

Recycling

July 27, 2010

Eric Rasmusen, Department of Business Economics and Public Policy, Kelley School of Business, Indiana University. BU 438, 1309 E. 10th Street, Bloomington, Indiana, 47405-1701. (812) 855-9219. Fax: 812-855-3354. erasmuse@indiana.edu, <http://rasmusen.org>.

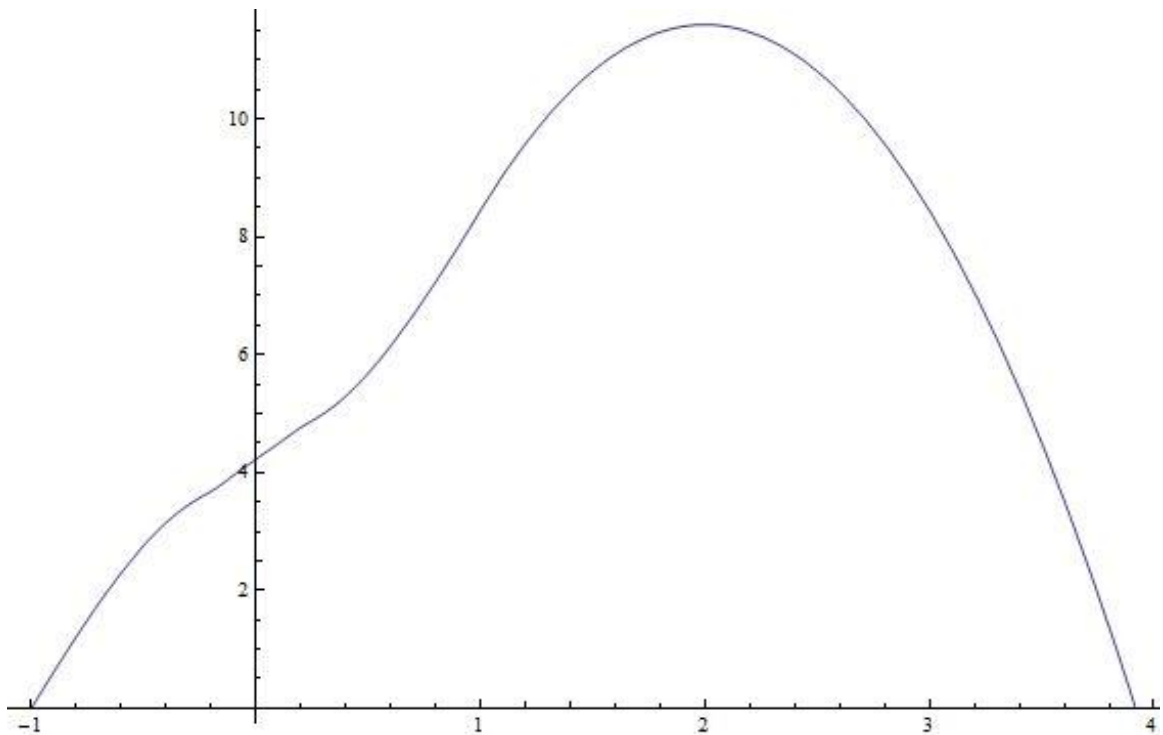


Figure 1: **Temp diagram holder**

Do fisheries here.

What do we mean by "to help the environment" ?

Environment (biophysical) the physical and biological factors along with their chemical interactions that affect an organism Natural environment, all living and non-living things that occur naturally on Earth [http://simple.wikipedia.org/wiki/Environment_\(disambiguation\)](http://simple.wikipedia.org/wiki/Environment_(disambiguation)) Environment (disambiguation) (November 19,. 2009) 3 I tried to estimate the value of New Yorkers' garbage sorting by financing an experiment by a neutral observer (a Columbia University student with no strong feelings about recycling). He kept a record of the work he did during one week complying with New York's recycling laws.

It took him eight minutes during the week to sort, rinse and deliver four pounds of cans and bottles to the basement of his building.

If the city paid for that work a typical janitorial wage (\$12 per hour), it

would pay \$792 in home labor costs for each ton of cans and bottles collected. And what about the extra space occupied by that recycling receptacle in the kitchen? It must take up at least a square foot, which in New York costs at least \$4 a week to rent. If the city had to pay for this space, the cost per ton of recyclable would be about \$2,000.

That figure plus the home labor costs, added to what the city already spends on its collection program, totals more than \$3,000 for a ton of scrap metal, glass and plastic. For that price, you could find a one-ton collection of those materials at a used-car lot—a Toyota Tercel for instance—and drive home in it.

Macdonald's uses disposable spoons instead of washing them.

We can deduce that plastic is cheaper, compared to the labor cost of collecting and washing them.

Let's suppose (my guesses) it costs 3 cents per spoon to use plastic: 1 cent for labor, 1 cent for the spoon, 1 cent for disposal. And it costs 5 cents per spoon to use metal: 4 cents for labor, 1 cent for warm water-electricity, and pretty much 0 for the metal, since it is used over and over. Why use metal?

Tierney: The only resource that has been getting consistently more expensive is human time: the cost of labor has been rising for centuries. An hour of labor today buys a larger quantity of energy or raw materials than ever before. ⁸ To economists, it's wasteful to expend human labor to save raw materials that are cheap today and will probably be cheaper tomorrow.

Should You Leave Your Laptop On Overnight?

An estimated \$2.8 billion wasted on excess energy costs each year in the U S alone

U.S. alone.... If you run a company with 1,000 PCs left on overnight, you can save about \$28,000 a year if they are turned off after hours. Why are companies so stupid as to not mandate that their employees turn off computers, if companies could save so much money?

The Cost of Turning Computers Off and On

. 1000 PCs * 5 minutes of employee time * 200 days per year * \$60/hour or \$1/minute = \$1 million/year labor saving from leaving the computer on all night. That compares to the \$28 000 electricity cost 11 28,000 cost. You can adjust my numbers if you think they're wrong. If you walk 1.5 miles and replace those calories by drinking about a cup of milk: The greenhouse emissions from that milk = methane from the dairy farm, carbon dioxide from the delivery truck = the emissions from a car making the trip. Two of you making the trip? — then the car emits less.

What should we do about nonrenewable resources? There is a finite amount of petroleum in the world, for example. Should we burn it up in our cars as if it is infinite? Since economics is all about how to optimally consume scarce resources, it is natural to turn to economics to address this question, and so we shall.

Using up a Finite, Nonrenewable Resource: The Telzebel Tree

Suppose I have just had a delivery of 10 square yards of mulch for my backyard. This is unusual mulch, made up of bark from a grove of telzebel trees near town, and in the future they'll be delivering cedar mulch instead.¹ The price will be the same: \$3 per square yard. Telzebel mulch is special, though: you only need to spread half as much to get the same effect of keeping weeds from poking up into your flowerbeds. Cedar mulch will be fine for later. For now, though, I have a big pile of telzebel mulch in an unused corner of my yard (which I don't have any other use for) from which I can take wheelbarrows of mulch as needed to the flowerbeds. The enjoyment of casual gardening just balances the cost in time for me spreading the mulch, so we can safely count my labor costs as zero on net.

For me, the telzebel mulch is a cheap, nonrenewable resource. It is cheap, because I have already paid for it, and I can't resell it or return it, so its out-of-pocket cost is \$0 per square yard. It is nonrenewable because no more of it exists in the world— from now on, I'll have to use cedar mulch.

¹Don't think telzebel trees really exist— I made up the name for the example.

I have to decide how often to spread mulch. The more thickly I spread the mulch, the better it will prevent weeds. Last year, when I just used cedar mulch, I decided that at the price of \$3 per square yard to spread 4 square yards each month, because I wouldn't get enough marginal benefit from a thicker layer of mulch. But what should I do this year? First of all, I've already paid for it, so it's free. So maybe I should spread more. But second, it's nonrenewable, so maybe I should spread less. And third, telzebel mulch is twice as effective as cedar. So there's another reason to spread less.

The first idea was that the telzebel mulch is free, so we ought to use more. In fact, if it's completely costless, why not use it all the first month? There's no reason to hold back when a good is free. But of course it's not really costless. It has an opportunity cost: if the telzebel mulch is used in the first month, it can't be used in the second month. Instead, I will have to pay \$12 to buy 4 square yard of cedar mulch next month. In fact, the opportunity cost of the telzebel mulch is \$6 per square yard, because each square yard would need to be replaced by 2 square yards of cedar mulch.

Since the telzebel mulch will run out, how about the second idea of making it last as long as possible? If I use just 1/2 square yard each month, for example, I can make it last for twenty months— and since I won't have to use it in the winter, that means I can stretch over several years.

Hoarding the telzebel is foolish, though. Remember, its purpose is to keep down weeds. If I use only 1/2 square yards each month, I'll have lots more weeds than I decided was optimal last summer. I will still have a pile of telzebel to look at for a long time, but for weed suppression, cedar mulch is just as good.

In fact, the optimal plan is to treat the telzebel as if it had a price of \$6 per square yard, its opportunity cost, and use 2 square yards each month, to get the same weed suppression as I did with 4 square yards of cedar mulch last year. After 5 months, the telzebel will run out, and then I can switch smoothly to cedar mulch.

The point of the story is that just because a resource is nonrenewable

does not mean we should be careful not to use it up. Rather, we should treat it just like any other good. We should not use it up all at once, because we would not get as much benefit from it as if we used it up more gradually. But we should aim to use it up eventually, because it is useless if never used.

Another useful example to think about is a common problem in personal life: the special bottle of wine that is never drunk. You receive a bottle of 10-year old Mouton Rothschild claret for your 21st birthday. It's ready for drinking, but you wait for a special occasion. College graduation isn't special enough. The wedding isn't right— too many people at the wedding, and you feel bad about just the two of you drinking it on the honeymoon. First baby? Too tired. First grandchild? Well, let's wait for a really special occasion. Retirement? Not very special. And so you die without drinking the wine. That's why the Wall Street Journal wine columnist invented "Drink that Special Bottle of Wine Night". Too much thrift ends up being waste.

Oil is like telzebel and wine.

The Market for a Nonrenewable Resource

In the example of the telzebel tree, we took the price of mulch as given. But how does the market arrive at a price for a nonrenewable resource? It will all be gone if we do not reduce our rate of consumption, so does that mean the price will rise to infinity? On the other hand, we have lots of resources like wood that are renewable, and so can be supplied in infinite quantity, so why doesn't that drive their price to zero?

First, note that for renewable resources are just like manufactured goods. If we use enough labor, capital, and time, we can produce any amount of cars we want. If we use enough labor, capital, and time, we can produce any amount of wood we want. Cars and wood aren't free, though, because the labor, capital, and time are costly. The price is determined by the cost, on the supply side, and how much people are willing to pay, on the demand side.

Nonrenewable resources also have some cost to produce. Let's put that aside for now, though, and

Hurting the Environment

How about hurting the environment? Suppose we create a landfill, and put in 7,000 tons of garbage—dirty diapers, old paint, severed limbs from amputations, old Elton John CD's, or whatever disgusts you most. We've lined the bottom of the landfill carefully, and we cover it over with dirt and grass, so no leak is possible and no human can detect the horrible pile underneath. Have we hurt the environment?

Well, what does that mean? The environment is not a person, or a god. It is a part of the planet earth. The landfill is a trivial part of the earth. In fact, the entire top 5 miles of the earth's crust is a trivial part of the earth, and an even tinier part of the universe. So really we should reduce the question to which people are hurt. But if there is no leak and nobody can detect the presence of the garbage, who is hurt? People can still be hurt by the idea. But perhaps the easiest way to deal with that is to get them to think differently. If it isn't— if they truly are bothered by the landfill, and willing to pay to do something else with it— then social surplus is maximized by using their

Self Sufficiency

I like to be self sufficient myself. But I don't care about whether you're self sufficient.

I like art by my children better than art by the neighbor's children, even if the quality is the same. I like my own vegetables better too. I like my own home-brewed beer.

Rare Mosses, Sequoia Trees, and Meteorites

Toilet Tank Regulation

Auto Mileage and Speed Limits

Auto Mileage and Speed Limits

”At least some choices are beyond reproach environmentally. It is clearly better for the environment to walk to the corner store rather than to drive there. Right?”

Now even this seemingly obvious conclusion is being called into question by Chris Goodall via John Tierneys blog. And Chris Goodall is no right-wing nut; he is an environmentalist and author of the book *How to Live a Low-Carbon Life*.”

Tierney writes:

If you walk 1.5 miles, Mr. Goodall calculates, and replace those calories by drinking about a cup of milk, the greenhouse emissions connected with that milk (like methane from the dairy farm and carbon dioxide from the delivery truck) are just about equal to the emissions from a typical car making the same trip. And if there were two of you making the trip, then the car would definitely be the more planet-friendly way to go.

Turning off Your Computer at Night

I saw an article that illustrates why it’s good for me to teach students about economic cost as opposed to raw accounting cost: I leave my laptop running overnight because I know it’ll take five minutes or more to get things going in the morning – not just booting up, but launching the various apps I start the day with, downloading my overnight email, filtering out the spam, and otherwise ”getting settled.”

But all the power wasted while computers are sitting idle overnight adds up, and one study has finally tried to measure it. The tally: An estimated \$2.8 billion wasted on excess energy costs each year in the U.S. alone....

The full report is available for download here (scroll down to ”PC Energy Report US 2009”)....

If you run a company with 1,000 PCs left on overnight, you can save about \$28,000 a year if they are turned off after hours. That’s not chump change. One advantage of the economic way of thinking is that it makes one think of a question here. Why are companies so stupid as to not mandate that their employees turn off computers, if companies could save so much

money? The economist naturally wonders if there is something that high-paid corporate executives know that the journalist is missing. Let's do the full calculation. $1000 \text{ PCs} * 5 \text{ minutes of employee time} * 200 \text{ days per year} * \$60/\text{hour}$ or $\$1/\text{minute} = \1 million/year saving from leaving the computer on all night. That compares with \$28,000 in energy savings costs. You can adjust my numbers if you think they're wrong. Suppose it's only 1 minute of employee time that it takes them to boot up, 100 days per year that they work, and \$6/hour that your company pays them. Then the benefit in labor costs from leaving on the computers is only \$100,000 per year, a mere four times the extra cost in electricity.

Recycling

Recycling has an ancient history. We of course all make use of used goods. Antiques are fancy used goods. Expensive materials are re-used even if they have been used to make something which wears out. Nobody ever threw out a gold necklace just because the clasp broke. The gold is melted down to use again.

What is new is the extensive re-manufacturing of plastic, paper, glass, and aluminum collected and carefully sorted out by consumers.

Questions You Should Be Able to Answer

Terms to Know

Homework Questions

HERE PUT EXAMPLES WITH DIFFERENT NUMBERS THAN IN THE TEXT