Farmers' perceived cost of land use restrictions: A simulated purchasing decision using discrete choice experiments

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ABSTRACT

This paper reports on the findings from discrete choice experiments designed to estimate farmers' perceived costs of land use restrictions, i.e. crop restrictions, additional fertilizing restrictions, and usage restrictions, as opposed to having no such restrictions. To this end, hypothetical land purchasing decisions were simulated based on the information about productivity, lot size, distance to other land, driving time to home, land use restrictions, and price. Farmers from the Campine area (Belgium) were invited to participate in the survey as the agricultural land in this region still faces the effects of historical heavy metal contamination resulting in crop restrictions. For identical pieces of land, we estimate the perceived cost, calculated as a change in the consumer surplus due to having a land use restriction, to be about 46,000 €/ha for the crop restriction, 50,000 €/ha for the usage restriction, and 70,000 €/ha for the fertilizing restrictions. Assuming this cost to represent a perpetuity, then with a discount rate of 5% the yearly fixed costs respectively equal about 2300 €/ha, 2500 €/ha, and 3500 €/ha.

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Introduction

The joint provision of public and private goods

Land ownership allows the landowner to carry out a limited set of actions (Coase, 1960). Furthermore, if private land also provides significant public benefits, it can be seen as the government's role to reallocate property rights in order to maximize social welfare (Thomson and Whitby, 1976). Such a reallocation is often instigated by environmental protection and conservation. The Endangered Species Act of 1973 in the United States (US) is an example of the tension created by such regulation culminating in the question: 'Should compensation be paid for such reallocation of property rights?' (Blume et al., 1984; Polasky and Doremus, 1998; Smith and Shogren, 2002). Similarly, the European Common Agricultural Policy (CAP) has shown growing attention for environmental protection and sustainable agriculture since 1992 (European Commission, 2012). This trend has made direct payments to farmers conditional upon cross-compliance to conditions relating to the environment, food safety, and animal welfare also known as the statutory management requirements (SMR) and standards for good agricultural and environmental condition of land (GAEC) (European Parliament and the Council, 2013a). This trend persists as the latest CAP reform puts the joint provision of public and private goods at the core of its policy. To support this change, a new support instrument has been created, accounting for 30% of the national direct payment envelope, called 'payment for agricultural practices beneficial for the climate and the environment' or in short 'green (direct) payments'. It targets farmers entitled to a payment under the basic payment scheme or the single area payment scheme. This instrument will be active from 2015 onwards and serves to support farmers for the public services their land is now obligated to provide. Specifically, the agricultural practices leading to public benefits include: (1) crop diversification, which aims at soil quality improvements, (2) permanent grasslands, which aim at carbon sequestration, and (3) ecological focus areas, which aim at biodiversity conservation. Consequently, the EU will be relying heavier on mandatory measures, while keeping the voluntary agri-environmental schemes alive in the second pillar (European Parliament and the Council, 2013b; European Union, 2013). Therefore, the situation of a reduction in private landowners' rights for the public's benefit will be encountered more often in the future.

The reallocation of property rights in the public's interest

The answer to the question 'Does such reallocation require compensation?' differs according to whom is giving the answer. In

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the European Union the private agricultural landowner is legally protected in most countries from the deprivation of possessions, including a nominal change in the degree of property rights. Our personal assessment based on the framework by Schutte (2004), who has listed the criteria of the European Court for Human Rights, provides little hope for farmers to be compensated for land-use restrictions such as those installed by the CAP out of legal motivations. Indeed (1) whereas land-use restrictions are a deprivation of a possession (2) causing interference with the peaceful enjoyment of that possession (3) which is lawful in the EU as it is installed via regulations, (4) such land use controls are pursued in the public's interest as the scenery, the climate, and biodiversity are public goods, and (5) they strike a fair balance (i.e. the balance between the public's gains and the individuals' losses in property rights) given the fact that the policy is equal for all farmers and can be seen as solving a collective action problem (i.e. the misuse of a resource to which no one is inclined to stop first as others might benefit). Economic literature has mostly dealt with the debate of Kaldor–Hicks efficiency and effectiveness of such regulation. Nevertheless, Mullan et al. (2011) argue that if the new regulation is based on society's beliefs about what constitutes a public good, such as agricultural land, side payments may be a practical way to lower the transactions costs of implementing a change by overcoming resistance from those who stand to lose. Originally the European Council (1992) proposed measures to 'compensate farmers for any income losses caused by reductions in output and increases in costs and for the part they play in improving the environment'. Such payments can be justified from a social point of view if more friendly environmental practices lead to a growth in consumer surplus greater than the decrease in producer surplus, signaling that the Kaldor–Hicks efficiency criterion is fulfilled (Bonnieux et al., 1998). For an overview of the full set of tools policy makers have to their disposal in promoting the services public goods deliver, we refer to Van Zanten et al. (2014). In conclusion, the view taken here is that the payments, offered to farmers for complying with novel regulation, serve to decrease resistance from those that stand to lose.

Assessing the amount of compensation

Bateman (1996) found that farmers are more familiar with the concept of assessing potential compensation than households are with estimating hypothetical payments for increased provision of public goods. Still, mostly discrete choice experiments (DCEs) have been used to estimate societies' preferences and hence willingness to pay (WTP) for an increase in agricultural non-commodities (Campbell, 2007; Colombo et al., 2009; Garrod et al., 2012, 2014; Huber et al., 2011; Kallas et al., 2007; Scarpa et al., 2009). Nonetheless, DCEs have previously also been used to inform the design of (novel) payments to farmers intended to increase the provision or quality of non-market goods (see Table 1). Espinosa-Goded et al. (2010), Christensen et al. (2011), Broch et al. (2013), Beharry-Borg et al. (2013), Kaczan et al. (2013) and Greiner et al. (2014) have investigated farmers' willingness to accept (WTA) (novel) voluntary payment schemes. Alternatively, to the best of our knowledge, Schulz et al. (2014) are the first to have explored the prospective compliance with the mandatory greening of the CAP. They have estimated farmers' marginal WTA an increase in 'greening'. All studies mentioned above have the following in common. They used the additional payment following compliance or equivalent reduction in payment following noncompliance with a novel payment scheme as the price vehicle that allows calculating the WTA an increase in the provision of non-market goods by farmland.

Similar to the branch of literature revised above, it is our ambition to calculate the level of compensation required to motivate farmers to comply with the regulations of a payment scheme.

Previously, mostly a change from a situation without additional restrictions (i.e. the real situation) to a situation with additional restrictions (i.e. the hypothetical situation) is considered. Here, we apply an approach in which a situation without any additional restrictions (i.e. the unaffected situation) is compared to a situation with additional restrictions to calculate the perceived cost estimates. Note that unaffected does not signal that there are no restrictions at all. It simply refers to the situation in which the three restrictions under study are simultaneously absent while other regulation is kept constant. In particular, we study land use restrictions motivated by water protection, i.e. the fertilizing restriction (European Council, 1991), carbon sequestration, i.e. the permanent pasture restriction (European Commission, 2009; European Parliament and the Council, 2013b), and food safety, i.e. the crop type restriction (European Parliament and the Council, 2002). It should nevertheless be noted that the interpretation of the perceived cost estimate of crop restrictions differs from that of the usage and fertilizer restrictions. In the former case the farmer is the victim of a situation caused by the zinc smelters, whereas the usage restriction and fertilizer restriction are brought into life to prevent contributions to climate change and water pollution caused by farmers. Nevertheless, the attribute was included in the experiment due to the case study context and for comparison purposes. The height of the perceived cost of the crop restrictions attribute can serve as a measure of how much farmers having to cope with the crop restriction would like to be compensated at the time of surveying. A lump sum payment by the polluter would be the ideal solution in this case. In practice this ideal is unreachable as the polluter has ceased to exist as a legal entity. A second best could be the creation of a fund created by tax payer's money. However, agreeing with existing legislation we do not feel such compensation should be granted to the farmers if in reality they bought the polluted land at a price rebate and were aware or could have been aware that the rebate is due to the environmental stigma (Flemish Government, 2006). The fertilizer restriction and the usage restriction are actually part of an agricultural payment scheme. Hence, their matching perceived cost estimates can be interpreted as the amount farmers would like to be compensated by for installing such restrictions on an unaffected piece of land. Such payments could be offered to farmers for complying with novel regulation in order to decrease resistance from those that stand to lose.

In this paper, a methodology using DCEs, building on the work of Tegene et al. (1999) and Gelso et al. (2008), is put forward that allows calculating farmers' perceived cost of land use restrictions by comparing the difference in utility between buying a restricted parcel and buying an unaffected parcel (see Eq. (1)). Such a calculation coincides with a change in consumer surplus, caused by the land use restrictions, which serves as an approximation of the compensating variation in logit models as originally proven by Small and Rosen (1981). In Eq. (1) the superscript 1 represents the situation with a restriction and the superscript 0 is the unaffected situation for respondent n and alternative j (Train, 2003).

$$\Delta E(CS_n) = \frac{1}{-\beta_{\text{price}}} \left[\ln \left(\sum_{j=1}^{j^1} e^{V_{nj}^1} \right) - \ln \left(\sum_{j=1}^{j^0} e^{V_{nj}^0} \right) \right] \quad (1)$$

The perceived cost, as defined here, is equal to the sum of both monetary (e.g. production income losses and transaction costs) and non-monetary costs (e.g. anxiety, reduction in freedom of choice) of installing such legislation. It thus represents the amount farmers would like to receive. The valuation was performed using DCEs motivated by the lack of available data for agricultural land prices. Hence, land use restrictions were embedded as an attribute in a discrete choice experiment simulating a purchasing decision as it was our goal to find out land use restrictions' impact on farmland