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Fruitore: **dott.ssa Elisabetta Genovese**, assegnista post-doc presso l'Istituto IRCrES, Milano.

Relazione finale della ricerca svolta presso il **"Frederick S. Pardee Center for the Study of the Longer-Range Future", Boston University**, sotto la supervisione del prof. **Anthony Janetos.**

Titolo della ricerca: **Mitigating disaster losses through insurance: comparing schemes and experiences in the European Union and the United States**

Objectives

Natural catastrophes represent an increasing threat worldwide. As a result, individual households, industry, private investors and public authorities are increasingly exposed to multiple risks that can cause major harm and economic losses. This trend requires the implementation of effective management strategies. The development of disaster mitigation measures requires, in addition to infrastructures and policy plans, also financial incentives and risk transfer options. Hence, risk management policies should ensure that financial resources are available to recover economic activity and replace essential physical assets after major disasters. The study analyzes different regulatory approaches that manage and finance flood risk through insurance, with a specific comparison between two big players such as the European Union (EU) and the United States (US).

In the US, insurance claims are managed through the National Flood Insurance Program (NFIP), which underwent an improvement reform in 2015-2016. In Europe, insurance penetration is still very low and each Member State (MS) has a different regulatory system. The Solvency II Directive (Directive

2009/138/EC) which has been amended by Directive 2014/51/EU (the so-called “Omnibus II") aims to endorse the development of a common EU insurance market by codifying and harmonizing regulations among the EU MS.

The analysis aims to describe the characteristics of the different regulatory systems in the EU and in the US with a specific focus on Countries that apply Public-Private (P-P) partnership schemes (US, UK, France), analyzing the peculiarity of local markets for insurance. The goal is to highlight key issues at stake for the development of adaptation policies and the role of public and private stakeholders in P-P schemes for raising awareness, risk perception, and demand for insurance. This information is important to better understand, on the one hand, the characteristics of risk and uncertainty that may affect different P-P responses to natural disasters and, on the other hand, the triggers and challenges to actors’ engagement. The identification of optimal levels of P-P engagement in the development of insurance adaptation tools and the combination of policy and physical/financial intervention can be a successful strategy in protecting citizens against floods.

Outline of the study

Despite their potential role for adaptation to climate change risk and extreme events, we still know little about how insurance products work and their effectiveness as risk financing instruments, given the limited number of studies on their use in the field of climate adaptation. The present study aims to discuss the characteristics of insurance as an adaptation tool against natural disasters and, in particular, against floods. The objective is to analyze how P-P schemes, while embracing both ex-ante and ex-post interventions, have the potentiality to promote a more cost-effective protection against floods and a more equitable risk sharing between taxpayers. In fact, this is a financially sustainable option for insurance companies since the cost of losses, over a certain level, is transferred to the government, which acts as a final reinsurer.

The final study will provide an overview on the EU and US adaptation experience against natural disasters, discussing the national regulation in certain EU countries and the effectiveness of NFIP and Solvency II. The new forms of P-P partnerships, developed and applied in particular in the US, UK and France, may represent an interesting solution to exploit the potentialities of both public and private actors to risk prevention and post disaster recovering while minimizing the unintended effects. The study explores the possibility to apply this kind of scheme to countries where a specific insurance system still not exists (e.g. Italy). Some experiences on adaptation against floods, in the EU and in the US, will be described. The objective is to shed light on the different role of public and private actors on how P-P insurance schemes can be supported or hampered by public policy. Best practices and lessons learned from the EU and US will be identified and some policy recommendations provided.

Insurance schemes in European Countries

The role of the government interventions and the size of preventive measures, as well as the role of insurance practices such as bundling and pricing rules, change across MS. Market penetration rate of disaster insurance is low in several MS, especially in the more vulnerable. The differences in the penetration rate of insurance products depends both on the objective difference in countries' risk exposures as well as from localized risk aversion, perception and awareness, and adaptive behaviors. In Italy penetration rate is below 10% of GDP for floods, storms and earthquakes, to the same degree as in Central and Eastern Europe and the Baltics. At the opposite, the highest penetration rate is reported in France, Ireland, Belgium, UK and Sweden.

Insurance products against natural disasters can be sold as single by-standing products or automatically bundled to an existing general policy with the aim to lower risk of exposure and cost of recovery. In order to favor subscription to insurance products against natural disasters, deductibles are offered with disasters specific limitations.

The government has set special funds to reimburse floods damage in Belgium, Denmark, Spain, France (where the Government provides for unlimited guarantee to the Caisse Centrale de Reassurance, a state-owned reinsurance company).

Insurance against risk of natural disasters is priced in the EU MS, which may choose between:

- the adoption of a risk-based pricing mechanism (which may reduce moral hazard and help the understanding of the characteristics and risk development mechanisms),
- the adoption of flat pricing (principle of solidarity).

Flood regulation in the European Union

In 2007, the EC launched the Flood Directive (Directive 2007/60/EC) which represents the first attempt to develop a coordinated action at the EU level with the aim of improving the overall level of flood protection in Europe. After being postponed several times, Solvency II came into effect on 1 January 2016, aiming to harmonized the EU insurance regulation. Solvency II replaces the Solvency I, established by 14 European directives, and will now led to the replacement of 28 different national regulatory regimes by a single system of supervision applied in all MS. The goals is to prevent insurers from being unable to meet claims. It sets three pillars:

1. establishes the minimum financial amount of capital that EU insurance companies must hold to cover risks and reduce the risk of insolvency;
2. defines requirements for the effective risk management and the potential for good governance of insurers and their supervisors;
3. focuses on information disclosure and transparency requirements, with the purpose of protect both consumers and insurers.

The demanding nature of Solvency II legislation compared to current regulations has attracted criticism.

Insurance schemes in the United States

Since 1968, homeowners' flood insurance in the US has been mainly provided through the federally-run National Flood Insurance Program (NFIP), which represented the first form of insurance against floods when private insurances were not available. Even given the low penetration of the program amongst those at risk, in 2005 Hurricane Katrina effectively bankrupted it and attempts are now focused on trying to develop a system that will not rely upon excessive subsidies from the taxpayer over the long term. The Flood Insurance Reform Act of 2012 raises the possibility of moving coverage to the private sector, assuming the market can price this risk effectively and that premiums reflect risk.

There are key difference between the NFIP and private insurance. The NFIP has specific goals (such as the increase of flood risk information, insurance availability and reduction of reliance on post-disaster aid) and does not take into account the risk of catastrophic events. Yet, their amount was not enough to cover the funding for extreme losses from 2005 onwards, thus reversing the original cash-flow basis structure. NFIP has two ranges of premium, for areas at low and high risk. There are large difference in pricing premium between NFIP and private insurance, in particular in more at risk areas where NFIP probably underestimates the effective risk. A main limitation is the lack of knowledge about the number of properties in floodplains, which makes it difficult to assess the flood insurance penetration rate.

Catastrophe models developed by the scientific community can be used to update U.S. flood maps. FEMA has begun to digitize flood maps using geographic information systems so that they are easier to update. These developments in assessing risk more accurately could be useful in determining costs and benefits of the proposed redesign of flood insurance.

Public-Private partnerships schemes

Private sector companies and the insurance market need to cooperate to ensure extreme risks through the development of catastrophes insurance systems. P-P partnership schemes are flexible tools and are usually characterized by long term forms of cooperation between public actors and companies. P-P partnerships may help reducing the trade-off between risk financing and adverse incentives by providing a new architecture to assure coordination between private and public actors' role.

P-P schemes are considered as more effective way to deal with adaptation because governments and insurance companies cooperate to share risk according to their core competencies and relative advantages. Insurance companies are usually required to cover the risk of small and medium-size damages, offering insurance programs and timely post-disaster support; the government covers the extreme risk (usually through state backed reinsurance or state guarantee) and provides prevention and mitigation plans.

P-P schemes may foresee different level and forms of government's involvement, from compensation, public re-insurance or State guarantee. Still, the role of government is central in the provision of and access to affordable and universal insurance against natural disasters because it represents the actor which covers extreme losses in the last instance.

Preliminary conclusion

The first results show the potential role of insurance as an adaptation tool for building resilience while strengthening cohesion in both the EU and the US and by tackling the sources of inequality in access to ex-ante and ex-post disasters adaptation tools. The study will draft some lessons learned on how existing insurance schemes could be changed in order to face the increasing number and intensity of natural disasters, deriving some useful recommendations for redistributive policies and governance.

The analysis highlights the importance of a preliminary multidimensional knowledge of the characteristics of risk of the areas and communities which are at risk of natural disasters, in order to design and develop

targeted schemes, as well as the role of governance and of transparent and timely regulation to guarantee their effective implementation. New insurance schemes should be targeted to the characteristics of the communities in which they are introduced, depending on their level of vulnerability, exposure, resilience. This would help the Governments identify possible trade-offs between insurance risk financing instruments and other existing policies, in order to guarantee the viability of insurance companies. The introduction of transparent regulatory and monitoring system will disincentive risk taking behaviors and search for positional advantages and extra-profits by both insurance companies and the beneficiaries.

Also, the increase in public investments in management system will help reducing the risk of damage and injuries in the population while increasing the commitment of insurance companies, thus building resilience. The lack of such provisions may lead insurance companies to step back from the insurance contracts thus not repaying for ex-post losses.

These lessons are intended to support policy makers to further develop a Country tailored insurance system able to face increasing risk of natural disasters.

Nota finale:

La struttura della ricerca è completa, tutte le pubblicazioni e informazioni necessarie sono state reperite durante la STM. I case studies sono ancora in fase di elaborazione. Il paper finale verrà inviato alla rivista "Environmental science & policy" (IF 3) o ad altra rivista di classe A.

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