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The Case for a U.S. National Carbon Tax

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Abstract:

This paper posits the need for a carbon tax in which proceeds are reinvested in clean technologies. Further, this paper serves to promote discussion on key elements to carbon tax program design, which include border adjustments, emission leakage, effects on low income segments, and removal of fossil fuel subsidies. The key finding lies in the need for greater discussion of carbon tax revenue use for effectively minimizing carbon tax effects on stakeholders while supporting specific policy objectives such as deficit reduction.

Keywords: Carbon tax, energy policy, energy subsidies, carbon tax strategy, border adjustments, emission leakage

1. Introduction

President Obama in his 2010 State of the Union Address stated “the nation that leads the clean energy economy will be the nation that leads the global economy. And America must be that nation.” The importance of developing green technologies encompasses not only environmental concerns, but also economic and political goals.

There are large bodies of research on both sides of the economic and ecological debates surrounding the current state of our energy systems. Earth’s finite supply of resources are being depleted, and supplies are in question. Peak oil, peak coal, as well as a number of other crucial resources are claimed to be nearing production limits, leading to catastrophic economic consequences to economic systems reliant on their abundant supply.

Climate change poses potential dire circumstances for life on earth resulting from the release of carbon emissions into the atmosphere. Our current economic system, energy use, and production processes have created problems whose magnitude is only beginning to be understood. In the face of such uncertainty, prudent courses of action must include mitigation efforts.

As the largest carbon emitter globally, the United States has the opportunity to address their moral responsibility of decreasing carbon emissions and use of fossil fuels, as well as targeting other national concerns through climate policy. A national carbon tax would serve to reduce greenhouse gasses and decrease use of fossil fuels, as well as provide an additional revenue stream to support social services programs, encourage the development of low-carbon technologies, and assist with government deficits. A carbon tax is a near-universal recommended policy tool in reducing greenhouse gas emissions, including support from the World Bank, the OECD, and the IMF. The United States is in a unique position globally to introduce a national carbon tax given its intellectual capital, economic factors, and size of the market.

This paper sets forth the advantages of a federal carbon tax introduced in the United States. Section 2 defines carbon taxes and outlines current use and advantages of carbon taxes over alternate climate policy instruments. Section 3 focuses on the advantages of the United States in employing carbon taxes and identifies the influence of a U.S. carbon tax would have on other nations. Section 4 details challenges in carbon tax implementation and design, including effects on low income households, and competitiveness concerns for U.S. industry. Section 5 concludes the paper highlighting vital considerations in the introduction of carbon taxes in the United States.

2. Carbon Taxes- Defined and Purpose

A carbon tax is a tax on carbon emissions, or more broadly on greenhouse gas emissions, thereby raising the price of economic activities that add carbon to the atmosphere. A carbon tax, rising to sufficient levels to impact emission levels which is applied to all sectors of an economy, is the policy tool favored by most economists due to its effects of reducing emissions at the lowest possible cost. (Rhodes & Jaccard, 2013) Carbon taxes differ from conventional taxes in that the primary aim is to reduce greenhouse emissions rather than to raise revenue, though this secondary purpose of carbon taxes is also significant. The revenue raised by employing carbon taxes is an ancillary benefit, which allows for the revenue to be used in any number of ways which contributes positively to society.

Carbon tax initiatives aim to incentivize the reduction of carbon emissions, and thereby promote the development of green technologies. The crux of carbon taxes is that feedback from the taxing of carbon emissions will spur innovative practices, production systems, and lead to more efficient resource use. In addition to the decreased carbon emissions in the

environment, carbon taxes can lead to decreased water and air pollution, road congestion by increasing the cost of private vehicle use, and increased efficiency in using earth's resources.

Carbon taxes create homogenous incentives to reduce greenhouse gas emissions, raises revenue which can further promote greenhouse gas reduction efforts, encourages innovation in reducing emissions, and are simple to design and utilize. Importantly, carbon taxes provide incentive for companies and industry alike to develop low-carbon technologies thereby reducing greenhouse gas emissions in the long-term. Research from Goulder and Mathai (2000) reveal that carbon policy and the rate of technological change are closely related. If governments are committed to reducing emissions, carbon taxes provide opportunity for sending market signals to economic agents for reducing greenhouse gas emissions, as well as the reinforcements for business and industry to develop low carbon technologies which provide the long-term promise of redefining the human interaction with atmospheric carbon levels.

From the economic perspective concerning the impacts of employing carbon taxes, importantly, carbon tax revenue has the opportunity of reducing the costs on society. Carbon tax revenues may be used to reduce other existing taxes, such as the case in the Canadian province of British Columbia (B.C.) which utilizes a neutral carbon tax. The B.C. carbon tax requires revenue neutrality on the part of the B.C. government, returning all funds raised to B.C. citizens through tax cuts. The purpose using carbon tax revenues to reduce existing taxes is to promote economic activity, and countering possible adverse effects of carbon tax use.

Alternatively, revenue from carbon taxes may be redistributed to affected stakeholders, reducing harm particularly to carbon-intensive industry and low-income households. Additionally, B.C. has introduced assistance for low income earners to help offset the effects higher energy costs have on lower income households. This use of revenue directly compensates disproportionately affected members of society from carbon taxes, and acts to make carbon taxes more progressive, and less regressive, tax instruments. It is important that the societal costs of initiating a carbon tax consider both the economic costs of the carbon tax, as well as the subsequent economic gains resulting from carbon tax revenues.

2.1. Revenue Stream

Carbon taxes provide government with revenue that could be put toward a variety of uses. Importantly, this revenue is not subject to political whims, and provides a stable source for funding programs that target alleviating the adverse effects which result in using carbon taxes. For example, carbon tax revenues could allow for reductions in existing taxes on labor and capital, thereby stimulating economic activity and offsetting some of the policy's social costs (Goulder, 1995; Goulder and Parry, 2008).

An estimate from the Congressional Budget Office of a carbon tax started at \$20 per tonne and rising gradually over time could raise approximately \$1.2 trillion during the decade 2012-2022. (Congressional Budget Office, 2011) A more recent study using the same parameters described above starting in 2013 would raise \$1.5 trillion in the first decade of implementing the tax. (Rausch and Reilly, 2012)

Carbon taxes potentially raise significant revenue during today's economic climate characterized by on-going scarcity of government revenue. This is a budgetary panacea, considering the source of the tax is taxing a source of social harm while alleviating government fiscal shortfalls. While new taxes are not favored by large segments of society, raising revenue through concurrently reducing greenhouse gas emissions is much more palatable for voters than is a more direct tax on income or value-added taxes as alternative sources for government revenue sources.

2.2. Current Carbon Taxes

Carbon taxes are currently employed throughout the world on various levels, ranging from national to municipal coverage. Thirty-nine countries and 23 sub-national jurisdictions already employ carbon pricing policies, or are actively considering their use, which covers a quarter of global greenhouse gas emissions. (Canada's Ecofiscal Commission, 2015) Carbon taxes have been introduced in countries including Finland, the Netherlands, Norway, Sweden, Denmark, Costa Rica, the United Kingdom, Switzerland, and Ireland, as well as regionally within the United States and Canada.

These taxes vary in breadth of emissions covered across countries, the price of the tax, and enforcement across industry sectors. Predominantly, current carbon tax programs exempt key industry sectors, and carbon-intensive industries in particular, from regulation. The need to garner sufficient political support in order to pass carbon tax legislation as well as the increased costs of a carbon tax levied on carbon-intensive industry vis-à-vis other sectors often excludes the industries from carbon tax regulation of final draft proposals. The application of carbon taxes varies from absolute amounts of emissions to taxing emission levels above a prescribed allowable level of carbon emissions. The price of taxes also varies greatly, from adding extremely low costs for emitting greenhouse gases (such as Alberta's SGER program) to carbon programs that strongly incentivize reduction in emission levels through high carbon cost. (such as Norway)

Overall, carbon tax programs have yielded positive results, including reduced carbon emissions, raised significant government revenue, and funded various social programs. One of the key advantages which have led to increased use of carbon tax initiatives is their simplicity in their introduction and administration.

2.3. Simplicity

A carbon tax would be administratively convenient and straightforward to implement in most industrialized countries. The tax could be incorporated within existing methods for fuel-supply monitoring and reporting to the regulatory

authority. (Aldy and Stavins, 2011) This key advantage allows the tax to be introduced within an already existing systems, and not having to add layers of bureaucracy and disrupting the economic system. This results in the absence of cost in revenue collection, thereby enabling the carbon tax revenue used for intended purposes, as well as the ease of introducing the carbon tax system.

Revenue could be collected upstream, when the fossil fuel is first sold following production or extraction processes, or downstream at the consumer level of sales. Upstream would involve fewer companies, and therefore be administratively cheaper and more desirable. The Congressional Research Service estimates a carbon tax could cover 80% of U.S. greenhouse gas emissions by levying the carbon tax on fewer than 2,300 business entities upstream. (Ramseur et al., 2012)

Carbon taxes provide the additional benefit of being easily adjusted in response to market conditions and changes in desired emission reductions targets. A key advantage of this feature is that it provides opportunity to initiate a carbon tax at a low initial compliance cost, which would be raised over time, in order to provide sufficient opportunity for companies to reduce carbon emissions. This ability of gradually increasing the cost of emitting greenhouse gases allows for stakeholders to adjust business practices over time without disrupting business operations. Without this ability to adjust carbon tax rates, greater disruption to economic activity would ensue from the need to establish initial carbon tax rates at a sufficiently high level in order to achieve political goals. Additionally, as political goals seek greater emission reductions, carbon taxes can be increased accordingly. This enables for signals sent to greenhouse gas emitters to adjust emissions levels or face higher penalties for non-compliance. This ability to adjust carbon tax levels enables for the economic cost of emitting carbon to result in the desired level of carbon emission mitigation. (Nordhaus, 2007)

2.4. Carbon Taxes Lower Fossil Fuel Use, Carbon Emissions, and Oil Imports

Introducing a carbon tax would raise the cost of carbon-intensive fuel use, including oil and all fossil fuels. This increase in the price of fossil fuels causes a decrease in demand, thereby reducing carbon emissions.

In addition, consumer behavior responds to higher fossil fuel costs by searching for low-cost alternatives. Studies on the impacts of energy prices on markets reveal that higher prices induce greater innovation as measured by frequency and patents, and, importantly, have led to increased commercial viability of more energy-efficient products. (Newell, Jaffe, and Stavins, 2006; Popp, 2002)

One such response to carbon taxes would be the increased incentive for improved energy efficient vehicles. In promoting a fleet of more fuel-efficient vehicles, the actual cost of driving could be reduced in spite of increased fuel prices. The economic result is a decrease in demand for oil, and lower overall carbon emissions per distance travelled.

A secondary effect from applying a carbon tax on fossil fuels would be the promotion of renewable fuels and electricity. While fossil fuel prices would increase as a result of carbon taxes, alternative fuel sources such as renewable energy would become cost-competitive. The displacement of fossil fuels use with renewable energy sources would serve to promote the primary goal of carbon taxes by reducing carbon emissions, among many additional benefits such as job creation and innovation in clean energy technologies.

3. Results

Carbon taxes have succeeded in raising revenue, curbed carbon emissions, and even helped economic growth. Between 1990-2006, Sweden's carbon tax helped reduce emissions 9%, while the economy grew 44%. (Ministry of the Environment, Sweden, 2008) This reveals how carbon taxes enable reductions in greenhouse gas emissions while allowing for economic growth.

However, current efforts at regulating carbon emissions have limited effects on global carbon emissions. Gains from carbon regulations have been undermined through emission leakage to areas without such incentives to reduce carbon emissions. Emission leakage results from firms relocating to areas without carbon tax enforcement and thereby simply increasing carbon emissions in other areas.

An additional concern undermining global carbon emission reductions is due to carbon taxes reduce demand for carbon intensive fuels globally. The decrease in global demand for fossil fuels suppresses the world price of these fuels. This resulting lower price for fossil fuels encourages increased use of these fuels in areas without carbon taxes, resulting in further offsetting gains from carbon taxes. (Aldy and Stavins, 2011)

Another element of carbon taxes needs addressing in order to increase the effectiveness of carbon pricing initiatives. Due to current carbon taxes utilized on a small scale, the political climate remains uncertain as to the viability and benefits of carbon taxes. This leads program initiatives to compromise its effectiveness in terms of breadth of greenhouse gas emissions regulated by carbon taxes, as well as key industries being exempt from legislation, in order to make programs more palatable for garnering political support in getting programs successfully initiated. Carbon taxes, and climate policy in general, often display significant differences between optimal policy proposed by experts, and legislation design as a result of this political process.

The shortcomings of existing carbon tax policies require a broader program aimed at reducing emission leakage, regional economic competition levelling, and establishing a framework for development. In addition to addressing these current shortcomings resulting from small scale application of current carbon taxes globally, the United States is a leading country with the most to gain economically and politically in initiating a national carbon tax.

3.1. U.S. Needs Carbon Taxes

The United States initiating a national carbon tax would promote clean energy technologies, raise significant revenue, and address fiscal deficits. Carbon taxes would send strong market signals to reduce carbon emissions and serve to attract world talent in pursuit of President Obama's clean technology- driven vision.

Investment in clean energy in the United States decreased significantly from 2011-2013. ("Clean Energy," 2014) The additional funding enabled by a carbon tax would provide a stable source of funding for clean energy not subjected to political whims or government budgetary considerations. This is a key advantage to renewable energy funding using carbon taxes. (Renewable Energy Policy Network for the 21st Century [REN21], 2014) Investment in clean energy requires many highly educated workers, promoting job creation and diversifying the economy. The additional carbon tax revenue would provide a potential stable source of funding for clean energy shielded from political whims. (REN21, 2014) Clean energy investment requires many highly educated workers, promoting job creation and diversifying the economy.

Government deficits and need for job creation are ongoing challenges for the United States economy. The U.S. Congressional Budget Office's (CBO) latest 10-year (2013-2023) budget deficit estimate is \$6.9 trillion. An economy-wide U.S. carbon tax of \$20 per ton of CO₂ is estimated to raise more than \$100 billion per year, which would assist with budget shortfalls. Furthermore, carbon tax revenues would reduce the need for current government expenditures on low-carbon subsidies. The projected size of the budget deficit will require many difficult political decisions regarding expenditure, and carbon tax revenue would enable continued fiscal support, which without carbon tax revenues would otherwise be candidates for budget cuts.

The size of the market in the United States provides unique opportunity for adopting a national carbon tax. The U.S. domestic market is the largest single market in the world and is able to generate sufficient demand for low carbon technologies. This provides sufficient production levels to lower costs through economies of scale and provide returns on investment for low carbon technologies to make the transition from fossil fuels economically feasible.

The cost structure of renewable energy production facilities features greater initial capital expenditures and lower operational costs when compared with fossil fuel plans. (Granovski, Dincer, & Rosen, 2007) This creates greater uncertainty in funding renewable energy projects compared with traditional fossil fuel facilities. The United States is endowed with adequate market size to ensure sufficient demand for low-carbon products, thereby making renewable energy projects more feasible vis-à-vis countries with less market demand. This provides opportunity for the U.S. to seize leadership within the clean energy industry, an industry projected to grow globally throughout the 21st century. Furthermore, the U.S. demand for low carbon technologies would create a universal incentive for developing low-carbon technologies including in other countries. (Meltzer, 2014) Therefore, the development of the U.S. low carbon technologies serves the U.S. economy in creating high-skilled jobs, reduces U.S. carbon emissions in substituting low carbon technologies for fossil fuels, and encourages international reductions in greenhouse gas emissions by creating U.S. demand for low carbon technologies internationally.

The U.S. initiating a national carbon tax addresses the emission leakage problem with existing carbon pricing programs being limited in scope as described above. Broadening the scope of existing carbon tax programs has the added benefit of deterring businesses to relocate to regions without carbon tax enforcement. Access to the United States market is crucial for global companies, and the implications of a national carbon tax in the United States and subsequent impacts on international trade would serve to encourage adoption of carbon taxes in other jurisdictions. As nations adopt carbon taxes influenced to some degree for accessing the American market, greater global reductions in carbon emissions result from additional carbon taxes employed globally. These direct reductions in global carbon emissions are enhanced by the indirect gains resulting from reducing areas without carbon reduction programs. By making pollution havens less prevalent and more likely to feel international pressure for greenhouse gas emission reduction efforts, carbon leakage will be less likely to undermine global carbon emission reduction initiatives.

4. Discussion

The careful design of an effective and politically feasible carbon tax are critical components in shaping climate policy. Carbon taxes are effective at reducing greenhouse gas emissions, raising revenue, and encouraging low-carbon technologies. However, carbon taxes also raise the cost of carbon-intensive industries, including transportation and electricity production. Effective carbon tax design needs to address critical societal effects of higher prices on energy, including the effects of carbon taxes on lower income households, U.S. industry competitiveness concerns vis-à-vis countries without carbon pricing programs, as well as the role of fossil fuel subsidies undermine the objective of carbon tax use.

4.1. Effects on Low Income Households

Lower income earners spend a greater portion of income on energy resources, while less in total, than higher income earners. As such, the brunt of negative effects from carbon taxes would be borne by lower income classes. Similar to the efforts of redistributing income to particular industries negatively affected by trade agreements, so too must lower income earners be assisted as affected members of carbon tax policy. A number of approaches have garnered recent research. (For example. See Metcalf, 2009; Shultz and Becker, 2013)

Two such options include a lump-sum carbon tax rebate, as well as a specific carbon tax rebate offered to Social Security recipients. These efforts would assist in alleviating the regressive effects of the carbon tax, increase the after-tax

income of lower income classes, and could make the carbon tax progressive depending on the amounts of the chosen program. (Ramseur et al., 2012) Redistributing carbon tax revenue to lower income households provide opportunity to negate adverse effects of higher energy costs through a direct transfer, as well as the potential to provide funding for social programs.

4.2. Border Adjustments

A U.S. carbon tax would pose additional costs to firms operating in the U.S. Many countries, including emerging markets such as Brazil, China and India, do not impose carbon tax costs on industry. This undermines competitiveness of U.S. firms vis-à-vis competitors operating in countries without carbon tax programs.

In order to ensure a level economic playing field, carbon taxing countries can utilize border adjustments, which are import fees levied on manufactured goods from non-carbon taxing countries. This enables for a country to successfully employ a carbon tax while not losing competitiveness in their domestic market. Border adjustments would encourage carbon reductions both at home and abroad, and result in reducing the incentives causing carbon leakage.

Taxing domestic and foreign goods alike would adhere to the WTO mandate regarding international trade. In the Shrimp Turtle case, the WTO based their ruling on the principle that global environmental concerns trump narrow commercial interests. (Stiglitz, 2006) This provides a justifiable basis for enacting legislation protecting the global environment. However, if climate legislation were found to violate WTO law, which is currently unclear, the repercussions would be limited to the United States having to change its legislation. No damages for past harm could be levied. (Pauwelyn, 2007) This allows for the introduction of competitiveness provisions with limited risk should the WTO rules be interpreted to be violated by U.S. initiatives.

To further promote the aim of reducing global greenhouse gas emissions, the United States may follow the EU approach of encouraging other nations to cut emissions. In 2007, the EU pledged to reduce emissions by 20% from 1990-2020, and further agreed to reduce emissions by 30% if other industrialized countries followed suit. (Commission of the European Communities, 2009) A similar policy employed by the U.S. would further incentivize other nations to reduce emissions and provide global leadership in prioritizing efforts in reducing greenhouse gas emissions.

Administering the border adjustment system faces administration challenges, including setting appropriate import tax amounts, and the determination of carbon content in material goods. These challenges need further examination in pursuit of domestic competitiveness and encouraging new participants in carbon reduction programs.

Border adjustments represent another revenue stream for use in supporting valuable projects or assisting disadvantaged segments of society, as well as acting to reduce carbon leakage through removal of incentives to relocate to non-carbon taxing areas.

4.3. Carbon Intensive Fuels Subsidy Removal

"Inefficient fossil fuel subsidies encourage wasteful consumption, reduce our energy security, impede investment in clean energy sources and undermine efforts to deal with the threat of climate change." (G20 Leaders, 2009). Currently, governments around the world speak about the need to encourage low-carbon alternative fuels, while at the same time subsidize the fossil fuel industries, thereby lowering fossil fuel costs, and creating cost barriers for low-carbon alternatives. Global fossil fuel subsidies were estimated to be \$523 billion in 2011 (IEA, 2012). International discussion has proved hopeful in phasing out these subsidies, but current agreements and promises now require action. Removing these subsidies in the long-term, and reducing in the immediate term, would more accurately price fossil fuels, and concurrently serve to promote low-carbon alternatives.

Critics of subsidy reform claim it will harm low-income households, but most fossil fuel subsidies disproportionately benefit the relatively wealthy in developing countries. According to recent research by Arze del Granado et al. (2010) it is quite typical for the poorest 20% of households to receive less than 7% of the benefits generated by fossil fuel subsidies. Consequently, removal of these fossil fuel subsidies would free up resources which could be applied toward programs for alleviating adverse effects from carbon taxes on low-income households or for promotion of low carbon energy technologies.

5. Conclusion

This paper highlights the advantages from use of carbon taxes, including the reduction of greenhouse gas emissions, source of government revenue, and ease of implementation. The benefits of a U.S. national carbon tax extend beyond the national benefits to include reducing carbon leakage and decreasing lobbying power of industry sectors which compromise the effectiveness of policy. The size of the U.S. market and magnitude of current carbon emissions presents a unique opportunity for the U.S. to take the lead in employing a national carbon tax. The projected near-term U.S. fiscal deficits demand that due consideration is given to implementing a carbon tax for long-term economic security and economic opportunity. Revenue allocation necessarily involves trade-offs between objectives of minimizing adverse carbon tax effects on stakeholders or supporting specific policy objectives such as deficit reduction. Additional research and debate is needed to determine the proper balance between compensating affected industry and segments of society from carbon tax use in the near-terms and the long-term goals of promoting low carbon technologies and fiscal deficit reduction.

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