



The impact of flood risk on the market value of property in Austria

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Following the publications of the Intergovernmental Panel on Climate Change (IPCC) and the Max Planck Institute for Meteorology (MPI-M) the risk of extreme weather events will increase significantly at settlements in the Alps. Historically these settlements have been built next to rivers for economic (river navigation) and strategic reasons (easier to defend). Due to climate change these settlements are highly exposed to river flooding and flash floods. Clearly, there will be strong effects on the property market in these areas. Thus, this paper seeks to derive a model within a hedonic property pricing framework integrating the effects of extreme weather conditions on market values of property in the Alpine Region. Furthermore, we will present key findings using this model for property market prices from a selected region in the Alps (transaction-driven database) that recently has been affected by river flooding.

Properties are private differentiated goods that contain different amounts of a variety of characteristics. Hedonic equations are one possibility to decompose expenditures for goods into measurable prices and quantities. In the concept of implicit markets, it is supposed that property characteristics are traded in bundles: The observed price for a property represents the value of the collection of all these characteristics, as they cannot be unbundled from the geographic location of the property (Malpezzi, 2002). Traditional approaches focus on a number of factors describing the location and the condition of the property as well as socio-demographic aspects and the image of the region. Lately, the effects of climate change on property prices have increasingly gained attention in this field of research. In order to derive implicit price functions, the hedonic price method allows estimating the marginal contributions of these property

characteristics and to infer values for non-traded attributes such as natural hazards.

In our model we adopt the findings of previous work in this field showing that the exposure to natural hazards, e.g. the risk of coastal flooding, is likely to have an impact on the attractiveness and consequently on the market value of properties. A common finding across all these studies is that buildings located within a floodplain *ceteris paribus* sell for less than equivalent buildings outside the floodplain. This price reduction is often greater than the present value of the future hazard insurance. With a database of about 30.000 property transactions in Alachua County, Florida, Harrison *et al.* (2001) examined the valuation of buildings located within 100-year flood plains. Dei-Tutu (2002) use sales records from Pitt County, North Carolina, to estimate the effects of flood hazards on property values. Bin (2006) has shown that the location of a building within a flood zone lowers its market value between 5% and 10%. Other studies with a comparable motivation have been performed by MacDonald, Murdock and White (1987), Donnelly (1989) and Speyrer and Ragas (1991).

Focusing on river flooding in the Alpine Region, we integrate spatial information from the Austrian flood mapping system eHORA (Hochwasserrisikozonierung Austria). The hedonic pricing approach allows examining the effects of river flooding on property market prices. Hence, using property market prices for the observed region, the locations of these properties are geocoded and then mapped against these digital flood mapping systems. The regression equations are estimated using semiparametric models allowing for possibly nonlinear effects therefore providing a flexible functional form for the implicit price functions.

To sum up, this article aims to verify that the findings of previous work that have shown a price reduction for properties in a floodplain are also applicable for properties in the Alpine Region.