

## A Start on nonmarket valuation:

Nonmarket-introduction.doc March 7, 2012

### Valuation and Consumer's Surplus, put simply

I use the term *individual*, to mean an individual member of some species, as in George Bush is an individual, and George the Gorilla is an individual.

(Most economists are typically only interested in individuals that belong to the species homo-sapiens, but there is nothing in economics per se that keeps an economist from including non-human individuals in society.)

For economists, value is anchored at the level of the individual: an individual associates different values with different things. It is a measure of the “worth” that an individual attaches to a commodity, activity, or state of the world.<sup>1</sup>

Put simply, if commodity A is valued by an individual more highly than commodity B, having A increases the individual's “happiness” more than having B would increase his or her happiness. (Often we use the word *utility* as a substitute for happiness.)

Values, from the individual's perspective, are **relative**.

As in, “I value my friendship with Marc more than I value my friendship with Don.” Or “I would give up three apples to remain friends with Marc but only two apples to remain friends with Don.”<sup>2</sup>

For economists, the values an individual associates with different commodities are expressions of that individual's preferences.<sup>3</sup>

For economists, the value society places on a commodity is the sum of the values (positive and negative) placed on it by the individuals in that society.

---

<sup>1</sup> Note the word “attach.” For economists, a red ball only has value because one or more individuals have attached value to it. Otherwise it would be without value.

<sup>2</sup> Assuming I like apples.

<sup>3</sup> A person is an individual, my dog Sofie is an individual, a worm is an individual, and my house plant, Wilbur, is an individual, a distinct member of his species. An economist would probably say that an individual who has no preferences cannot value things: for such an individual, there are no values, nothing to count. Some people say that the ability to experience pain is necessary for having preferences. Others would say it is both necessary and sufficient. I am not sure that the ability to experience pain is necessary but I would say one has to be able to “feel” something; that one has to be able to experience external stimuli at some level.

(For economists, if the individual members of society do not value a commodity, the commodity has no social value. To say this another way, values that are not individual based, are not counted by economists.<sup>4</sup>)

An important question then is which individuals count? Whose values count? Economists typically limit counting to individual humans, but not typically all human individuals. That said, there is nothing in economics that requires this. Note that many environmentalists, and some economists, believe that the preferences/values of non-human individuals (or at least some of them) should count towards social value. (Who should and should not count is an equity question.)<sup>5</sup>

**Value is of critical importance to economists because economists think the best thing to do is the thing that has the most value.**

**Note that many people define value differently from how economists define value.**

For example, many environmentalists would argue that the earth has value independent of how individual humans value it, and that value should count when decisions are made about how to use the earth and its resources.

(An economist would either say that there are no such values, or if there are they should not be considered.)

Religious people would tell us that the values that count are God's values, that what should be done, or not done, should be determined by the preferences of God, not the preferences of men.<sup>6</sup>

Many philosophers, but not economists, talk about whether things can have *intrinsic value*: value not assessed by some *valuer*—built in value.<sup>7</sup>

---

<sup>4</sup> Soon I will briefly discuss other notions of value.

<sup>5</sup> Note the distinction between (A) Edward the individual is a member of society whose values count directly in the social adding-up. Edward has a dog, Sofie, whose happiness he cares about greatly. But, Sofie is not a member of society, so her values **do not count directly** in the social adding-up. And (B), Both Edward and Sofie are members of society, so both their preferences count directly in the social adding-up. Sofie's welfare gets weight in both worlds, but in A) her preferences do not directly count; they count only because a member of society cares about her.

<sup>6</sup> This is not to say that economists believe that people should not believe in God. Rather they would describe belief in God as something that affects one's preferences. For example, a believer might not want to sin because sinning increase the probability that he will suffer in hell. That is, sinning, for believers, decreases long-run happiness. If God sends sinners to hell and non-believers don't believe this, then non-believers misjudge the consequences of their sins.

<sup>7</sup> Its value "for its own sake," or "in its own right." As in, a tree has value for its own sake, or for the sake of the cosmos, not simply because individuals, who count, use it for shade or value it because it can become part of a house. Tanya, a student, asked me "Can intrinsic values be factored into economic analysis?" Good question. The more general question is whether intrinsic value can be incorporated into A start on non-market valuation: Edward Morey March 7, 2012

Economists typically value things in money.

- Could choose some other unit of value (ducks? in “Ducks we Trust”)
- Important thing is to value everything in the same units, so one can compare

The concept of value that economists typically use is called *consumer’s surplus*. I will define it in a moment.

Before I do, I need to make a distinction between market and nonmarket commodities.

- Market commodities are commodities that are bought and sold in the market place. Each individual takes the price of the commodity as given and chooses the quantity to purchase.

Price is exogenous, quantity is endogenous.

All the stuff available for purchase in the market place

Most market commodities are congestible – what does that mean?

Write down the names of five things that are market commodities, and explain why they are market commodities.

---

decision making--letting things have intrinsic value would, it seems, set economics on its head. How might it work? There would be two kinds of values: economic values, based on the preferences of individuals, and intrinsic values. The decision maker would want to add them together. This would require that they are all in the same units, probably dollars. I am comfortable with measuring people values in dollars because people have use for dollars, but less comfortable saying that a tree has an intrinsic value of \$10? What would the tree do with \$10? Nothing, but does that matter? Who would assign the intrinsic value? I guess an economist would say that to justify, on efficiency grounds, cutting down a tree, the net benefits, to humans, of cutting down the tree must be greater than its intrinsic value standing.

A start on non-market valuation: Edward Morey March 7, 2012

- Nonmarket commodities are commodities that are provided in some fixed quantity at a zero marginal cost to the individual(s) consuming it.

Examples include public goods, historical monuments, snow in the mountains, the weather, air quality, how fat or skinny is George, that Barak is President, etc.

What is a public good?

Nonmarket commodities might, or might not be, congestible. For example, national defense is a nonmarket commodity and a public good, so not congestible. But a common-property fishery is also a non-market commodity, and it is congestible.

What does congestible mean?

Write down the names of five things that are non-market commodities.

True false question: is Rocky Mt. National Park a market commodity or a non-market commodity?

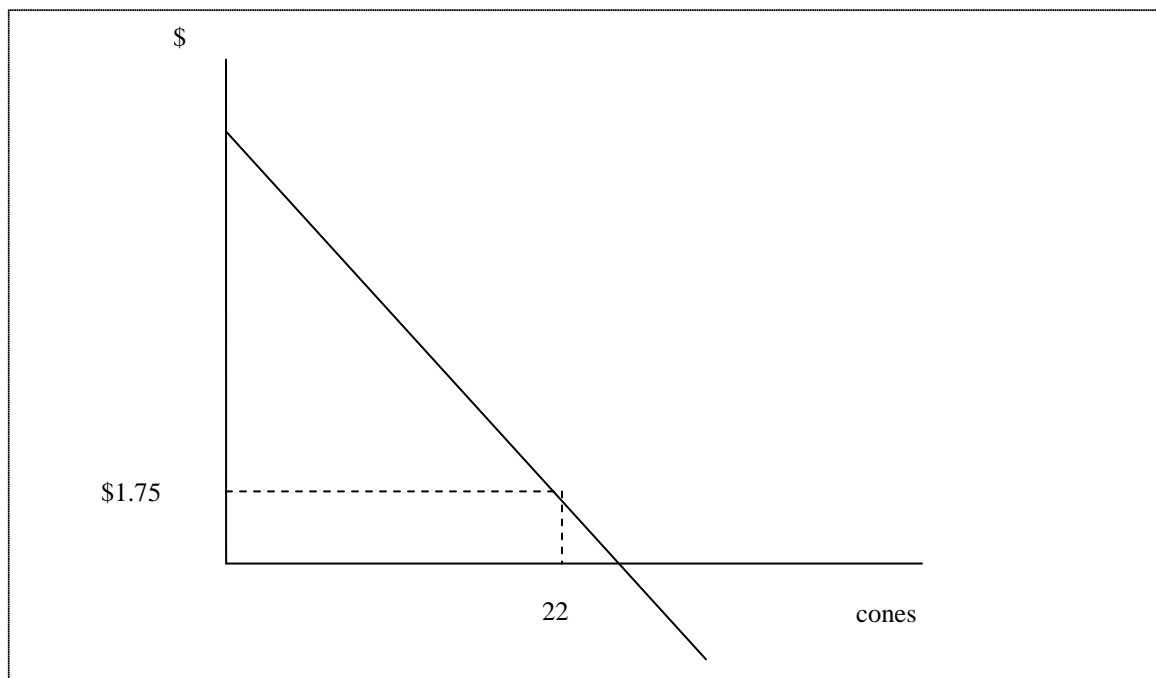
Some aspects are market commodities, some are non-market commodities.

**Let's start with market commodities and ask how one can identify an individual's value for a market commodity.**

Need to distinguish between

- Price
- Marginal value
- Total value
- Net value

Assume Ralph's inverse-demand curve (note I put \$ on the vertical axis) for ice cream cones is the simple linear function below. Assume the market price is \$1.75 a cone. From the graph we see that at this price he chooses to consume 22 cones a year.



Ralph's inverse demand function for ice-cream cones per year ("inverse" because money is on the vertical axis).

- Ralph's inverse demand curve is his marginal value curve for additional cones. That is, it traces out his WTP (willingness-to-pay) for each additional cone. **Estimating demand curves (inverse demand curves) is an exercise in valuation and preference estimation.**
- Note that at around 25 cones, Ralph's WTP for an additional cone is negative: the additional cone make him worse off, so he would have to be paid to consume it.<sup>8</sup>

---

<sup>8</sup> Note that if "WTP" is negative, it is willingness-to-accept, WTA, as in, what I Ralph would have to be paid to eat a cone that is going to make him worse off.

- If the price of cones is exogenous to Ralph, he will consume cones up to the point where price equals the value of the last cone to Ralph (his marginal value)

This will be true for not just Ralph; it is true for everyone.

If price is less than his current marginal value, Ralph, or anyone for that matter, will buy more

If price is greater than marginal value, Ralph bought too many (made a mistake)

How much does Ralph value the 22<sup>nd</sup> cone?

How much does Ralph value 22 cones a year? That is, what is the maximum he would pay for the 22 cones?

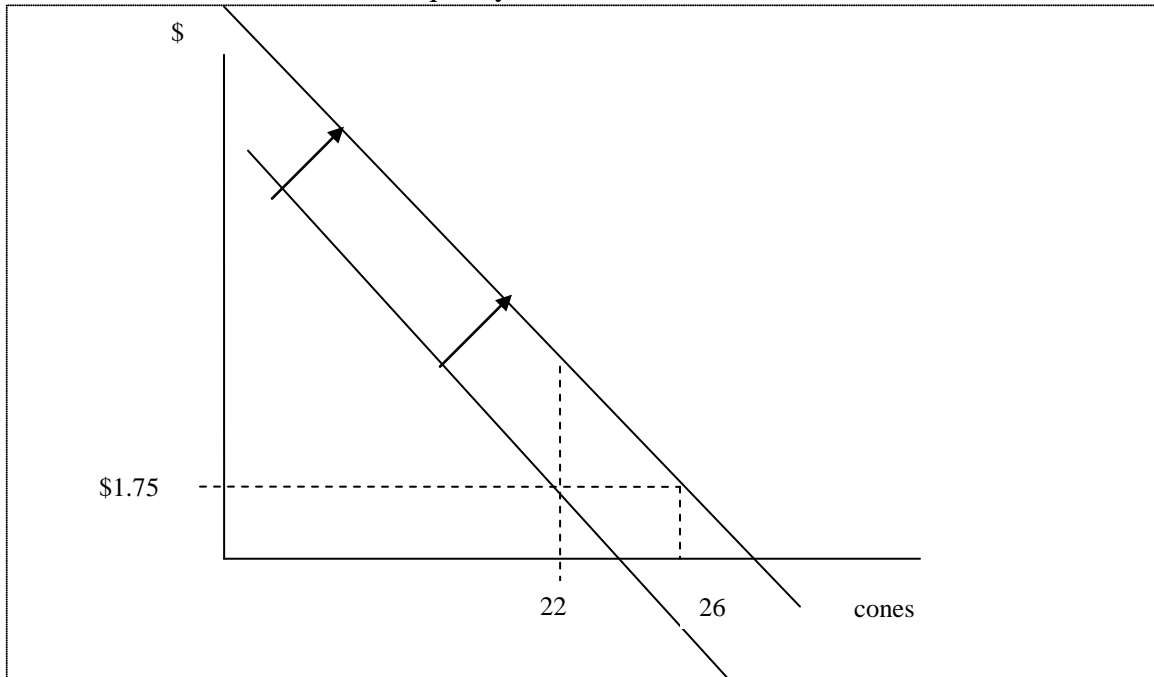
- Area under the inverse demand curve up to 22.

How much would he pay above and beyond what he currently pays? That is, what is the net benefit he receives from having ice cream cones available for sale at \$1.75 each?

- What do we call this amount? Consumer's surplus. It is the area below his inverse demand curve for cones and above the current price.
- This is his willingness-to-pay (wtp) above and beyond what he currently pays

Can you figure out the dollar amount of the area?

Now consider an increase in the quality of ice-cream cones



What happens to consumer's surplus from cones if the price remains at \$1.75?

How about if the temperature rises into the high 90's, the price remaining at \$1.75?

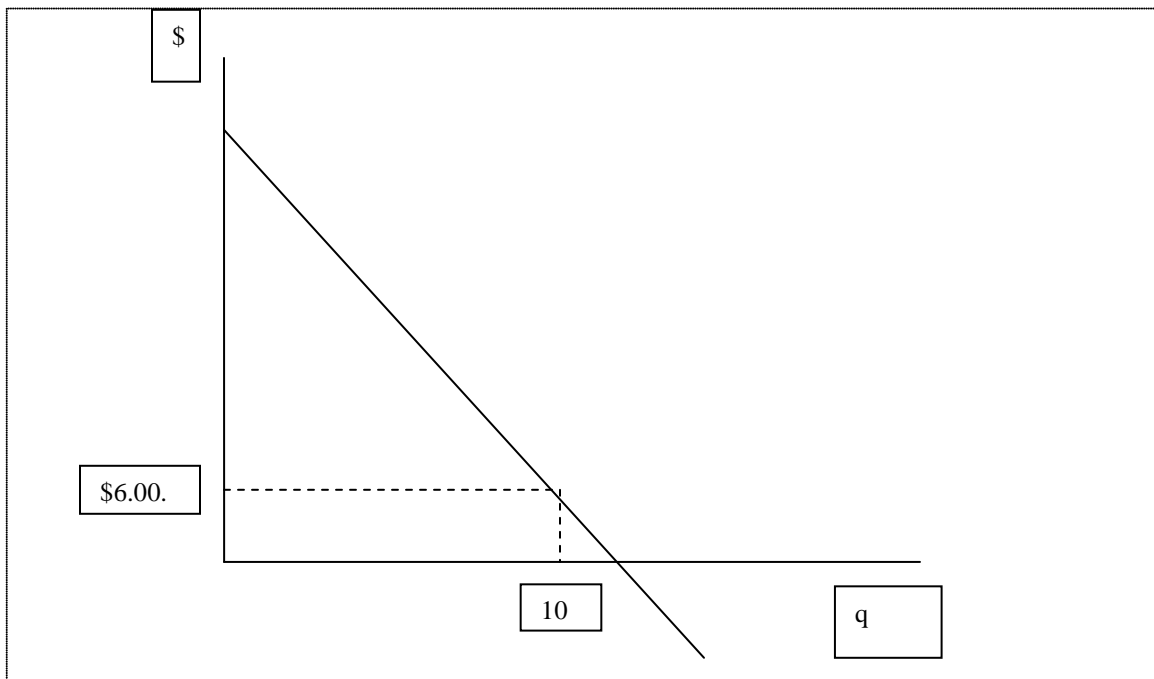
What would likely happen to Ralph's consumer's surplus from cones if the price of a cone remains at \$1.75, but he loses his job, so has less money.

**Now consider the value to an individual for a nonmarket commodity.**

Draw Ralph's inverse demand curve for nonmarket commodity  $q$ .

$q$ , for example, might be acres of Boulder official open space (measured in 100's of acres)

Assume 10 units (there are 1000 acres of open space) are being produced/supplied



Ralph's inverse demand function for some non-market commodity,  $q$

What is his WTP to have 1000 acres of open space available at a zero price in the amount of 10 units? It is the area under his inverse demand curve to the left of 10.

- In this case, how would you define marginal value? His WTP for another 100 acres (units increased from 10 to 11). It is \$6.
- Note that in this case total value equals net value
- Note that \$6 is **not** a price he pays

What an individual is willing to pay for something beyond what he currently pays is his or her *consumer's surplus*

Would Ralph prefer Boulder with no open space or 1000 acres of open space at a cost to him of \$6 per 100 acres (total cost \$60)? He prefers the open space at a cost of \$60. Why?

If it cost him \$9 to have open space increased from 1000 to 1100 acres, would he want this increase take place? No

What happens to Ralph's consumer's surplus from open space if its quality is degraded by pollution? If all of it is opened to mountain bikers, and Ralph hates mountain bikers?

**Is consumer's surplus WTP or WTA? And, what is the difference between the two.**

WTP is willingness-to-pay

WTA is willingness-to-accept

Define in words your WTP to be cured of a deadly cancer. Define in words your WTA a deadly cancer.

Are they the same?

Do we have any pets in the room?

Meet Sofie, my dog.



I am going to cut her head off. I have the legal right, and I am weird, but you, and you alone can stop me by bribing/paying me to stop.

How much are you willing to pay me to save Sofie from decapitation? If I accept your offer, I won't, ever, kill her. She will live out her life in dog bliss. Otherwise, she is a goner.

Alternatively, if you had the legal rights to Sofie (you own her), how much would I have to pay you (WTA) for you to agree to my decapitating Sofie?

Much research suggests that what you would pay to buy something (your WTP to acquire it) is less than what you would have to be paid to accept its loss (WTA)

How people value things seems to depend, critically, on whether they "own" it. This finding is somewhat problematic for economists.

A start on non-market valuation: Edward Morey March 7, 2012

There are lots of experiments along the following lines. The experimenter finds out how much you would pay for a candy bar (or whatever). They then try to buy the candy bar back from you. And find that what you would have to pay to give it up is more than what you were willing to pay to acquire it.

In my Sofie example, in the one case (WTP case) I own the “right” to where her head stays, so to stop me you need to pay me. In the other case (WTA case) I can only chop with your permission so you own the right to where her head stays.

WTP typically does not equal WTA

Note that WTP is bounded by you income (ability to pay) but WTA is unbounded

Under U.S. superfund law the polluter is responsible for the damages to the American people caused by the pollution where damage is defined as WTP for elimination of the damages.

Which is a better measure of damages from pollution injuries?<sup>9</sup> WTP or WTA? WTA. Why?

WTP is how much you would have paid to stop the injury from happening

WTA is how much you would have to be compensated to be *made whole*, after the loss.

We use WTP, not because it is more ethically defensible, but because it is easier to estimate.

---

<sup>9</sup> Here the word “injury” refers to the physical effects, the physical effects of the pollution (fish die, respiratory disease increases etc.). And the word “damages” refers to the negative effects of the physical injuries on people. These are legal terms.

**So, a number of years ago I faced the following problem in a legal case. An Indian tribe had been injured, years ago; specifically it had been forced to leave the river basin where it had lived for hundreds of years and move to a reservation, with no river. The cause was pollution.**

Put simply, the injury was the loss of their river-based culture

The Government and the Tribe were considering suing the current landowner for the damages the tribe suffered because they lost their culture.<sup>10</sup>

The economic question was how much the tribe was damaged in \$ because of this injury? WTP would be how much the poor tribe, back then (100 years ago), would have paid in \$ to stop the loss of their river-based culture.

(Note that back then most of their exchanges and trades were not in \$.)

Their WTA would have been how much white-man money they would have had to have been given to voluntarily move—to voluntarily give up their culture. Again, keep in mind that most of what they consumed and valued was not bought with white-man money.

WTA would be hugemongus. WTP, in comparison, a trifle, they had few dollars to pay.

Legally WTP is the correct measure of damages, but WTA is what would make them whole.

Note to Edward. See also the example about African tribe in book about place.

---

<sup>10</sup> Under the law, the current landowner is legally responsible for the damages caused by injuries caused by previous owners. Don't buy a toxic waste dump unless you get it "real cheap."  
A start on non-market valuation: Edward Morey March 7, 2012