THE BENEFITS AND COSTS OF SEISMIC BUILDING CODES[1]

William D. Schulze, David S. Brookshire

John Tschirhart, Ronda K. Hageman

Introduction

Perhaps the most developed institutional structure for employing earthquake hazards information is use of building codes. Communities in earthquake prone areas typically adopt the provisions of the Uniform Building Code pertaining to earthquake resistant structures. Such building codes have been developed in great part on the basis of ground shaking information. Thus, one of the principal benefits of earthquake hazard mitigation programs is embodied in building codes which reduce property damage and risk to human life from earthquakes.

In estimating benefits of any program which reduces risk to human life, great care must be taken in relating dollar values to safety. Thus, our first task undertaken in the next section is to explain just how safety programs can be valued in terms of a priori measures of the value households place on reduced risk to life. Note then, that economists try to obtain information on how individuals value their own safety, i.e., how much they are willing to pay to live and work under safer conditions, not how much a particular person's life is worth in dollar terms, an objectionable and now discarded concept.

Section 3, building on Section 2, then develops the economic theoretical basis for assessing the benefits and costs of building codes including reduced property losses. Economic analysis is based on expectations. Thus, for example, if the odds of an event which would destroy five percent of the real estate in Los Angeles County are one in one hundred per year, then annual expected losses are $E(L) = 1/100 \cdot .05 \cdot$ (value of real estate in L.A. County).[2] If building codes would reduce damage by 10 percent then annual benefits of building codes (from this source) would be $.1 \cdot E(L)$.

Calculations of the sort described in Section 3 are impossible without some estimate of probability of, at least, major events in the study area, Los Angeles County. It is the purpose of Section 4 to examine the available evidence on event probabilities and likely damages to structures. New evidence on the history of the San Andreas fault is employed to provide data for an analysis using statistical failure theory. This analysis suggests that the annual odds of a large event