

The economic impact of the 2016 Italian earthquakes with a Bi-regional IEMM approach

Topic: (4.2) Input-Output analysis of disasters

Author: Andrea K. EL MELIGI

Co-Authors: Luca Piermattei, Rosita PRETAROLI, Francesca SEVERINI, Claudio SOCCI

The Central Italy was faced with two strong earthquakes in August and October 2016 followed by other swarm earthquake

events. The occurrence of these disruptive events has more recently create a new strand of literature in the topic of the disaster impacts analysis. This catastrophic events besides bringing devastation can cause economic blackouts to important activities inside the supply chain, perturbation able to produce different magnitude reaction in terms of economic performance, including effects on the social capital, the income and the learning (Yamamura, 2010). In the aftermath of these events the importance of an assessment "of the direct and indirect effects, and their consequences on the social well-being, is indispensable for identifying and undertaking reconstruction programme and projects"(Bradshaw, 2003).

In this field one of the most "beaten track" in studying and analyzing highly interconnected economic system is the Inoperability approach. The Inoperability Input-Output Model (IIM) has been for the first time introduced theoretically in Haines and Jiang (2001), and from then on widely tackled and discussed by Santos and Haines (2004) and Leung et al. (2007) with several assessment of disruptive events due to terrorism that cause inoperability across interdependent infrastructures.

Further studies that represent an extension of the IIM approach has been recently introduced with the purpose to enlarge the spectrum of the results, including not only the direct and indirect effects, but also the induced effects. In fact the critical aspect of the IIM approach is therefore represented by the overall underestimation of the economic impact of the event due to a partial representation of the economic phenomenon.

In this respect the Inoperability Extended Multisectoral Model (IEMM) implements a bigger accounting scheme such as the Social Accounting Matrix (SAM) for assessing the effects of a system perturbation as in the case of the UK Air transport Services in the aftermath of the Iceland Volcano Eruption in 2010 (Ciaschini et al., 2016).

Along these lines the effort of this study is to present an evolution of the IIM and a further in-depth analysis of the IEMM approach, introducing a Bi-Regional IEMM (hereinafter referred to as B-IEMM) based on a Bi-Regional Social Accounting Matrix that divide the Italian territory in two macro-areas, North-Central and South-Islands. The results of this model provide an assessment of the higher order effects in the production processes and the impact in the disposable income of the institutional sectors affected in the aftermath of the two strong earthquakes occurred in August and October 2016 in the Central Italy.

The B-IEMM methodology is based on the Demand-Reduction IEMM, following the considerations of the demand-side IIM (Santos and Haines, (2004) and Haines et al., (2005)), and according with the reflections suggested by Dietzenbacher and Miller (2015). This methodology is developed as an inter-dependency analysis tool for assessing the ripple effects triggered by various sources of disruption such as natural disaster or human hazard (Ciaschini et al., 2016).

In order to achieve the task of an economic impact analysis it is of primary importance to introduce the starting framework. The use of SAM methodology in the disaster analysis studies has been largely tackled by Cole (1995, 1998, 2004), by Bradshaw (2003) and more recently by Okuyama and Sahin (2009) among others. In fact the SAM is an adaptable accounting scheme that presents inter-dependencies among activities, primary factors and Institutional sectors at different level, it is

therefore able to detect an interdependent system failure and consequently supporting modeling in the task of measuring the inoperability due to a perturbation (Ciaschini et al., 2016). Moreover, this framework points out the disposable income formation process in order to assess not only the impact of intervention policies on the main economic variables (GDP, output, employment) but also to evaluate the income distribution variation among specific groups inside the institutional sectors at a deeper level.

As previously mentioned, this study is based on a Bi-Regional SAM (B-SAM) where a distinction between two macro-areas, North-Central and South-Islands, is provided. This scheme includes: six-teen industries per each macro-area, two components of the Value Added per each macro-area, Capital formation and Rest of the world. Moreover the framework presents further differentiation in the Institutional Sectors such as Households and Financial corporation and offers a detailed scheme that contains, per each macro-area, different level of Government: Central, Regional, Provincial and Municipal.

The B-SAM used exploits an already existing framework (Pretaroli and Socci, 2008) that has been updated with the 2012 data provided by the National Institute of Statistics (ISTAT).