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What is the best use of 100 Euros to reduce the earthquake risk of a residential masonry building in a developed nation? Optimisation and Quantification of the benefits of risk reduction

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The average loss per building in developed countries like Australia or Switzerland due to earthquakes will be far in excess of 100€ over a political lifetime of 4 years (via a stochastic risk assessment). So a good question is, what can be done for 100€ and a bit of hard work, to strengthen and retrofit a URM (unreinforced masonry house). Of course much of the loss occurs in a few large events, but significant damage also occurs from more frequent smaller events.

Using the CATDAT Damaging Earthquakes Database (Daniell et al., 2011), 57% of deaths from earthquakes have occurred in masonry buildings since 1900 globally. Thus, with a view towards life safety and the maximum return on investment, different options are tested and discussed for retrofitting the average brick house for earthquake resistance.

Bolting and bracketing furniture, electrical equipment and valuables to walls, the removal or tying in of certain non-structural elements, as well as adjustments such as seismic wallpaper and reinforcement are tested from empirical and analytical experience from around the world. Of course, earthquakes are not the only main concern for developed nation populations, so a view as to the best use of the 100€ is looked at in combination with other disaster types. Insurance takeout and its implications are also discussed.

The process is repeated for the D-A-CH (Germany, Austria and Switzerland) region in order to see the regional economic implications for widespread awareness of earthquake risks and losses. The risk reduction is quantified and is seen to be significant for nearly all of the D-A-CH region. This analysis has implications for developed and developing nations alike.