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Endowment effect theory and the Samuelson solution – a thought experiment

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Endowment effect theory and the Samuelson solution – a thought experiment

Abstract

Thaler (1980) employs prospect theory to explain the endowment effect, i.e. the empirically observed disparity between the willingness to pay for a certain good (WTP) and the willingness to accept retribution payments in exchange for giving up this good (WTA). This disparity is caused either by the disutility from parting with one's endowment and/or by an extra utility from ownership which is not anticipated by individuals who are not endowed with the good. These effects may not apply to public goods because consumers are not given exclusive property rights. The graphical tools introduced by Samuelson (1954) are applied to show how these effects influence the allocation of resources among private and public goods. An inefficient allocation only occurs if the ownership utility effect applies to one good but not to the other.

Keywords: endowment effect, loss aversion, public goods, efficiency, Samuelson solution

JEL: H40, D60

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1. Introduction

Since the 1940s, the contingent valuation method and surveys are widely applied tools to elicit consumers' preferences (e.g. Hanley and Spash, 1993). The answers to these studies show a systematic disparity between the participants' willingness to pay for a certain good (WTP) and their willingness to accept retribution payments in exchange for giving up this good (WTA) (e.g., Adamovicz et al., 1993; Morrison, 1997, Horowitz and McConnell, 2002). The literature contains different explanations for this WTA-WTP-disparity (e.g., Morrison, 1998; Brown, 2005). The endowment effect is the most controversially discussed explanations among them. It was introduced by Thaler (1980) who draws on prospect theory and argues that a substantial part of the disparity is caused by a general loss aversion: Individuals asked for their WTA for a certain good consider this good part of their endowment while individuals asked for their WTP do not. Given the asymmetric value function (e.g. Kahneman and Tversky, 1979), this difference in point of reference causes the WTA to be substantially larger than the WTP (Thaler, 1980). A number of experiments support the empirical validity of this argumentation (e.g. Kahneman et al., 1991; Franciosi, 1996, Van Boven et al., 2003). Among others, Knetsch (1989) and Borges and Knetsch (1998) and recently Carmichael and Macleod (2006) have discussed the implications of endowment effect theory for the efficiency of factor allocation.

This paper adds to this literature by discussing the implications of endowment effect theory for the factor allocation when individuals can choose between private and public goods. It starts by introducing two different interpretations of Thaler's endowment effect theory in section 2. Accordingly, the loss aversion can be caused by a disutility from parting with one's endowment and/or by an extra utility from ownership which is not anticipated by individuals who are not endowed with the good. Given that consumers are not given exclusive property rights for public goods, section 3 argues that the parting disutility as well as the ownership utility is likely to be much smaller for public goods than they are for private goods. Section 4 employs the graphical tools introduced by Samuelson (1954) to show that ownership utility effect leads to a bias in the allocation if it applies asymmetrically to the two types of goods. If it applies symmetrically, the two effects neutralize each other.

2. Endowment effect theory – two alternative interpretations

In order to gain a better understanding of the endowment effect, this paper follows Plott and Zeiler (2005) in differentiating between the empirically observed phenomenon of a WTA-WTP-disparity (i.e. the endowment effect) and the theoretical explanation based on applying prospect theory (hereafter endowment effect theory). There is a broad consensus among behavioural economists that endowment effect theory offers an important contribution to understanding the empirically observed disparity (e.g., Morrison, 1997). At the same time, there are two distinctly different interpretations of endowment effect theory.

According to Loewenstein and Adler (1995) and Van Boven et al. (2003), it results from the fact that people get attached to goods they own. In order to provide a valid explanation for the WTA-WTP-disparity, the utility from feeling attached to one's endowment has to be unanticipated by those individuals who are not endowed (e.g. Van Boven et al., 2003). To illus-

trate this, let us assume that the factors named in section 2.1 do not apply. At the same time, let us assume that people feel attached to the goods they possess. This feeling of attachment causes an extra utility which will hereafter be called ownership utility. It is important to note that the ownership utility is not drawn from owning any good in particular but rather from owning something at all (e.g., Loewenstein and Adler, 1995). Now consider a person who owns a certain good A and has the possibility to trade it for another good B. If this person anticipated the ownership utility, his valuation of good A and B would not be influenced by the fact that he owns A instead of B. He would know that when trading A for B the ownership utility he draws from B would compensate for the ownership utility lost by giving up A. Thus, he would not have to demand a retribution payment for the loss in ownership utility and his WTP and WTA for A would – ceteris paribus – be identical. Alternatively, when not endowed with either A or B, the person would anticipate that he will experience an additional ownership utility. Again, his WTP for A before receiving it would equal his WTA afterwards. If, on the other hand, the ownership utility is not anticipated, the individual does not foresee that possessing B will compensate him for the loss in ownership utility he suffers by giving up A. Nor can he anticipate the ownership utility from owning a good before possessing it. Thus, his WTA for a certain good will exceed its WTP even if the explanations discussed in section 2.1 do not apply. In other words: The feeling of attachment can explain the difference between WTA and WTP only if the ownership utility is not anticipated. It describes a bias in the way individuals predict their own preferences (e.g., Loewenstein and Adler, 1995; Van Boven et al., 2000). This phenomenon will hereafter be called (unanticipated) ownership utility effect.

Kahneman et al. (1991) offer an alternative interpretation of endowment effect theory. Accordingly, the WTA-WTP-disparity is caused by a disutility which the owner suffers when parting with an endowment. This disutility cannot be compensated for by owning another good in exchange because it results from the mere act of parting. This parting disutility effect can explain the WTA-WTP-disparity without implying any bias in the prediction of tastes.

Loewenstein and Adler (1995) report on an experiment which reveals a significant prediction bias for the WTA. They use a mug with the logo of the students' home university as the object of choice. In the control group, each student is asked to guess the result of tossing a fair coin. Those who guess correctly are given the mug for free, the others are given the possibility to buy it later on in the experiment. After the coin is tossed and the mugs are handed out, those students who received a mug (control group 1) are asked for their WTA. All other students (control group 2) are asked to state their WTP for the mug. In the experimental group, all students are told that each student had a 50 percent chance of receiving a mug for free. All he has to do is to predict the result of tossing a fair coin correctly. Before the coin is tossed, each student is asked to imagine that he made the right prediction and then state his WTA for which he would be willing to sell the mug again (anticipated WTA). The students in all groups are told that the actual trading price P for which they have to buy respectively sell the mug has been fixed ex ante but will not be announced until the end of the experiment. Every student who states a $WTA \leq P$ has to sell the mug for the price of P . Similarly, any student stating a $WTP \geq P$ has to buy it for the price of P .

Table 1: WTP, WTA and ex ante WTA for mugs

Group	Indicator	N	Average amount (standard error)
control group 1	WTA	24	5,96 \$ (0,460)
control group 2	WTP	29	4,05 \$ (0,329)
experimental group	anticipated WTA	53	4,16 \$ (0,293)

Source: Lowenstein and Adler (1995).

The results of the experiment are summarized in table 1. As predicted above, the WTA in control group 1 turned out to be significantly higher than the WTP in control group 2. The anticipated WTA voiced in the experimental group was significantly lower than the WTA in control group 1 but showed no significant difference to the WTP in control group 2. This result suggests that the players in the experimental group did not consider the mugs their own before the toss of the coin and were thus not attached to it. Apparently, they did not anticipate the feeling of attachment (i.e. the ownership utility) but stated a hypothetical WTA which largely equals the WTP voiced by control group 2. This result suggests that WTA-WTP-disparity results from a systematic bias in the prediction of tastes. The prediction bias accounts for 94 per cent of the difference between WTP and WTA. With respect to the two different interpretations of endowment effect theory, this result suggests that the WTA-WTP-disparity is due to an unanticipated ownership utility effect rather than to a parting disutility effect as suggested by Kahneman et al. (1991). The evidence provided by Van Boven et al. (2003) further supports this notion. Though exercise reduces the magnitude of the prediction bias, the participants fail to anticipate the disparity between WTA and WTP throughout the experiment.

3. The WTA-WTP-disparity for publicly provided goods

In the contingent valuation studies reported in the literature, the ratio of WTA:WTP is substantially larger for public goods than for private goods (e.g., Zöllner, 1997; Horowitz and McConnell, 2002). This result seems to support the notion that endowment effect theory applies to public goods just like it applies to private goods (e.g., Frey and Eichenberger, 1991; Hildebrandt, 1995: 119 ff.). On the other hand, the specific characteristics of public goods nourish doubt as to whether the empirical evidence for private goods can be generalized. For private goods, each individual is given an exclusive property right by which it can exclude other individuals from participating in consumption. Given these exclusive property rights, the owner can naturally regard private goods as part of his individual endowment. For public goods, consumers are not assigned exclusive property rights but merely have the right to use them parallel to others. This non-excludability from consumption may prevent the consumer from regarding public goods as part of his individual endowment. In this case, the disutility

from the act of parting can be expected to be smaller. Similarly, if excludability is a precondition for the feeling of attachment, the ownership utility derived from public goods may be smaller than for private goods. As a result, both parting disutility effect and ownership utility effect are likely to be smaller in size for public goods. In the end, they may not exist at all.

4. Endowment effect theory and the Samuelson solution

This section discusses the implications for allocation of resources to the provision of public and private goods. It employs the graphical concept suggested by Samuelson (1954, 1955) to illustrate the major points. Ownership utility effect and parting disutility effect are discussed separately.

The basic impact of the ownership utility effect is illustrated in the standard diagram on the “Samuelson condition” for public goods (see figure 1). Consider an economy with two identical individuals A and B who have to decide about which amount of a public good X and a private good Y they want to produce and consume. The transformation curve is given by TT'. For illustrative reasons, the following analysis abstracts from possible problems of aggregating preferences for public goods. Instead, the individuals are assumed to follow the normative procedure suggested by Samuelson (1954, 1955). If neither the public nor the private good is subject to an ownership utility effect (hereafter benchmark case), A and B can correctly anticipate the experienced utility for different combinations of X and Y. In figure 1, the relevant indifference curves are marked in solid lines. If, furthermore, A and B are entitled to the same amount of the private good X, they will choose point P_0 . Each one of them will consume x_0 of the public good and $y_0/2$ of the private good. This solution is pareto-efficient.

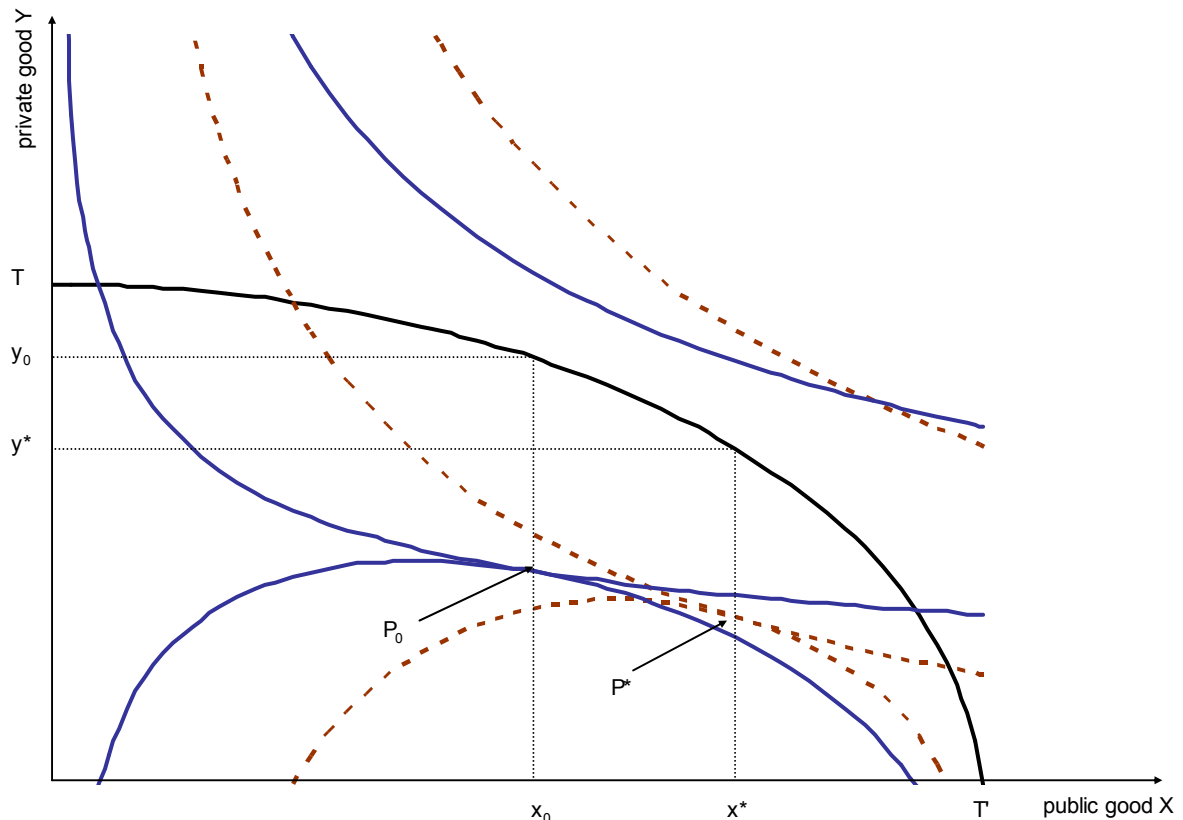
Second, consider a situation in which both private and public good are subject to an endowment effect. In addition, let us assume that the ratio of endowment utility to the utility experienced when consuming the goods ex post is the same for X and Y (case 1). In this case, the marginal rate of substitution calculated by the ex ante utility (excluding the ownership utility) is identical to the one calculated by the utility experienced ex post. Thus, they will use the same indifference map as in the benchmark case. Again, they will settle for the pareto-efficient bundle (x_0, y_0) . The only difference to the situation in the benchmark case is that ex ante A and B will underestimate the experienced utility from (x_0, y_0) .

Third, consider a situation where the ownership utility effect is stronger for private goods than it is for public goods. In this case, the decision utility will lead A and B to operate with a biased marginal rate of substitution. Namely, they underestimate the loss in utility from giving up a marginal unit of the private good Y. This bias leads them to the map of dotted indifference curves which are less steep than the solid indifference curves underlying the decision in the preceding cases. Their biased perception of utility leads A and B to settle for P^* and (x^*, y^*) . This bundle is not pareto-efficient; it contains too much of the public good. Both A and B can experience a higher level of utility if they are provided with (x_0, y_0) instead. However, once endowed with (x^*, y^*) , the ownership utility effect (and the parting disutility effect) will lead the indifference curves to be kinked in P^* (e.g., Knetsch, 1989; Carmichael and Macleod, 2006) and prevent A and B from discovering the superiority of (x_0, y_0) . In the theo-

retical case that the ownership utility effect for public goods is larger than the one for private goods, an underprovision of public goods would be expected.

Unlike the ownership utility effect, the parting disutility effect does not imply that individuals have a biased perception of their own utility. Thus, individuals A and B will always choose the pareto-efficient bundle (x_0, y_0) regardless of whether private goods and/or public goods differ in the magnitude of the parting disutility or not.¹

Figure 1: Samuelson solution and endowment effect theory



5. Conclusion

Endowment effect theory is one of the most widely discussed applications of prospect theory. Extending on Thaler's original idea, the literature provides two alternative explanations for the empirically observed disparity between WTA and WTP. It may result from the disutility associated with the act of parting with one's endowment (parting disutility effect) and/or from the positive utility derived from ownership which is not anticipated by non-owners (ownership utility effect). Given these effects, it is not self-evident – as implied by different authors (e.g.,

¹ In a dynamic perspective with shifting transformation curves and marginal rates of transformation, both ownership utility effect and parting disutility effect can lead to a suboptimal re-allocation of resources in the short run when pareto-efficient reallocation would imply a reduction in the quantity of X or Y (e.g. Knetsch, 1989; Carmichael and Macleod, 2006). In the long run, however, this does not cause a systematic bias in the allocation of resources as long as technical progress is not restricted to one of the two types of goods such that – on efficiency grounds – the same good should be reduced continuously.

Frey and Eichenberger, 1991; Hildebrandt, 1995: 119 ff.) – that endowment effect theory applies to public goods in the same way it applies to private goods. Doubt is especially nourished by the fact that consumers are not assigned exclusive property rights. Consequently, the utility from “owning” publicly provided goods respectively the disutility from parting with them can be expected to be much smaller than for private goods for which consumers have exclusive property rights. This paper discusses the implications of endowment effect theory for the efficiency of public goods provision. The analysis shows that the Samuelson condition is satisfied if the ownership utility effect has the same strength for both private and public goods. If the ownership utility effect is stronger for private goods than for public goods, the Samuelson solution is violated; the quantity of public goods is too large. The opposite is true in the case when the effect is stronger for public goods. This result seems somewhat ironic: People who feel more attached to private goods than to public goods will get tricked into consuming too many public goods while people who develop a stronger attachment to public goods are tricked into consuming too many private goods. An efficient allocation can be expected if the ownership utility effect applies symmetrically to both types of goods and thus the two effects neutralize each other.

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