

Policy recommendations

Risk assessment

Italy in general, and RER in particular, would be well-advised to substantially step-up its efforts and capacity in natural hazard and economic risk assessment. The outcomes will be conducive to a better framed and informed risk management and governance.

The high sovereign debt makes Italy's economy susceptible to adverse shocks to growth and debt's interest rates. The most recent debt sustainability analysis (DSA) of the European Commission (EC) showed that marginal changes in nominal GDP growth (-0.5%) and interest rates (+1%) would lead to much higher (+7%) debt-to-GDP ratio in 2026 than the one projected as a baseline (EC, 2016). The stochastic debt projection that considered the size and correlation of past shocks yielded a relatively high probability (11%) that the Italian debt ratio will be greater in 2020 than in 2015 (ibid). In the absence of disasters' financial protection tools, the low-frequency/high-impact events are capable of straining the growth beyond the levels considered in the EC study. For comparison, in RER alone a fluvial flood event associated with chance of being exceeded in any given year equal to 0.4% (i.e. a 250-year flood) is likely to cause structural damage equal to or greater than €9 billion (~ 6.3% of gross regional product GRP), or between €5 and 10 billion (3.5-7.2% of GRP) production losses, depending on the flexibility of the regional economy (Mysiak et al., in preparation).

The hazard and risk assessment should build upon a systematically collected, re-assessed, and possibly openly shared data on past disaster events embedded in the

FloodCat database that is managed by the Department for Civil Protection (DPC) in collaboration with the regional civil protection (CP) offices. The records of past flood compensation should be re-assessed and used for producing regionally validated economic assessment models for structural damage, in a similar way as we have done in Amadio et al. (2016) for the 2014 Secchia event. Proper attention paid to a systematic analysis of economic and production losses could be driven by extending the Great Risk Committee²¹ – a high level expert body advising the DCP – to cover areas related to disaster impacts on economic growth, social cohesion, and disaster financing. This is consistent with the draft OECD Recommendations on disaster risk financing strategies (OECD, 2016) and other OECD and EC recommended practices (De Groeve et al., 2014; OECD, 2014a, 2014b).

The hazard assessment in low-altitude floodplains in RER and elsewhere in Italy deserve particular attention. The flood hazard maps produced in the context of the Floods Directive in RER are not available for the low-probability scenario (Trigila et al., 2015). This means that the extent of areas prone to medium hazard level is greater than that of areas prone to low hazard level (respectively 46% and 36% of the total RER territory). The hazard simulations completed by the ENHANCE team complement the flood hazard and risk assessments in RER with more differentiated hazard scenarios, including the scenarios of disrupted DS, for the lowland areas of the LRB-EC. In our simulations, the initial conditions of the DS in terms of water volume stored immediately prior to the precipitation events are a critical factor influencing the assessment results.

Italy's participation in the United Nations Economic Commission for Europe (UNECE) Task force on climate change related statistics (UNECE, 2011) and the Task force on measuring extreme events and disasters (UNECE, 2015) presents an opportunity to closer engage the national and regional statistical offices in flood vulnerability and risk assessment under current and future climate change. In addition, UNISDR also provided opportunities for Italy to align its existing disaster loss database with the standards set by UNISDR and the European Commission (DESINVENTAR). Our analysis was based on leading-edge regional climate projections (at 8km resolution) and advanced hydrological and hydraulic simulations. We have shown the effects of climate change and soil sealing on ensuing flood hazard risk in the study area and over the entire RER. For the flood damage and risk assessment we have used detailed regional, high-resolution data on land cover/use and population. Availability of the micro-data on household disposable incomes and the structural building characteristics – both of which are collected through the population and housing census – would greatly improve the potential economic damage. We recommend that this potential is explored by means of targeted pilot studies with due attention paid to ensuring compliance with privacy and data security policies.

Compensation of inflicted damage

The *controlled flooding* strategy that forms a central element of the MSP serves as an emergency measure until after the DS has been fully restored. The strategy allows inflicting flood damage on low-value lands that would otherwise not be affected or only to a lesser extent, in order to protect exposed high-value urban areas further downstream. The MSP has detailed the role of the various parties to the agreement, but has not elaborated on how the damage would or should be compensated. In absence of an explicit cost-recovery mechanism contemplated for this purpose, it is likely that the economic damage would have to be compensated, according to the prevalent practice, from the *National Civil Protection Fund* and/or through additional regional excise taxes on motor fuel. We have explored various alternative financial instruments, including land drainage charge, land and property taxes, mutual insurance, and compensations for land easement.

The flood risk management on secondary and minor water courses in Italy is delegated to the *Land Reclamation Boards* (LRBs); semi-public entities introduced in the

1930s that are operated with certain degree of autonomy by landowners and which are authorised to levy and collect charges to recover costs of flood protection and surveillance measures. The LRBs are similar in structure and function to *internal drainage boards* (IDB) in the UK, and water boards in the Netherlands. The drainage levee contributes to recovering operational and maintenance (O&M) costs of LRBs, whereas the capital investments for extending or improving flood protection operated by LRBs are born by public funds. The LRBs use a rather complex scheme to split up their O&M costs connected to rainwater collection, flood protection and surveillance across the served land and properties. The principles of the cost allocation is specified by regional legislation (RER, 2012, 2014) and further developed in the so-called *drainage district classification* scheme by LRBs themselves (CdB-EC, 2015). The LRB-EC applies an index-based scheme to estimate benefits, which the properties situated within the reclamation district derive from the Board's operations. To serve as damage compensation instrument the scheme would need to recognise the damage inflicted by controlled flooding and the damage should be compensated by LRBs as an eligible cost item. This would require amendment of the regional legislation. In our case study area the matter is further complicated by the fact that the controlled flooding incurs cost in the LRB-EC if the landowners benefiting from it are situated in the LRB-*Terre dei Gonzaga in Destra Po* (LRB-TG) in the Lombardy Region. Hence, the compensation would entail financial transfer across LRBs and across administrative regions. Our flood risk analysis estimates shows the ensuing costs in much more detail than the district classification scheme, and across more the entire probability distribution. As such, our results lend themselves better for this scope.

Alternatively, the costs can be recovered through council taxes. The IMU (*Imposta Municipale Propria*) is an immovable city property tax that replaced earlier city council taxes (ICI, *imposta comunale sugli immobili*) in 2012. The tax base is determined by the land registry income of the property. The rates are differentiated according to the registered type and use of property. For the first time the tax is levied on agricultural land, except for municipalities situated in mountainous areas. The tax is not levied on residential properties serving as the main residence, apart from upper-class housing. The TASI (*tributo per i servizi indivisibili*) is a tax meant to cover the costs of indivisible services, which are services that cannot be charged separately to individual taxpayers.

²¹ The National Committee for Predicting and Preventing Major Risks was set up in 1992 to advise the DPC on technical-scientific matters and future directions on coping with various risks.

The tax base is the same as of IMU but the rates are different and the tax is not levied on agricultural land.

Property insurance coverage in Italy is low, except for explosions and fires, not necessary of natural origins, which is a mandatory requirement for obtaining mortgage loans. The system of state compensations of disaster losses, which does not constitute a duty-to-compensate, but connotes a long-established customary practice, is seen by many as the main obstacle for private insurance markets. Over the past decades there have been numerous, so far fruitless attempts to give a boost to a private insurance market and relieve the notoriously ailing public finances (Mysiak, 2016). Most of these proposals embraced some type of coercive public-private partnership (PPP) and risk sharing. Typically, the schemes that were put forward have imposed duty on homeowners to underwrite disaster insurance or to extend existing policy to natural hazard risks. Our review has shown that actuarial risk pricing has never been envisaged neither in short- nor in long-term. The proposed schemes take for granted that actuarial risk pricing is either not socially equitable or not viable. Up to date there has been no or limited public debate and consultation about what solidarity principles should the insurance-based PPP be based on. This is important insofar the current hazard exposure is at least to some extent a result of decades-long unsustainable land management and spatial planning practices. As a result, one may argue that in the current situation the collective accountability holds sway over individual responsibility and risk-careless choices. The currently established compensation practise relies on general tax revenues in which the income taxes have the largest share. The compensation regime exemplifies a solidarity that entails transfer of wealth from high- to low-income households regardless of the hazard exposure or risk reduction undertaken to limit the damage.

Independently of the cost recovery scheme, the MSP should set agreed rules for calculation of the flood damage inflicted by controlled flooding. The compensation may not only reflect the crops damaged or destroyed, but possibly also the loss of land value. Designating a land property for recurrent controlled flooding is equal to imposing a restriction (easement) of the land tenure rights. Elsewhere in Italy, notably in the Veneto region, the land easement was adopted as alternative for land expropriation in cases of dry polder construction. The easement imposes an obligation to accept occasional flooding of the land, in exchange of a fee or compensation. The compensation of lost land value in Veneto was set to 40% of the value that would have been paid if the land was expropri-

ated. The crop damage is estimated as the present value of perpetuity due (infinite annuity with payments at the beginning of each period), whereas the perpetuity is calculated as annual expected damage (AED) to the crop cultivated in the area on which the easement was imposed. In the case of LRB-EC the damage compensation can take form of a one-off payment as in Veneto, or annual agreed payments, or periodic damage reimbursements.

Improving the partnership

Italy has a long-standing tradition of MSPs dating back to the 1990s. The law 662²² endorsed various instruments based on multi-stakeholder negotiated agreements, including framework programs, territorial pacts, program agreements, and thematic contracts. These instruments were transposed into regional legislations. In Lombardy for example, the regional law 2/2003²³ introduced among others *framework agreements for territorial development*, an example of which are river contracts (RCs). The Piedmont's *Water Protection Plan* and the *Po River Basin District Management Plan* encourage application of RCs for achieving the objectives laid out therein. The reason behind this is that RCs are becoming more common and proving to be an effective tool able to detect actions and strategies for the preservation of collective goods and contributing to riverine local development. As for now, around 60 RCs were signed in Italy or are in advanced negotiation phases. Recent reform of the Environmental Code (law 152/2006) recognised RCs as alternative planning instruments, complementary to traditional hierarchical instruments. LRBs play an important role in the RCs.

We have recommended extending the MSP so as to become **a cross-regional negotiated agreement similar to RCs**. The partnership should engage LRB-EC and LRB-TG, along with landowners and municipal councils, under auspices of the Po River Basin District Authority (PRBDA) and the regional civil protection agencies.

The partnership should aim at:

- improving the assessment of risk associated with controlled flooding, while paying due attention to risk amplification driven by climate change and soil sealing;
- designing a fair financial compensation of inflicted damage along with an equitable cost recovery scheme;
- further developing the flood protection from minor and secondary river courses and artificial drainage networks.

²² Law 662 of December 23rd, 1996 Measures for improving public finances, Official Journal 303 of December 28th, 1996.

²³ Regional law 2 of March 14th, 2003 Negotiated regional planning, Regional Official Journal n. 12 of March 18th, 2003.

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