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# Discounting and Climate Change Economics: Estimating the Cost of Cap and Trade

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The Environmental Protection Agency (EPA) recently released its preliminary analysis of the Boxer–Kerry cap-and-trade bill. It largely reheats their analysis of the Waxman–Markey bill from last summer.

Proponents of both bills often claim the EPA analyses pegs the cost per household at a postage stamp per day. However, the reality is that the costs of both bills are far from trivial.

**The Real Cost of a Car.** The EPA lists the cost of the Waxman–Markey energy tax for the year 2050 at just $174 per household. Summed over all households, this figure still adds up to tens of billions of dollars per year, but it is relatively small in a world of trillion-dollar proposals. The problem is that that amount is not what the actual cost would be.

If inflation over the next 40 years equals that of the past 40, the EPA analysis would project that Waxman–Markey would cut consumption by $7,465 per household per year in 2050. The impact for Boxer–Kerry would be similar.

How, then, does the EPA transform $7,465 into $174? It adjusts for inflation and then takes the discounted present value. It is this second step that can be misleading.

To help sort this out, imagine that a time machine takes analysts back to 1969—a time when the average price of a new car was about $3,500. Once back in 1969, the exercise is to explain to Congress how much a new car will cost 40 years later in 2009.

Having already lived to see 2009, we know the average price for a new car is about $23,000. But telling the Congress of 1969 that in 40 years cars will cost $23,000 would give an exaggerated notion of the cost increase, because inflation alone will have increased prices by a factor of 5.8. If inflation is taken into account, the price of a new car in 2009 is about $4,000 in 1969 dollars.

From 1969 to 2009, car prices increased, but so did bread prices, housing prices, clothes prices, wages, income, and nearly everything else. Since money is the measuring stick for cost, this measuring stick changes with inflation.

When people buy cars, the real cost is defined as what they have to give up in order to afford the car: clothes, food, dinners out, etc. Economists adjust prices for different years to eliminate the impact of inflation so that a price increase means a good's price has risen relative to that of other goods.

**A Steep Discount.** In any event, it is not adjusting for inflation that turns the EPA's $7,465 cost for 2050 into $174. Adjusting for inflation brings the annual cost down quite a bit, but the hit is still $1,287 per household, well above a postage stamp per day.

What, then, does the EPA do to turn $1,287 into $174? They take the discounted present value using a real discount (interest) rate of 5 percent.

This paper, in its entirety, can be found at:
*www.heritage.org/Research/EnergyandEnvironment/wm2705.cfm*

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Discounting is a legitimate tool in finance and for cost–benefit calculations. But discounting can give a much distorted view of costs, as is done by those misrepresenting the EPA analysis.

The car example may help illustrate this problem. Taking the inflation-adjusted (1969 dollars) $4,000 price of the average new car in 2009 and discounting it in the EPA fashion would generate a present value in 1969 of $562.[1] This is clearly much less than the cost of an average car in 2009, even after adjusting for inflation.

What then is this $562? It is the amount when invested for 40 years, at an interest rate guaranteed to be 5 percent above inflation, that would buy the $23,000 car. In other words, if a person in 1969 invested $562 at 9.72 percent interest (5 percent above inflation), letting all of the interest compound and paying no taxes, it would now amount to $23,000, enough to buy a new car.

With similar logic, if every household in 2010 invests $174 at 5 percent above inflation (guaranteed and with no taxes), then in 2050 (assuming inflation in the next four decades is the same as the last four), it would amount to $7,465, or enough to pay for one year's worth of the consumption that Waxman–Markey would have destroyed. Of course, most of the households of 2050 do not exist in 2009.

In any event, the discounted value is not the amount households will have to pay each year, even with discounting. In the most generous case, the present value is the amount that would have to be paid for one year, right now, if the present value for each of the 40 years were paid in one lump sum right now—that is, if the cost for all 40 years were paid at once. So no matter how it is sliced, there is no sense in which a postage stamp per day reflects the annual cost of the cap-and-trade legislation.

Just as the inflation-adjusted, undiscounted $4,000 average price of a 2009 car would best explain the future cost to people in 1969, the inflation-adjusted, undiscounted $1,287 would be the best measure of the EPA's projected per household consumption loss due to Waxman–Markey for the single year of 2050. But per-household consumption loss may not be the best measure of cost.

**Adding to the Cost.** When income drops, people prevent consumption from dropping by dipping into savings. In turn, lower savings reduces the ability of families to cope with other shocks and reduces their future income. Further, consumption comes from after-tax dollars, so losses in tax revenue do not show up in data on household consumption. The real economic cost is the loss of income.

Change in national income, as measured by gross domestic product (GDP), is a better measure of the overall economic impact of a policy. Since consumption expenditures are about 31 percent less than GDP, the lost income corresponding to the EPA's lost consumption calculation would actually be $1,867.

Lastly, a household is not necessarily a family. Three college students sharing an apartment are a household according to government statistics, but in reality they are part of three separate families. The EPA uses the average household size of 2.6 for its cost impact. Adjusting household size to a family-of-four standard adds another 53 percent, bringing the cost of cap and trade to $2,872 per family per year.

**Very Expensive Postage.** The EPA, with some very generous assumptions (doubling nuclear power output in 25 years, for example), projects that the Waxman–Markey energy tax will have an impact of $174 per household in 2050 in present discounted value. However, even using the EPA results shows that the inflation-adjusted impact per family of four would be much higher at $2,872 per year in 2050. Those are some very expensive postage stamps.

Again, though discounting is a useful tool for some financial calculations and when properly employed in cost-benefit analysis, it is not appropriate for giving an accurate picture of future prices. Saying cap and trade will cost a postage stamp per day is equivalent to saying the average new car today costs $562. It is clearly wrong.

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1. Adjusting $23,000 to 1969 prices using the CPI calculator at the Federal Reserve Bank of Minneapolis's Web site (*http://www.minneapolisfed.org/index.cfm*) yields $3,959.19. Discounting that figure at 5 percent for 40 years gives $562.36.



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