

# SOME USES, UNDERUSES, AND MISUSES OF THE FINDINGS OF DISPARITIES BETWEEN PEOPLE'S VALUATIONS OF GAINS AND LOSSES

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**Abstract:** *The well-known behavioural finding that losses have a greater impact on people's well-being than gains, has important implications for the study of individual and collective choices, as well as the ways in which analyses are carried out -- many more than have yet been seriously considered. It also has many for analysts' use of such tools as price elasticities, discount rates, value of statistical lives, risk analysis, and the like. A greater recognition of the behavioral findings would likely lead to reductions of the biases in many present analyses.*

Findings from the relatively new, but rapidly growing, field of what has become known as behavioural economics are not only providing insights to improve economic explanations, predictions of people's choices, and policy guidance, but they continue to raise serious questions about the appropriateness of the present near total reliance on standard economics as the only acceptable guide for economic analyses. A prominent example of a behavioural finding that differs from those assumed in standard economic theory is the repeated demonstration that people commonly value many losses more, and often much more, than otherwise commensurate gains. This is likely the most widely known, and arguably the most significant, empirical result from all research in behavioural economics to date.

Except for some entitlements, such as those held for resale rather than consumption (Kahneman, Knetsch, and Thaler, 1990) and those with very close substitutes, the empirical findings from hundreds of tests reveal that for large classes of goods and services, and especially those which are frequently the subject of explicit valuations and policy choices dependent on them, are overwhelmingly inconsistent with the equivalence assumption of standard economic theory. The ratios of the maximum people are willing to pay for entitlements (the WTP measure) to the minimum sums they demand to accept a loss of the same entitlement (the WTA measure), have commonly been found to vary from around 2 to 1, to 6 or 7 to 1 – disparities much greater than that of equality expected by economists and far in excess of any explanation, such as income effects, offered by standard economic theory.

The empirical evidence of valuation disparities have been reported in the most discerning and prestigious professional journals in economics, psychology, and related fields, with increasing frequency, for well over three decades. However, applications of these findings have been, at least to some, surprisingly limited and far from uniform across fields.

With little question, the most widespread and varied use

of the valuation disparity findings has been made in issues of finance – even to the extent of a wide recognition of what has become known as almost a sub-field of behavioural finance. In this area, the years have witnessed the rapid growth of often imaginative well supported research and relatively ungrudging rapid use of the findings. Applications are increasingly common in not only traditional areas of financial dealings, such as in securities trading (for example, Odean, 1998), but extensively so in areas such as retirement savings programs. An important and illustrative example of the latter is one that made explicit use of the well-known behavioural finding that people generally find a loss far more aversive than a forgone gain of equal magnitude. Rather than asking new employees how much they want to contribute to their pension scheme, which they would likely view as a loss from what they regard as their reference wage or salary, they were instead asked how much of the foregone gain of a future wage increase they would give up and have contributed to their pension fund – a less aversive forgoing of a gain rather than a loss, and one that will occur in the future rather than now. This change from a present loss to a foregone future gain resulted in a continuing nearly four-fold increase in average voluntary contributions in the initial application, with similar changes in the many applications that have been implemented in subsequent years (Thaler and Benartzi, 2004).

In nearly all fields, other than finance, such as health, transportation, and, perhaps especially, environmental economics and policy, the applications have been far fewer and have failed to generate much peer approval – indeed, nearly all published reactions are quite the opposite. There have, for example, been a series of “reviews” published in recent years on the consensus over the validity and usefulness of behavioural findings in dealing with issues related to environmental values and policy. Essentially all provide negative conclusions and little encouragement to pursue changes from what has been found acceptable before. Smith

and Moore (2010), for example, conclude:

“We have argued that the most carefully reasoned analytical arguments within the behavioural economics literature do not as yet have specific insights to offer for practical benefit-cost analysis”(p. 231).

An even more recent review reaches a similar conclusion:

“We view the current state of the behavioral welfare economics literature as an important foundation for future research, but the existing theoretical work appears to be far from ready for use in practical policy analysis” (Gillingham and Palmer, 2014, p. 28).

This is not to suggest an absence of a growing literature concerning implications in these various fields, but it is to note the relative scarcity of concomitant actions – more talk, but little else. The seemingly prudent caution to avoid the error of making use of misleading findings, that reviews and assertions such as these call for, comes, however, with a cost. It can lead to foregoing the benefits of possible missed opportunities for improvements that more accurate assessments that the evidence suggests are available with more appropriate choices of welfare measure. The question seems more an empirical one of judging the accuracy and appropriateness of the alternatives on the basis of available evidence, rather than the often suggested one of slavish consistency with standard theory. The latter perhaps exemplified by suggestions such as, “A failure to satisfy the requirements of economic theory would suggest that the appropriate preferences were not being measured” (Diamond, 1996, p.346); “When value measures are derived using models of behavior, these models should be internally consistent and be based on accepted theories of preferences, choice, and economic interactions” (Freeman, Herriges, and Kling, 2014, p.38).

### **The Measures and the Disparity of Valuations Between Them.**

The maxims of standard economic theory define the monetary value of a welfare gain resulting from a positive change as the maximum sum a person is willing to pay for it – the amount that leaves the individual indifferent between the status quo of retaining the money and foregoing the gain, and paying the sum and obtaining it (the willingness-to-pay, or WTP, measure). The parallel, and fully as valid and correct, view of standard theory for the monetary value of a loss of welfare resulting from a negative change is the minimum sum required for a person to accept it (the willingness-to-accept, or WTA, measure). The near universal announced intention of analysts in all fields is consistent with these dictums and the findings from behavioural studies provide little or no reason to challenge these prescriptions from standard theory. Indeed, the behavioural evidence suggests instead that better assessments would result from a more consistent application of this aspect of standard theory, rather than a lesser one.

The major wedge between analysts’ practice and behavioural findings is largely the subsequent inclusion in standard economics of the assumptions that an income, or wealth, effect is the sole cause of any difference between

the WTP and WTA assessments of the value of a change, and that this difference can nearly always be expected to be small and of little significance or importance – “... we shall normally expect the results to be so close together that it would not matter which we choose” (Henderson, 1941, p. 121). As the income effect was thought to be the only source of any difference between the results from using the two measures, as this was assumed to be of little or no consequence, and as it is “... often easier to measure and estimate” (U.S. Environmental Protection Agency, 2000, p.61), in practice the WTP measure has become the near universal measure of choice for assessing the monetary measure of losses as well as gains.

The issue raised by the behavioural findings, again is not with the accepted monetary measures of gains and of losses, it is with the assumptions that it is only income or wealth effects that can lead to a significant disparity between the WTA and WTP measures, and that as these can be taken as inconsequential, that the use of either measure will lead to equivalent monetary valuations. It is essentially an empirical assessment of the validity of these common assumptions – and the empirical evidence is overwhelmingly at odds with the assumption of equivalence.

Tests of essentially the equivalence assumption have been carried out, with increasing frequency, for over three decades. These have included hypothetical contingent valuation studies, real exchange laboratory experiments, and particularly in recent years, field and natural experiments in which people make real choices in their day-to-day lives in circumstances that yield a true test of their WTP and WTA valuations of gains and losses. Examples of these latter studies are ones showing that people are reluctant to accept losses in securities trades and commonly sell company shares that have gained in price while continuing to hold ones that have lost value – a bias that results in substantially lower total returns (Odean, 1998); and professional golfers, who regularly compete for very substantial money prizes, were found to putt less accurately to make a gain of a one-under par, birdie, than to avoid a loss of a one-over par, bogie – resulting in higher scores and lower winnings (Pope and Schweitzer, 2011).

Around 200 earlier valuation disparity studies were summarized in a meta-analysis by Horowitz and McConnell (2002). They found that the average WTA values were 6.7 times larger than the average WTP valuations of otherwise commensurate entitlements (the median ratio of WTA to WTP was 2.6). Tuncell and Hammitt (2014) provided a similar meta-analysis of 76 generally more recent studies, which reported results from a total of 337 individual tests, and found that the overall geometric mean of the WTA/WTP ratios was 3.28. They also reported that these ratios varied widely depending on the types of goods or entitlements being valued, ranging from a high of 6.23 for values of environmental goods and services and 5.09 for those involving health and safety, to 1.56 for lotteries and 1.45 for leisure and travel – differences possibly related to perceived substitutability among the entitlements.

Reports of contrary findings of equivalence between WTA and WTP valuations, that would be consistent with

the predictions based on standard theory, have been from studies focused mainly on procedural issues in laboratory studies (for example, Plott and Zeiler, 2005 and 2007), and on the adaptability of people and the consequent elimination of disparities with people's greater experience with the choices at issue (for example, List, 2003). Overall these studies have so far only addressed a small portion of the tests that have resulted in showings of large and statistically significant disparities, and even with these the presumed contrary results appear more likely to be the result of shifts in the reference state – which is the major factor influencing valuation disparities – induced by the procedures used in the experiments rather than gain-loss equivalence (Koszegi and Rabin, 2006; and with a confirming empirical test, Knetsch and Wong, 2009). Somewhat similarly, the lack of a reluctance to trade in the observed greater exchange activity of shopkeepers and dealers, seems far more likely to be due to trading being the point of their enterprise and a sale is therefore unlikely to be seen as a loss, than it is any evidence of an adaptability premise.

A more useful explanatory suggestion for the pervasiveness of reference dependence, at least for entitlements traded in markets with well-known market prices, is that giving up a good for a sum of money lower than the known market price may induce cognitive dissonance in some people (Weaver and Frederick, 2012). This dissonance may, in turn, give rise to a reluctance to sell even if the good has little or even no value to them. While a very plausible description for some findings, it clearly applies only to the limited portion of the disparity evidence that draws on trading of goods with well-known market prices. Further, this reason for the disparity seems more in the way of explanation for a disparity rather than evidence of its absence. While the accumulated empirical evidence indicates that not all positive and negative changes of entitlements are subject to disparities in people's valuations, it clearly shows the pervasiveness of the differences and their common substantial size. The behavioural findings also demonstrate that people value many, if not most, gains and losses not in terms of their final states, or end point outcomes, as assumed in standard economic theory, but instead in terms of positive and negative changes from a neutral reference state, which may, or may not, be the status quo or determined by extant legal entitlements.

People's preference, or value, function typically in these cases does not have the usual depiction of a continuous smooth curve driven by diminishing marginal utility over greater quantity, indicating that the value of a change from some quantity A to another B, is equal to the value of a change in the other direction from B to A. In cases of a valuation disparity, it is instead more accurately depicted having a "kink" at the reference quantity, and a steeper slope in the domain of losses below, or short of, the reference quantity, and a lesser slope above, or beyond the reference quantity, as indicated in Figure 1. Given a value or utility or welfare scale on the vertical axis, a negative change in the quantity of the good from, say, the reference state, R, to L, is clearly of greater consequence or value, than a positive change of equal magnitude from the reference, R, to a quantity, G.

## Gains vs. reduction of loss

An important, but largely overlooked, implication of the reference dependence of changes, is that a positive change may be a gain, if it is perceived by people as an added quantity over and above the reference quantity (a move from R to G, in Figure 1); but it can also be a reduction of a loss, if perceived by people as a move to the greater quantity level of the reference state (a move from L to R, in Figure 1). For example, people living near a body of water – a lake, a harbour, a river, or whatever – are very likely to regard the reference state of their environment as an expected or normal one without the advent of an oil or toxic waste spill. If such a spill were to occur, it can usually be safely assumed that it would be regarded as a negative change relative to the reference state, and therefore considered by them to be a loss. The monetary value of such a negative change would then be the minimum sum they would require to be as well off as they would be at the reference level of environmental quality without the spill – the WTA measure. As the reference state of a water body without an oil or toxic waste spill is unlikely to change if such a spill occurs, the clean-up of the spill would then be regarded as a reduction, or elimination, of the consequences of the spill. The monetary measure of the value of such a change, would be the sum necessary for them to forego the clean-up that would return them back to the level of welfare they enjoyed with the reference state of the environment – the WTA to forego the change (for example, Knetsch, Riyanto, and Zong, 2012). Although the practice is overwhelmingly to use the WTP measure of the maximum sum people would be willing to pay to clean-up a spill, this will very likely understate the real welfare loss of people effected by the spill and to therefore provide often seriously biased guidance on whether or not a clean-up of a spill is economically worth undertaking.

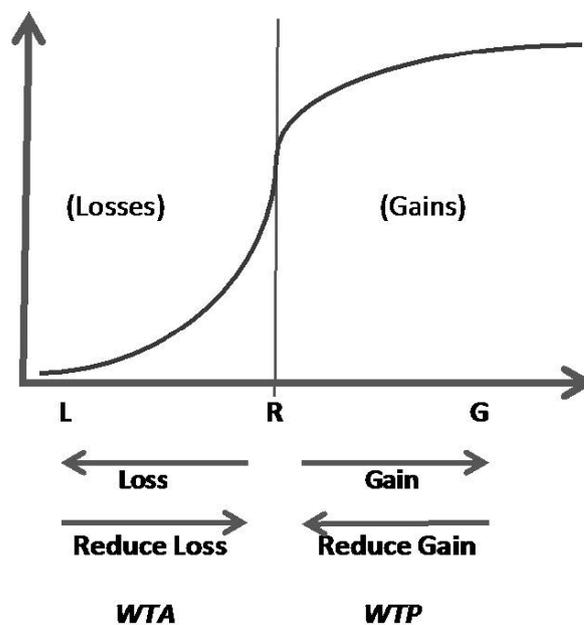


Figure 1. Reference Dependent Positive and Negative Changes.

Other cases of whether a positive change should be best treated as a gain or a reduction of a loss may also be fairly easily resolved. For example, ones such as stopping a physical assault are almost certainly to be best regarded as eliminating a loss, and not a gain from a reference of being physically beaten. They are therefore, best thought of as being worth the equivalence of the sum of money the person would demand to allow the abuse to continue. While this by itself would be an exceptional case unlikely to be of much import in reality, it is very likely illustrative of a wide range of instances that might be regarded as such. For instance, medical treatment of a child's injury or illness may be better thought of in terms of the sums people would demand to forego it – a context that may well give rise to justifications for levels of support for medical services far larger than normally thought of when considered in the usually less than appropriate ways of how much they are willing to pay for them.

The same may be the case for others in which contemplated positive changes are nearly always regarded by analysts as gains rather than reductions or eliminations of losses. Notions of “safe” may serve as the reference level for many instances in which improving safety standards are then better regarded as a reduction of a loss from that reference, rather than a gain beyond it. References of “clean” or “unpolluted” may also influence, if not dictate, people's feelings of the importance of pollution control policies – a “correction” that would call for greater levels of support for *protecting* and *improving* the environment than are prompted by the current practice centred on how much people would pay for such “gains”.

### Losses vs. foregone gains

An analogous distinction can be made for the case of negative changes. These can be either a loss from the reference, (a change from R to L in Figure 1); or foregoing of a gain back to the reference state (from G to R, in Figure 1). If a loss, its value is then most appropriately made in terms of the compensation people demand to accept it (to leave them indifferent between their well-being at the reference state and their equivalent level of welfare suffering the loss but with suitable monetary compensation, the WTA measure). If a reduction of a gain, but with a reference state remaining at R (in Figure 1), such as might occur with a taking away of some temporary facility or entitlement, its value is then given by the sum they would be willing to pay to remain in the gains beyond the reference state, the WTP measure (Knetsch, Riyanto, and Zong, 2012).

While valuation issues frequently arise in cases of losses, as well as with reductions of losses, changes in the gains – both gains and foregoing of gains – are likely to be frequent as well, but perhaps less likely to be of as much policy and analytical concern.

### Some Implications of the Disparity in Valuations. Price elasticities

The implications of the findings of pervasive gain / loss valuation disparities go well beyond issues of welfare assessments and the like, and include a wide range of the mainstays of economic analyses. One, for example, is the estimation and interpretation of measures of the sensitivity of the response to changes in the levels of prices – commonly the estimation of price elasticities. While differing depending on markets, length of run, and the like, nearly all such analyses take as their empirical focus, observations of differing prices and the quantities demanded at these varied price levels. However, although the price level is likely a very important determinant of quantity, it is also the direction of the change that gave rise to each price that may also greatly influence the demand response. People may well regard an increase in price as a loss from a reference of an earlier or “normal” price, and consequently react more to this change by then buying much less at this “new” price, than they would if this same price resulted from a decrease in price, which they would likely regard as a gain. And as people have been shown to be more sensitive to losses than to gains, a change to the same price after a price increase is likely to prompt different purchase decisions than those following a price decrease – resulting, therefore, in different elasticity measures.

In a surprisingly rare instance in which price elasticity estimates were made separately for price-quantity observations after a price increase and after a price decrease, Putler (1992) found that the estimates for retail sales of eggs were -1.10 for observations after a price increase and -0.45 for those after a price decrease. People in this market clearly reacted more responsively to price increases than to price decreases. Here again, people were differentially more sensitive to losses than to what they regarded as gains.

Marketing studies have, over the years, taken some account of the difference in consumer response to price increases relative to price decreases, but these appear to be mostly in terms of how consumer decisions are made and as a factor to be considered in store promotions and the like, rather than in terms of estimates of elasticities to be used in guiding price policy (for example, Somervuori and Ravaja (2013). Curiously, in spite of the importance of this policy tool in fields as diverse as energy policy and medical treatment costing, in current practice little or no account appears to be taken of this potentially important factor, one that on current evidence could lead to much more accurate and useful outcomes. This may be yet another observation of the resistance to change implied by the reference effect itself.

### Reference dependent changes in taxes and fees

Aside from the benefits that might attend more attention to price change in estimates of the price elasticities of private goods, there might well be a somewhat similar payoff to such greater attention to people's responses to the initial setting and changing levels of Pigouvian taxes and fees – collections

such as road tolls, pollution taxes, and penalties for delinquent income tax fillings, that are primarily implemented to change behaviours rather than to raise money for government operations and programs. Mostly anecdotal evidence suggests that initial imposition of such taxes quite commonly causes a substantial change in behaviour, at least in the short run, but subsequent changes in the tax or charge levels very often result in very modest further change. A better understanding of people's response to these taxes could well improve outcome estimates, but could also lead to a better accounting of factors that influence responses – as, for example, the increasing use of electronic road tolls that eliminate the inconvenient and traffic-slowng stopping at toll booths but do so likely at the cost of reducing the deterrent effect of the tolls – and lead to improvements in their design that would increase sensitivity and response levels.

### Tradeoffs between present and future losses and gains

Another staple of economic analysis for which the disparity between valuations of gains and losses is likely to have major implications, is the discount rate that people use to trade-off present and future consumption. A discount rate is often applied, for example, to establish the present value of a future return from some facility or program, so that more informed judgments can be made of the worthwhileness of the cost incurred now to produce this return. A return of €100 in a year's time is currently worth €95.20 if discounted at 5 percent, but worth only €92.60 if discounted at 8 percent.

Establishing the appropriate discount rate to be used to estimate the present value of future costs and future benefits of various proposed projects or programs, has given rise to a long, voluminous, and rarely conclusive literature going back over many years. In all of this extensive debate, it has been widely agreed that whatever discount rate is used to calculate the present value of a future loss or gain, the same rate should be used for both. Not only has the issue of comparability of discount rates for future gains and future losses not been seriously addressed, or, often, even mentioned, but analysis practice the world over is firmly based on the same rate being applied to both. This, despite bits of seemingly persuasive empirical evidence, such as an early study provided by Thaler (1981), demonstrating that people discounted the value of future gains with a substantially higher rate than they used to discount the value of future losses. Given the extent of the evidence that people so commonly value present losses more than present gains, it seems likely that they too would value future gains and losses differently and use differing discount rates to do so.

Just as the value of an immediate gain is the maximum sum a person would be willing to pay now to receive it, the present value of a gain accruing in the future is appropriately measured by the maximum amount the individual would sacrifice now to receive an entitlement to the future benefit. The appropriate measure of a future gain is then, for most purposes, a valuation based on the willingness to pay measure. Similarly, just as the value of a loss is correctly measured

by the minimum compensation demanded to accept it, the present value of a future loss imposed on an individual is the compensation that would leave the person as well off as without the change, the WTA measure.

Observations, from some studies, of people demanding more to accept a future loss than they are willing to pay for a future gain, may not, however, provide evidence of a disparity between the gain and loss discount rates. Such differences may well reflect a combination of the impacts of the gain – disparity in the valuation of the good itself, whether consumed now or in the future – and a difference in the rate at which people discount future gains and losses. This can therefore lead to incorrect conclusions that the observed differences resulted from a variation in discount rates alone. The difficulty might be illustrated with the case of the valuations of the future gain or loss of a mug. Previous studies have shown that people are willing to pay much less to acquire than they demand to give up a future mug. Observing that they would pay less to gain a future mug than they require to give up an entitlement to a future mug, may then be due to the gain-loss disparity of mug valuations, whether occurring at present or in the future, together with whether individuals use identical or different rates of discount for future gains and future losses.

This difficulty does not arise if the exchanges are made in the same metric, such as paying or receiving money now in exchange for receipt or disbursement of money in the future. With money, for example, people would presumably pay up to but no more than \$10 to gain \$10 and would demand at least but no less than \$10 to give up \$10. Therefore, any observed difference in people's willingness to pay \$10 in the future and the compensation they demand to give up \$10 in the future, would be due to different discount rates for gains and losses. The Thaler (1981) study, noted above, is illustrative of the relatively few that have made use of this design and as a result have provided clear evidence of the common presence of a disparity between the rates people use to discount the value of future gains and losses.

### WTP/WTA for increasing and decreasing risks

Somewhat analogous implications of the discount rate difference, arise with determinations of the values people place on increases and decreases in the risks of negative outcomes (with likely symmetric implications for changes in the chances of positive outcomes). Typically, programs or activities that are seen as responsible for changing the risks for people are evaluated in terms of how much people are willing to pay for a decrease in the risks of the negative outcome – for example, the risk of health impacts from industrial pollution. The results are then commonly indiscriminately used to assess the value of increases as well as decreases in such risks.

However, here again, given present evidence, there seems to be little reason to expect people's valuations of increases in risks to be identical, or even very close, to their valuations of decreases in such risks. As increases in the risks of a negative outcome are most appropriately valued with the WTA measure, the common use of the WTP measure is likely

to systematically bias their assessments, resulting in fewer precautions and more illness and injury.

One specific, and widespread, use of people's valuations of risk changes, is in the estimation of the value of a statistical life. To the extent that valuations are made in terms of people's WTP, it likely biases the resulting estimates, and here again the guidance provides by them is likely to be distorted.

## Some Conclusions

The ubiquity of behavioural findings that have important implications for individual and collective choice and decisions is becoming more widely appreciated throughout the world, though clearly not uniformly across fields or locales. In the case of people's greater weighting of the value of losses over the value of gains, research and applications are far and away more prominent in matters related to finance, including individual decisions as well as collective policies, related to pension schemes and savings, with less, and usually much less, attention being attracted in other areas such as environmental quality valuation and policy and health and safety – specifically the fields the Tuncel and Hammitt (2014) meta-analysis suggest are more likely to exhibit larger valuation disparities.

An interesting development related to this recognition of the possible uses of behavioural findings is the appearance of government and quasi-government agencies charged with finding applications of behavioural findings to improve government programs and operations. Among the most prominent, and active, is the so-called “Nudge Unit” (officially, The Behavioural Insights Team) in the U.K., which has been able to draw on many behavioural findings to implement policies and procedures that have improved government operations and outcomes across a wide spectrum of activities. One interesting characteristic of not just the U.K. unit, but of all, is that while academic discourse tends to discount results that may be statistically significant but are of seemingly little economic importance, this is often much less the case with applications that may only involve a small proportion of the target population, but if that population is in the millions or tens of millions, which it often is, the impact can indeed be significant and much worth doing (Halpern, 2015).

Another, largely yet unresolved issue, is the extent to which people from different countries and regions may react differently than people from countries where most studies were carried out – these being until very recently, largely in North America and Europe. Most people are aware that in spite of pushes from changes in communications, the growth of international trade and international tourism and visitation, the growing universality of chain store enterprise, and the large numbers of students studying in foreign schools and universities, all of which are among those pushing towards homogenization of people and their reactions to change, populations remain different in many ways. There is growing evidence that whatever their cultural and other differences, when anecdote is replaced with controlled tests, behavioural

reactions to choices and changes are very largely the same. But these tests have not yet been carried out in sufficient detail and in enough locations to reach totally firm conclusion – more empirical evidence is still clearly needed, on this as on so many other issues and problems.

A subsidiary conclusion on the issue of whether people act in similar ways or not is, however, in keeping with so much of what has already been found from behavioural studies, that much can almost always be done based on what has already been confirmed.

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