



Analysis

Environmental Valuation With Periodical Payments in High-inflation Economies. An Argentinean Case Study



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ARTICLE INFO

Article history:

Received 9 September 2016

Received in revised form 1 March 2017

Accepted 13 March 2017

Available online 27 March 2017

Keywords:

Environmental valuation

Contingent choice

Periodical payments

Annuities

Inflation

ABSTRACT

Stated preference valuation surveys often ask respondents for periodical payments, sometimes for the remaining life of the individuals. Questionnaires do not usually specify whether those payments would vary according to inflation. This may be less important in low-inflation economies, but results could differ significantly in high-inflation countries. A contingent choice exercise was conducted to explore the severity of this effect in Argentina. The empirical application focused on an anthropogenic-pressure mitigation program for the basins of the Mendoza region. A comparison of willingness-to-pay results from a scenario where annual payments were to be increased according to inflation with another of fixed annuities, found inflation to be significantly influential on respondents' stated values. Furthermore, a test on the robustness of the estimated values found results to be consistent with prior expectations.

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1. Introduction

Over the last decades, stated preference valuation methods have experienced a generalized growing interest, including an increasing number of applications in developing economies (Carson, 2011, and for some examples in Argentina, Agüero et al., 2005; Lacaze, 2009; Saidón, 2012; Farreras et al., 2016). They are used to estimate the value of a wide range of non-market goods in terms of maximum Willingness-To-Pay (WTP). Typically, a questionnaire describing the provision of the good in exchange for a payment is administered to a sample of the relevant population. The elicitation question can take different forms, depending on the specific method. Contingent choice is one of the extensively applied variants (Hensher et al., 2005). Typically, the elicitation question asks to select the preferred alternative out of a choice set, each alternative being defined by a given level of provision of one or several goods, and a payment amount.

Sometimes, the valuation exercise demands a certain periodical payment (annuity) over a given span of time, or for life (Hanemann et al., 1991; Kahneman and Knetsch, 1992; Willis and Garrod, 1998; Johnston et al., 1999). It is assumed that respondents would be more

prompt to commit to the requested cost if the questionnaire expresses the annuities in nominal terms (e.g., p monetary units each time, regardless of inflation), compared to stating payments in real terms (e.g., p monetary units each time, to be adjusted according to inflation). In the former case, the estimated WTP result ought to be higher in a positive inflation environment. However, when annuities are used and the questionnaire does not indicate whether values are nominal or real, respondents are left with their own interpretation. In that case, individuals may reasonably take their own personal experience, or some other aspect, as a cue. Consequently, the researcher may not know the setting respondents had in mind when stating their valuation choices. In dealing with this uncertainty, some studies (e.g., Chilton et al., 2004; or Desaigues et al., 2011) treat annuity payments as real values, while others (for example, Unsworth and Bishop, 1994; Kinnell et al., 2002) interpret payments as nominal. However, most studies with annuities seem to obviate the inflation issue.

In order to explore this problem, a contingent choice valuation exercise was conducted to estimate the social welfare change due to the effects of possible anthropogenic-pressures over the next 10 years on the basins located in the western part of Argentina, this country facing relatively high inflation rates at the time of the study, in 2013, above 20% per year. A closer look at the macro-economic context of Argentina reveals that inflation has historically been a matter of concern for the population, also in recent times. In the mid-1970s, after different unsuccessful stabilization policies, the twelve-month inflation reached 347%. The 1980s was the worst decade in terms of price increases, reaching

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an unprecedented 4900% in 1989, followed by 1300% in 1990. In the early 2000s, after the sovereign default, inflation soared to 40% in 2002. It entered a rising path again in 2007, reaching 25.6% in 2012 and 28.7% in 2013, with an average annual inflation rate of 20% over the last 10 years.

The rest of the paper is organized as follows. Section 2 presents the materials and methods which includes the case study, the contingent choice method, the empirical application, and the hypotheses tests. Section 3 reports the main results and tests undertaken. Finally, Section 4 discusses the findings and draws the main conclusions.

2. Materials and Methods

2.1. Case Study

The valuation exercise deals with an environmental improvement in an area neighboring the agglomeration of Gran Mendoza, in western Argentina, on the eastern slopes of the Andes Precordillera (Fig. 1). Several watersheds run through this web of arid and semi-arid piedmont landscapes, providing several provisioning, regulatory, and cultural services. However, strong anthropogenic pressures on the basins west of Gran Mendoza threaten some of the services they provide to society. In recent decades, population growth and urban expansion have generated significant changes in the dynamics of the piedmont-city ecotone, which has contributed to the degradation of the services generated in the watersheds that integrate the alluvial area of Gran Mendoza (Vich et al., 2005; Salomón, 2009; Grunwaldt et al., 2010).

The vegetation of the region is composed of *larrea divaricata* community in 11.9%, *artemisia mendozana* community in 17.7%, *larrea cuneifolia* community in 9.6%, and *zuccagnia punctata* community in 60.8% (Martínez and Dalmasso, 1992; Martínez, 2010).

The progressive reduction of vegetation cover diminishes the infiltration of water into the soil and increases surface runoff (Vich et al., 1993). Furthermore, the natural drainage system to evacuate water excesses suffers alterations (Vich et al., 2007). All together leads to soil erosion, downstream sedimentation, and a further deterioration of the hydrological characteristics of the soil (Vich et al., 2004). The hydrological cycle alteration increases the threat of debris flow and flash floods in these alluvial fan environments, which places society at risk during brief spells of heavy rainfall (Vich et al., 1993; Vich and López Rodríguez,

2010). The reduction of plant cover and the increased risk of alluvial flow are two of the most pronounced effects of anthropogenic pressure on the Mendocinian piedmont.

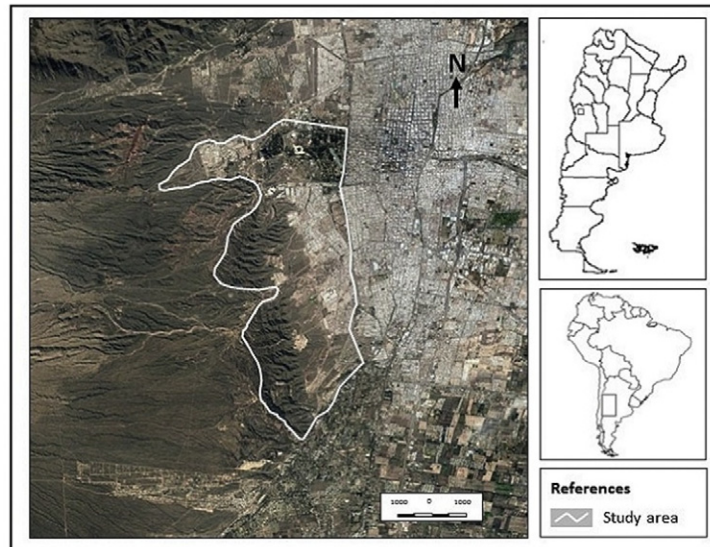
Based on results from the above-referenced field studies, and on current knowledge of the plant cover in the Mendocinian piedmont (Martínez and Dalmasso, 1992; Martínez, 2010), threat of debris flows and flash floods (Vich et al., 2010; Moreiras, 2010; Fernández, 2010), and land use (López, 2010; Gudiño et al., 2010) in the watersheds that integrate the alluvial area of Gran Mendoza, we hypothesized a most likely base scenario over the next 10 years. This scenario is referred to as the Business-As-Usual (BAU) situation or “do nothing” scenario, according to two environmental variables, plant cover and alluvial flow risk. Under BAU, it was predicted that the plant cover percentage, currently averaging 45% of the Mendocinian piedmont, would drop to 20%, while the alluvial flow risk, currently affecting an average of 10 out of 100 houses of Gran Mendoza every year, would increase to 16 out of 100 houses.

The implementation of a program to mitigate the expected extent of the consequences of the anthropogenic pressures on the Mendocinian piedmont would modify the BAU situation. The suggested program includes small infrastructure works (like water traps, and dikes of gabions) and improvements of the natural vegetation (including seedling planting), as proposed in some watershed management studies (Vich and López Rodríguez, 2010). However, these management corrections would restrict the recreational access to the piedmont area during the application of the program. Depending on the extent of the management corrections, the consequences on the recreational restrictions would vary.

2.2. Contingent Choice Method

The label *contingent choice* refers to a survey-based valuation method that simulates a market choice situation (Louviere, 1988; Hanemann and Kanninen, 1999; Bennett and Blamey, 2001). A questionnaire details the good to be considered. The good description includes some of its characteristics, usually called attributes. Depending on the proposed action, the attributes of the good vary in their quantity or quality level. Different level combinations of the attributes, together with a proposed payment, conform different alternatives. Respondents face a choice from a set of alternatives (a choice set), consisting of BAU and two or

The basins west of Gran Mendoza and the study area of the Mendocinian piedmont



Source: own elaboration based on Google Earth images

Fig. 1. The basins west of Gran Mendoza and the study area of the Mendocinian piedmont. (Source: own elaboration based on Google Earth images.)

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