8.76% of the total number of homes are insured against the risk of "flood" and 7.38% of households are insured against the risk of "earthquake", but also by the fact that Bulgaria is in the top 10 countries most affected by climate change in 2022 in the world, as a result of climate change, the risks of floods and fires are significantly increasing.

5. Conclusions

In conclusion, the main findings on insurance against natural hazards in Bulgaria show insufficient information and awareness among the population about the available policies and protection mechanisms. The percentage of insured properties and assets remains significantly low, making effective risk management difficult. Recommendations include strengthening education campaigns aimed at raising awareness of the benefits of insurance and developing innovative products to meet the specific needs of different groups. In addition, it is important to improve cooperation between the insurance sector and government to create sustainable financial mechanisms to cover losses following natural disasters. These steps will contribute to significantly improving Bulgaria's resilience to natural hazards and optimize the post-disaster compensation mechanism. Especially considering that according to the conclusions made in the Fifth and Sixth Reports of the Intergovernmental Panel on Climate Change (IPCC, 2013; IPCC, 2022; IPCC, 2023), the country is at increased risk of climate and weather extremes that increase the risk of drought and droughts, extreme temperatures, heat waves, fires and floods. It is therefore necessary not only to implement plans and measures to adapt to climate change, but also to take appropriate measures to cope with the possible consequences of the natural disasters they provoke, including measures to improve both the regulatory basis for increasing the levels of insured and to implement a public policy related to creating the possibility of reducing the financial burden of the process of recovery from natural disasters, including even considering Since the consequences of climate change will affect all socio-economic and natural systems, which requires considering options to increase their resilience. Serious attention must be paid to the development of systems for reducing the risk of natural disasters - torrential rainfall and floods, drought and fire, thunderstorms and other storms, hail and other related events forming the so-called cascading risk.

Author Contributions: Conceptualization, M.I., K.N., A.A.; methodology, M.I; validation, K.N., A.A., and M.I; formal analysis, M.I.; investigation, M.I. and K.N.; resources, A.A.; data curation, A.A. and M.I; writing—original draft preparation, M.I. and AA.; writing—review and editing, M.I., K.N., A.A.; visualization, M.I., K.N., A.A.; project administration, K.N.. and M.I; funding acquisition, M.I. All authors have read and agreed to the published version of the manuscript.

Funding: "This study is financed by the European Union- NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project No BG-RRP-2.004-0008-C01"

Data Availability Statement: Data is contained within the article.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analysis, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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