University of Tennessee, Knoxville
Trace: Tennessee Research and Creative Exchange

University of Tennessee Honors Thesis Projects | University of Tennessee Honors Program

12-2011

Rethinking a Carbon Tax in an Era of Budget Deficits

Chad Covert
University of Tennessee, ccovert@utk.edu

Follow this and additional works at: http://trace.tennessee.edu/utk_chanhonoproj

Part of the Agribusiness Commons, and the Business Law, Public Responsibility, and Ethics Commons

Recommended Citation
Covert, Chad, "Rethinking a Carbon Tax in an Era of Budget Deficits" (2011). *University of Tennessee Honors Thesis Projects.*
http://trace.tennessee.edu/utk_chanhonoproj/1494

This Dissertation/Thesis is brought to you for free and open access by the University of Tennessee Honors Program at Trace: Tennessee Research and Creative Exchange. It has been accepted for inclusion in University of Tennessee Honors Thesis Projects by an authorized administrator of Trace: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

THE UNIVERSITY OF TENNESSEE, KNOXVILLE

Rethinking a Carbon Tax in an Era of Budget Deficits

Chancellor's Honors Program Thesis

Chad Covert

11/15/2011

This thesis establishes a framework for using a carbon tax as a method for raising budget deficit reduction revenue. By following the Australian carbon tax model, the United States has the opportunity to reduce carbon emissions while raising revenue for deficit reduction.

United States Energy Usage and Carbon Emissions

The United States of America depends on fossil fuels for its energy. It gets 78% of its energy from petroleum, natural gas, and coal with the electric power sector comprising 35 % percent of all energy demand [1] (Figure 1). This paper will focus on electricity production from this point forward when referring to energy. Coal is the top fuel for electricity production comprising 48% of all electricity production [1]. Fossil fuels such as coal remain the most dominant sources of US energy despite the pollutants associated with their burning. Burning fossil fuels emits SO_x and NO_x which contribute to acid deposition, mercury which bioaccumulates in water ways and can be harmful to humans, and other toxic pollutants that are harmful to humans and the environment.

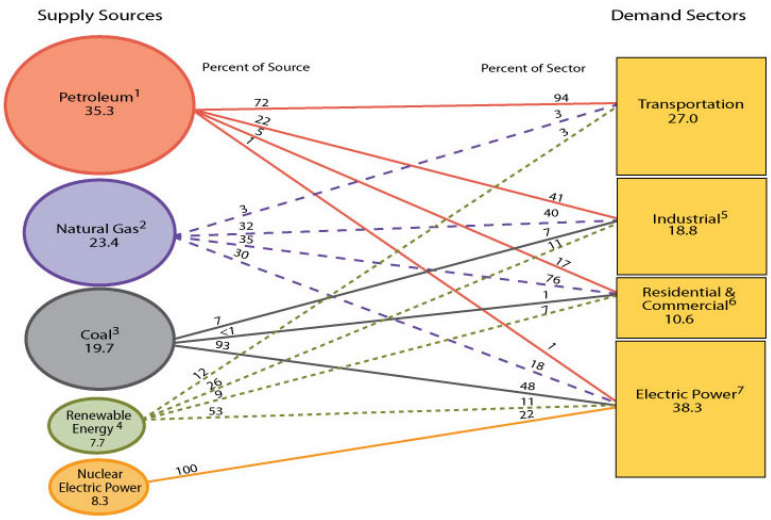


Figure 1.

The compound causing the most buzz around the world right now, however, is CO_2, a gas that is necessary to sustain life on this planet. Plants require it in their respiration process that

ultimately provides humans with the oxygen needed for life, and animals emit it as a byproduct of their respiration. Yet, this compound may also be the greatest threat to environmental quality in the world if global climate change becomes a reality. The theoretical causes of global climate change are greenhouse gases accumulating in the atmosphere. Over time, excessive greenhouse gasses could contribute to worldwide climate change, causing unknown consequences to the world's inhabitants. CO_2 happens to be the most common greenhouse gas, though others include methane and water vapor. This has led the Environmental Protection Agency to list CO_2 as a pollutant, despite its life bringing necessity.

Economics of Energy Usage and Carbon Emissions

So how do fossil fuels remain the top energy source with all these pollutants associated with them? Fossil fuels are cheap, perhaps artificially so. But to make a statement like this assumes that there is an equilibrium price dictated by supply and demand. In addition to being subsidized by the US government, the price paid for fossil fuels does not account for the environmental and health damages associate with their burning; therefore, the price of fossil fuels, and thus the electricity from their burning, is priced too low. This market operates inefficiently because it does not arrive at a socially optimal equilibrium, which would be less than the current level of consumption. Arriving at this is the result of the law of demand because people buy less when the price increases.

Instead of raising the price of energy to reflect these damages, the government has subsidized these fuels. The United Nations recognizes that energy subsidies have "important implications for climate change and sustainable development more generally through their effects on the level and composition of energy produced and used" leading to the conclusion that

“subsidies that result in a lower price to end-users normally increase the consumption of the respective fuels and, thus, inevitably have harmful impacts on the environment – including higher airborne emissions of noxious and greenhouse gases”[2]. (Figure2) This total disregard for the consequences of subsidization indicates that political pressures to provide policies that support cheap fossil energy are strong, even if the UN is willing to admit that these subsidies harm the environment. Eliminating the subsidies would effectively raise the price that consumers pay for electricity. This politically unfavorable decision has been cast aside in favor of popular opinion.

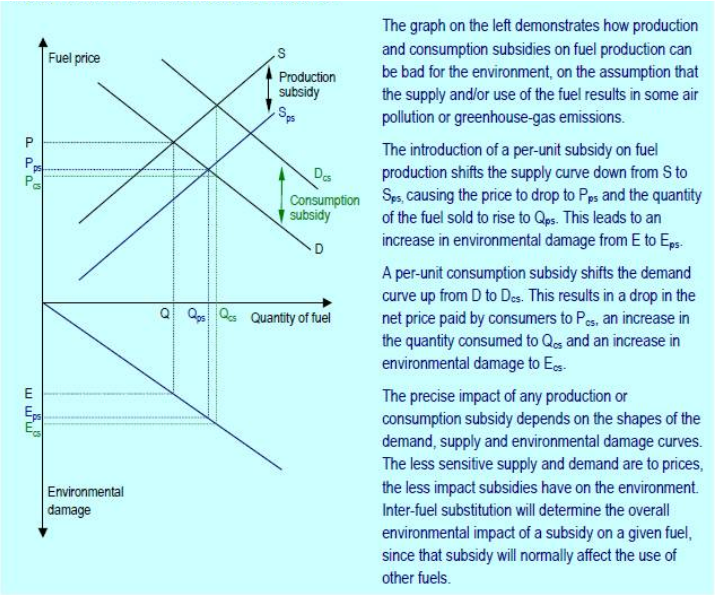


Figure 2

The US Budget Deficit

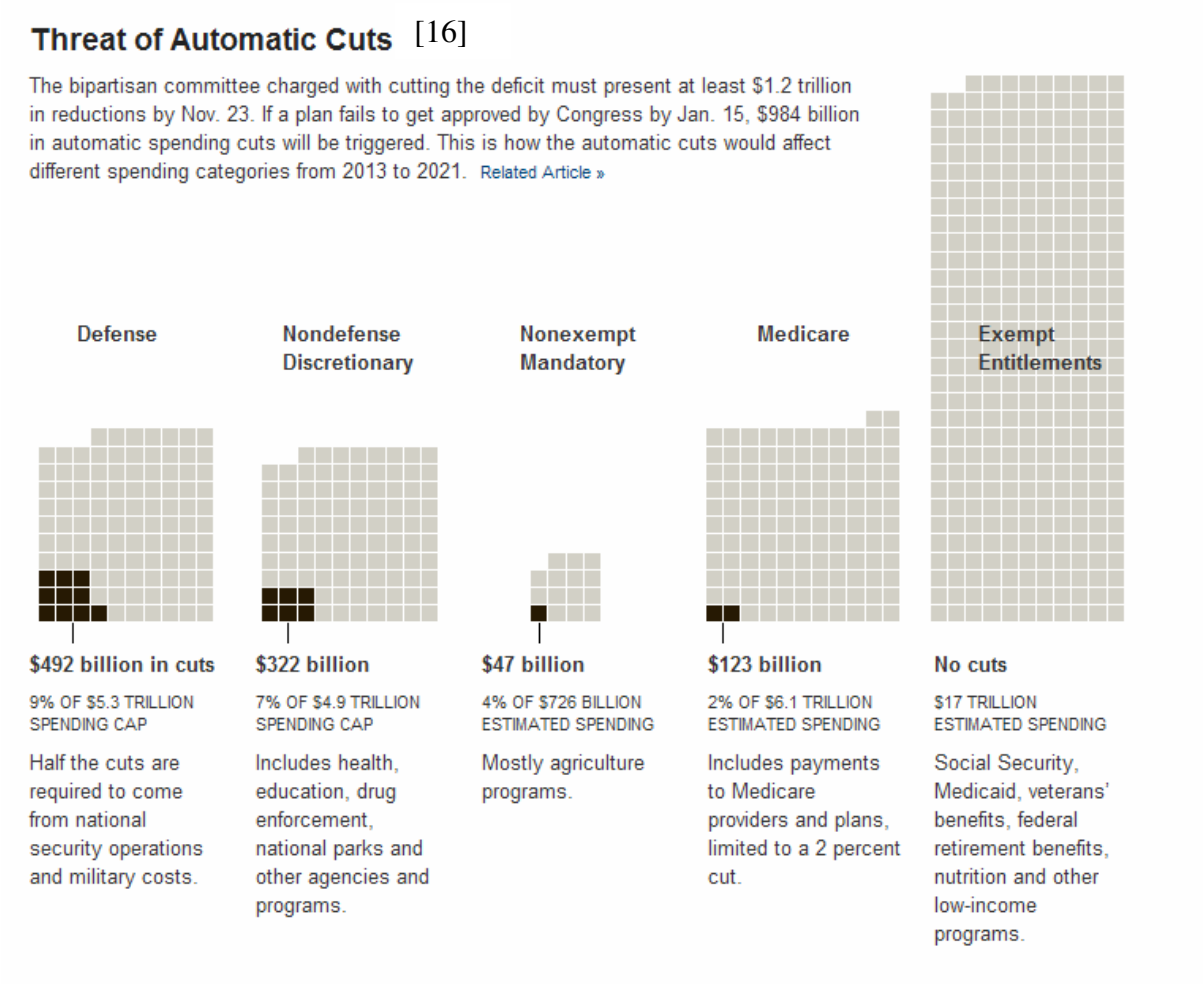
Monetarily, these subsides are just a small fraction of the growing US budget deficit. The US budget deficit in 2010 was $1.294 trillion[3] “leading some economists to believe the United States faces the prospects of large federal fiscal deficits in the immediate future, the next 10 years, and the longer term” [4]. Expanding deficits need to be dealt with soon before they become too large to manage. If they continue to rise, they could pose a serious threat to the

quality of life of future Americans by reducing future national income and living standards [4]. The top three entitlement programs, Social Security, Medicare, and Medicaid, represent the largest portion of federal spending, and thus will continue to contribute the most to deficits [5].

Lawmakers are becoming increasingly aware of the political ramifications of dealing with the deficit. Reducing the budget deficit requires raising revenue through taxation or cutting government spending or some combination of the two. Neither option is desirable as citizens do not like higher taxes nor do they like seeing spending on programs they deem as valuable cut. Therefore, the lawmaker faces a situation that he or she cannot make all constituents happy. Mark Warner (D-VA) says the main target for cuts is discretionary spending not tied to national security, including a lot of popular programs from NASA to children's nutrition, representing 12 percent of the federal budget [6]. Even still, American voters are becoming increasingly conscious of the budget and are beginning to demand action from their lawmakers.

The latest attempt to reduce the budget deficit resulted in failure. A “super-committee” was formed in August of 2010 by Congress to find ways to cut the deficit [14]. Top representatives from both parties came together for the sole purpose of developing a bi-partisan plan to reduce the deficit. All ideas were on the table, including tightening the budgets of popular spending programs and increasing taxes to raise revenue. However, as the committee continued to meet, little progress occurred, and eventually the committee failed to reach an agreement by November 21 and resorted to blaming the members of the opposing party [15]. This will result in the automatic cuts outlined by the budget deal Congress had already passed including $492 billion from Defense, $322 billion from nondefense discretionary spending, $47 from billion nonexempt mandatory spending, and $123 billion from Medicare during the years of 2013-2021 [16]. The following illustration from the New York Times visually represents the mandatory

cuts. Though they are large in monetary value, they still will not provide large reductions that are needed to balance the budget.



Given that cutting popular programs is unfavorable, the government has to explore taxation to raise revenue to slash the deficit. A tax on CO_2 emissions would raise the cost of electricity generated from the burning of fossil fuels and generate tax revenue for the government. Electricity utility firms could choose to pay the tax on their emissions or abate CO_2 emissions with technology or output reduction. Either way, the price of electricity would go up and people would be incentivized to use less electricity. With the price of electricity from fossil

fuels increasing, renewable low-carbon fuels may be able to compete in the electricity market. These fuels struggle to compete on price right now in part because they must compete with artificially low prices in the fossil fuel market due to government subsidies and the inefficient level of electricity consumption. If the new renewable energy sources could compete on price, new energy companies could enter the electricity market. Eventually, these new energy sources will develop new technologies will hopefully make electricity generation from renewable sources cheaper.

The revenue from the carbon tax could be used to shrink the deficit. A carbon tax is "the least distorting way to slow the growth in emissions"[5]. For each unit of CO_2 emitted, the government would charge a fee. They could use this revenue to pay off existing debt, and eventually makes strides toward paying all the debt off. The revenue stream would be stable in the short run as consumers are slow to react to changes in prices in the absence of quality substitutes; that is the demand for fossil fuel based electricity in the short run is very inelastic. In the long run, as the availability of viable substitutes increases, utilities may shift from the carbon intensive fossil fuels toward the substitutes. It is at this point that the revenue stream begins to diminish from the carbon tax but will remain substantial for the foreseeable future. Hopefully the deficit reduction has occurred because the environmental benefits will be realized.

A potential way to temper price increases in energy markets would be to redistribute some of the tax revenue back to citizens. Doing so still allows the fossil fuels to be priced more appropriately without placing too much a burden on citizens. Recycling the revenue in this way helps to protect the real income of most Americans [7]. Doing so also encourages positive behavior in reducing fossil fuel consumption while protecting income. Expenditure taxes tend to be better than income taxes because they do not punish saving and working [8].

If utility companies feel slighted by the new carbon tax, the government could transfer some of the revenues back to these companies. This way, they are not harmed as much financially in the short run by the tax. The transfer essentially gives back the money the utility would lose from consumers using less energy. Consumers would use less energy which would be a loss in revenue to utilities. The transfer from the tax revenue would help ease this loss to utilities. The idea here is to appease the utilities so that they are not hurt too badly by the tax.

These revenue transfers increase the political feasibility of the tax. Consumers and utilities alike are more likely to accept and support a carbon tax if they are receiving some of the money from the tax. The tax still makes the price of energy from fossil fuels more expensive than before and transferring only part of the revenue back to consumers and utilities still leaves revenue that can be used to reduce the deficit. Of course, the wealth transfers need only be used if the tax will not pass otherwise. With no wealth transfers, there is more money for deficit reduction.

A potential new application of the wealth transfer could address the issue of equity, considering that the poor spend a higher percent of their incomes on the energy than their richer counterparts. The American Coalition for Clean Coal Electricity found that lower-income families earning less than $10,000 pay 69 percent of their after-tax income for energy, and that families earning pretax incomes of less than $50,000, spend about 19 percent to pay energy costs [9]. Rising prices would only exacerbate this problem. Furthermore, energy tax policies are inherently detrimental to the poor representing a transfer of wealth from poor individuals to utility companies [10]. This equity issue is another opportunity to redistribute tax revenue to the affected poor families. This could help offset the rising energy cost to these low-income families.

This in effect makes the tax more progressive than regressive, which is often more politically appealing.

Wealth transfers offer retribution to negatively affected parties to assist in political feasibility, but what happens if the carbon tax is improperly set? This means that the policymakers were unable to reflect the cost of the externalities associated with fossil fuel use. There are two possible mistakes. The tax could either be too high or too low. Either way results in a deadweight loss to society. If the tax is set too high, the price of energy will be too high and people will consume too little energy relative to true social cost of doing so. In effect, the price of electricity would be too expensive, which has negative implications to society reflected in the deadweight loss. The deadweight loss is the energy that should be consumed, but is not because the price of electricity is too high. This hurts current businesses and citizens by forcing them to pay too much for their energy.

If the tax is set too low, the price of energy will be too cheap and people will still be consuming too much energy relative to the social cost of doing so. In effect, the price of electricity would be too low relative to the social cost consuming the electricity. The deadweight loss in this situation would represent the excessive energy consumption that remains relative to the true social cost of doing so. In this situation, the environment sustains too much harm relative to the benefit of consuming the fossil fuel energy.

The Australian Approach and US Application

One prominent country has moved forward with a carbon tax agenda. Australia passed legislation that would tax carbon at the equivalent of $23.50 per carbon ton [11]. Each year, the tax is set to increase by 2.5% until 2015 when it switches to a floating rate tax that allows for tradable permits [11]. Carbon reductions associated with this plan are expected to reach 160

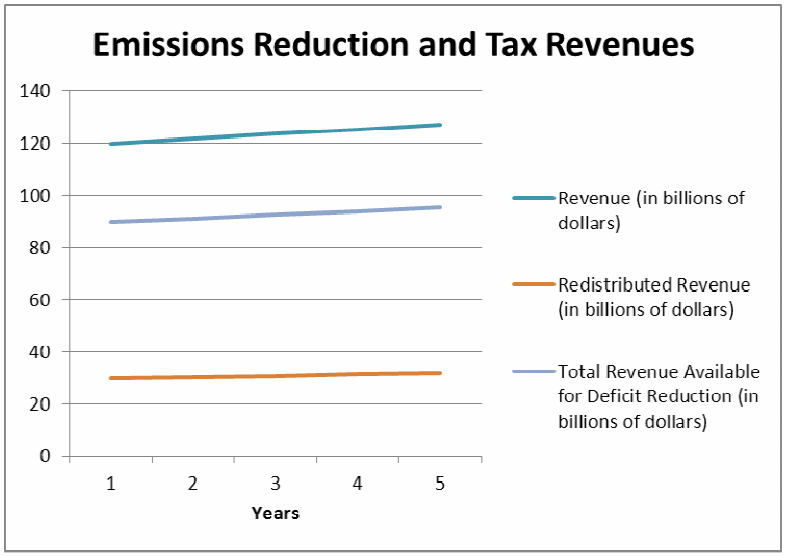
million tons [11]. This would achieve a 5% reduction from year 2000 levels over 10 years [16]. Opposition to the tax cites that imposing a tax on carbon could harm the economy and hurt the average family which would face higher energy prices [12], but the legislation makes provisions for transfer of revenue that is raised by the tax back to families and businesses. Under the tax scheme, "$15 billion in tax cuts and increased benefits mean 4 million households will receive more in compensation that the carbon tax will add to their cost of living" while "a further 2 million households will be no worse off by being fully compensated, while another 2 million will receive something;" meaning "of the nation's 8.8 million households, only 700,000 receive nothing" [17]. Current projections estimate that this would consume 90% of the carbon tax revenue. Thus, the legislation addresses issues of equity but still manages to provide revenue for the government while providing some certainty for the businesses facing the carbon tax.

To address the rising budget deficits, the US could adopt the framework of this carbon tax as a means to raise revenue. In 2008, the United States emitted 5,214 million metric tons of CO_2 from electricity generation [13]. By taxing this level of emissions with the proposed $23 per ton tax, the United States could expect to generate about $119 billion dollars in the first year. The Australian model estimates the carbon tax would yield a 1% reduction in carbon emissions each year [16]. Because the US tax exists primarily to raise revenue, redistribution percentages could be set much lower than the Australian model. Supposing the US government would allot 25% to redistribution, approximately $90 billion would go toward deficit reduction each year, offsetting about 10% of projected budget deficits over the near term.

A Five Year Model of the Proposed Carbon Tax

Year	Tax Level	Emissions (in millions of tons of CO2)	Emissions Reductions (in millions of tons of CO2)	Revenue (in billions of dollars)	Redistributed Revenue (in billions of dollars)	Total Revenue Available for Deficit Reduction (in billions of dollars)
1	23	5214	52.14	119.92	29.98	89.94
2	23.58	5161.86	51.62	121.69	30.42	91.27
3	24.16	5110.24	51.10	123.49	30.87	92.61
4	24.77	5059.14	50.59	125.31	31.33	93.98
5	25.39	5008.55		127.16	31.79	95.37
Total			205.45	617.56	154.39	463.17

A total of nearly $617 billion could be raised by following this proposed taxation model. Carbon reductions would total 205 million tons of CO_2 with the 1% annual emissions reduction estimation. The redistributed revenue rise each year is due to increased tax prices. After the fifth year, the taxation program gives way to tradable permits. Estimations of the market price of the permits are unknown, but during the taxation phase, large amounts of deficit reduction would occur.



Conclusion

CO_2 taxation has the ability to raise needed revenue for the US to reduce its debts and improve environmental health. By raising the price of electricity, consumers will be incentivized to use less and find ways to conserve. In using less electricity, the emission of harmful pollutants and CO_2 will be reduced as utilities will need to generate less electricity. Redistributing some of the tax revenue to poor families and utilities would help ease the problems associated with rising energy costs. The political feasibility of this tax is improved because it appeals to both environmentalists and those who want to see the deficit reduced and causes everyone who uses electricity to pay taxes relative to their consumption.

Works Cited

1. EIA, *U.S. Primary Energy Flow by Source and Sector*. 2009.
2. Programme, U.N.E., *ReformingEnergy Subsidies*. 2008.
3. *Projected Deficits and Surpluses in CBO's Baseline*. 2010: Washington, D.C.
4. Auerbach, A.J. and W.G. Gale, *Deja Vu All Over Again: On the Dismal Prospects for the Federal Budget.* National Tax Journal, 2010. **63**(3): p. 543-560.
5. Economist, T., *Dealing with America's fiscal hole*, in *The Economist*. 2009, The Economist Newspaper Limited.
6. Horsley, S. (2010) *As Deficit Looms, 'Gang Of Six' Seeks Compromise*. National Public Radio.
7. Boyce, J.K.R., Matthew, *Cap and Dividend: How to Curb Global Warming While Protecting the Incomes Of American Families*. 2007, University of Massachusetts Amherst.
8. Economist, T., *The state's take*, in *The Economist*. 2009.
9. Trisko, E.M., *Energy Cost Burdens on American Families*. 2010, American Coalition for Clean Coal Energy.
10. Parry, I.W.H., *Are Emissions Permits Regressive?* Journal of Environmental Economics and Management, 2004. **47**(2): p. 364-387.
11. Brindal, Ray and Curran, Enda. "Australia's Carbon Tax Clears Final Hurdle." *The Wall Street Journal.* November 8, 2011.
12. Kelly, Paul. "Carbon Tax Set in Stone as World Starts to Crumble." *The Australian.*
13. EIA. Emissions of Greenhouse Gasses Report. December 3, 2009.
14. "US debt reduction 'super-committee' takes shape." BBC News. 10 August 2011. <http://www.bbc.co.uk/news/world-us-canada-14484485>.
15. Barrett, Ted, Bolduan, Kate and Walsh, Deirdre. "'Super committee' fails to reach agreement." CNN Politics. 21 November 2011. < http://articles.cnn.com/2011-11-21/politics/politics_super-committee_1_deficit-reduction-republicans-committee?_s=PM:POLITICS>
16. "Analysts' view: Australia passes carbon reduction laws." Reuters. 8 November 2011.
17. Coorey, Phillip. "$15 billion in tax cuts for low and middle income earners under carbon deal." *The Sydney Morning Herald.* 10 July, 2011
18. "An expensive gamble: The prime minister stakes her future on a divisive scheme" *The Economist.* 14 July 2011.