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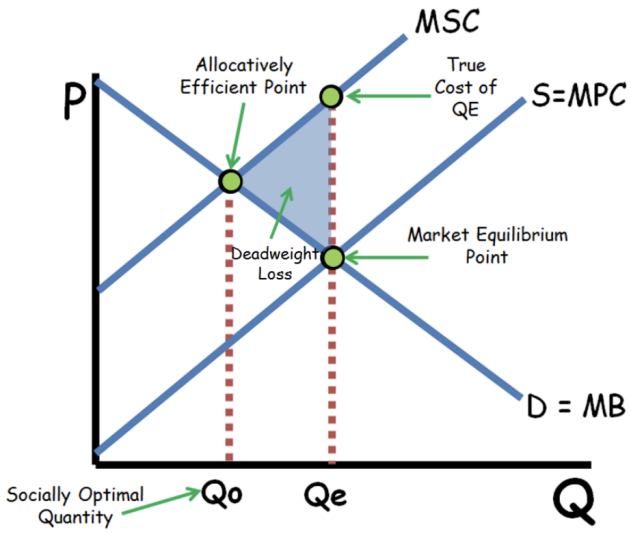
A Plea For A Pigovian Tax

Adam Smith's invisible hand guides the free market towards the efficient distribution of resources, with the exception of externalities. An externality being "a cost or benefit to someone other than the producer or consumer"[8]. We will continue to enjoy positive externalities, but negative externalities have become a focus of the twenty-first century as the world bickers about how to deal with our most threatening modern externality: carbon emissions. CO_2 is the leading greenhouse gas contributing to climate change. The source of CO_2 emissions is hard to define, it is intimately related to both individuals driving cars, and with large corporations producing steel or concrete. Economic theorists have come up with a handful of techniques to deal with externalities. In order to reduce pollution, the government could directly regulate the quantity produced by setting limits. Another option would be for the government to implement coasion bargaining, also known as cap and trade. Economists hypothesize that by issuing a limited number of permits to pollute, and allowing the permits to be bought and sold amongst polluters, an efficient allocation of pollution will be reached. Both strategies present how a logical approach to regulating externalities could be implemented. We will focus on a third strategy, known as a Pigovian tax to regulate carbon emissions. More specifically, the US economy would benefit from passing a long lasting carbon tax and route the generated tax revenue towards green infrastructure.



Negative Externality in Production

Let us dig into how the Pigovian tax corrects market externalities. In order to minimize total externalities a Pigovian tax is implemented that is equivalent to the per unit cost of the negative externality. In reference to carbon dioxide, the tax would be measured in \$/ton of CO_2 emissions, and would be placed on individuals and corporations. In the diagram attached, it can be seen that the additional price of the tax raises the total price of production (think of goods such as gasoline and heat) and induces a shift left in the quantity consumed from an excessive amount Q_e to the optimal level of consumption Q_0. Economists appreciate a Pigovian tax because it is a market based solution. Meaning, it alleviates the need to directly regulate specific industries or even individual polluters, instead allowing the market to adjust itself to the tax. Essentially, by implementing a Pigovian tax, the free market accounts for the externality of carbon dioxide emissions and can be left alone.

If carbon emissions were harmless in the way that nitrogen or oxygen is, then we wouldn't consider it an externality. However, CO_2 leads to global warming, which is the impending cost of the externality. Climate change is an emotionally fraught topic, and while I do become animated in this paper, it is essential that we view climate change as an economic factor rather than a political or moral topic. Thus, the economic framework is as follows. The price of

fossil fuels is lower than economically optimal because it does not account for the externality of carbon emissions. Since the price does not account for carbon emissions the cost is passed onto society. In the case of CO_2, the cost is actually placed on to our future society, the cost being the impending harmful economic effects of climate change. Thus, when a Pigovian tax is placed on carbon the knee jerk reaction may be to complain that gasoline prices have risen, however, paying slightly higher rates now reflects the true cost of production. Attempting to put a number to the taxation rate is a precarious calculation, for now let us just agree that the Pigovian 'carbon tax' can be viewed using this economic framework. Since we have established that reducing carbon emissions can benefit the economy by more efficiently allocating resources, let us turn to the subtleties of how the Pigovian tax will reduce carbon emissions in the US and thus improve the economy.

A Pigovian tax guides individuals and corporations to directly emit less, decouples the growth of the economy from the use of fossil fuels, and has double dividend returns for CO_2 reduction. The most obvious benefit is that a carbon tax prompts polluters to directly emit less carbon. The statement is rather basic, but it is worth diving into the subtleties of the assertion. An important note is that externalities can be both in production and in consumption. For example, combustion engine cars produce carbon emissions during both production and in use, a carbon tax will address both sides.

For producers competing to sell the same or substitutable good, a carbon tax would immediately put the dirtiest producers at a disadvantage in a competitive market. A company producing the same product with cleaner practices pays less in taxes and would outperform competitors. High emission producers offloading costs onto society through cheap polluting practices are now incentivized to compete toward lower emissions to lower price for whatever good or service they are providing.

From a consumer standpoint, economist Gregory Mankiw simply summarizes that a carbon tax would, "induce households and firms to internalize the carbon externality when deciding, for example, how much to drive, what kind of car to buy, how much electricity to use"[6]. For the amount of attention climate change receives in the US very little is done in the way of assuming personal responsibility. US citizens feign concern over the economic impact of climate change, but fail to act as economic agents that take into consideration the externalities of their actions when making decisions. Implementing a carbon tax makes it so every action or decision considers climate change, rather than relying on individuals to assert their agency and take the bus or turn off the lights an economic incentive now encourages them to. Furthermore, a prevailing opinion is that climate change is due to a small group of highly polluting corporations, but industry accounts for only a third of US energy consumption[2]. Household heating, transportation, and electricity consumption are also major emitters. A carbon tax forces Americans to realize that our emissions are the aggregate of our daily decisions, holds us accountable, and prevents us from frivolously amounting an economic debt like a naive postgrad with their first credit card.

Another important environmental benefit of Instituting a Pigovian tax on carbon is its power to aid in decoupling our economic growth from the consumption of fossil fuels. In countries with a carbon tax, over the course of a few decades, the countries have seen a gdp growth rate on par with similar countries while continually decreasing their carbon emissions[4]. Our economy is highly dependent on fossil fuels, but that does not mean we cannot grow gdp/quality of life without the use of oil. By maintaining a carbon tax over the long term our economy will develop healthy habits of not relying on fossil fuels. The nature of a carbon tax is

not an economic form of self flagellation but rather a guiding force towards minimizing externalities. Over time the economy will grow to have little to no reliance on fossil fuels. Hopefully, as we wean off, it becomes easier, to the point of trivial, to not use fossil fuels.

Finally, the cherry on top, a carbon tax can be implemented as to have "double dividends" [7]. The first of which being the obvious benefit of dissuading carbon emissions. The second dividend is the redistribution of the taxes collected. The US can decide to use the taxes by reinvesting them in green infrastructure. Green energy projects, and electrical grid infrastructure will aid in the fight against climate change. Furthermore these investments will also make it easier for individuals and businesses to reduce their reliance on fossil fuels. Directly encouraging reduction, decoupling the economy over the long term, and reinvesting in green infrastructure are the ways in which a carbon tax will reduce emissions in the US.

Thus far the Pigovian carbon tax has been presented as a magic bullet in the fight against climate change. Gee, this carbon tax sounds like a great plan, what should we set the $/ton rate to? As stated earlier, theoretically, the Pigovian tax is implemented at a rate equal to the per unit expense of the negative externality. While this rule is straightforward, it is extremely difficult to calculate the correct sum. Attempting to calculate the cost of carbon's negative externality is computationally equivalent to estimating the monetary cost of climate change. From a scientific standpoint, this is a monumental modeling task. Climate change is influenced by hundreds of variables, is chock full of nonlinear relationships, and its effects are unevenly distributed over geographic areas and populations. From a political standpoint, setting a price has been insurmountable. The emotionally based views politicians have on climate change vastly vary. In 2018, "The EPA offers a range of… estimates from $14 to $138 per metric ton" [7]. An order of magnitude difference between the high and low estimate of the carbon tax reflects the uncertain consequences of climate change. This uncertainty has been easily exploited in arguments against a carbon tax. Do not let the varied estimates dissuade you that climate change is not a legitimate economic threat. To at least grasp the scale of the impact, the White House has estimated that by the end of the century, climate change could lead to $2 trillion in lost revenue per year[11]. Fully, the carbon tax has been pulled into the dramatics surrounding climate change, but just disagreement does not negate the seriousness of the problem facing our economy.

Another legitimate hesitancy shown toward the carbon tax, is the question, what will be done with the taxed money? [7] A nice outward facing story is that a carbon tax is levied in the name of the environment, but let us not overlook that a carbon tax would generate billions if not trillions of dollars over its lifetime. The opportunity exists to reinvest the money into carbon reducing projects but recent news articles view a carbon tax as a useful tool in addressing our national debt issue. These headlines are emblematic of the fact that sitting politicians will be eyeing a new revenue stream for the programs they head. The question of what will be done with the money raised by the tax is a legitimate concern, but it also reflects a more sinister acquisition that climate change is being leveraged for the government to gain power. To ensure political support, a clear use case for the taxed dollars must be presented in conjunction with the proposal for a carbon tax. The two best options are reinvesting in the environment or redistributing the tax to citizens through a reduction in income tax. These two layers, the challenge of setting a price, and agreeing on a best use case for the money, are main reasons why a carbon tax has failed to be passed in the US.

Despite these challenges facing a carbon tax, the US is primed for the introduction of a long lasting carbon tax that routes the additional tax revenue towards green infrastructure. Proof of concept exists in having seen a carbon tax play out over the long term and work very

successfully in other countries. Also, our government has demonstrated political alignment over climate change by enacting green infrastructure projects that provide a fitting outlet for the taxed income. Finally, the world is pushing ahead and we will be subject to a carbon tax whether we like it or not.

The carbon tax is not a new idea and not merely a concept. In Europe, the Nordic countries are leaders of environmental governance. Sweden currently has the highest carbon tax at 117.30$ per ton of CO_2. Sweden has also had a carbon tax in place since 1991, three full decades and counting[4]. However, the program in Sweden was not an immediate success. Out of the gates the tax level chosen was not high enough to have any impact on emissions leaving all parties disappointed with the outcome[4]. Yet perfection was not what the Swiss were aiming for. The carbon tax set a precedent and since its introduction has grown in a stepwise function over the course of the past 30 years, incrementally rising from 6$/ton to 117$/ton. Even ten years in the swiss carbon tax had failed to make much change and could have been viewed as a flop[4]. Again, as time has gone on, the Swiss have seen total carbon emissions fall by 29 per cent (compared to 7% in the US), standard GDP growth of more than 50 per cent, and a decoupling from fossil fuels faster than in other European countries. The history of Sweden's carbon tax should emphasize to American politicians that they must think about the carbon tax as lasting decades, in this manner they can gain political backing for the policy by starting small and then nurturing the tax into something more substantial. Starting small appeases the resisting parties in order to give birth to a policy that will grow and change over its lifetime. Swiss officials pushing for a stronger climate policy introduced the tax at an inconsequential rate of $6/ton, they then rallied behind the momentum of passing the policy and subsequent successes of the carbon tax in order to push for a higher carbon tax rate[4] . The difficulty in agreeing on the perfect price to introduce the tax, is holding back having any carbon tax at all. America needs to let go of creating the perfect carbon tax and start somewhere modest with the intention of growth.

For a carbon tax to be successfully implemented in the US it must one, be introduced at a modest rate, and two, have a clear and direct outlet for the collected revenue. Over the past few years president Biden has created the perfect outlet for the money collected. When Biden came to power climate change began to be taken seriously. A reflection of this is billions of dollars of investment in the green energy sector, the energy infrastructure industry, and the finance of environmental projects[11]. These projects provide a direct and clear outlet for the revenue generated by a carbon tax. Establishing a clear parallel between the tax and the projects it is financing, helps gain trust in the policy. Already having the government and structure in place to deploy the funds establishes confidence and quells fears of a tax being abused to fund unrelated projects or to generally grow the government. Emphasizing the importance of coupling the tax with a clear mission, one survey found,"Americans oppose a carbon tax when the resulting revenue's use is left unspecified, but 60%—including majorities of Democrats, Republicans, and independents—were in support when the money was used to fund research and development for renewable energy programs" and that ,"The highest support was associated with using tax revenues to fund clean energy (80%) and infrastructure (77%)". Furthermore, utilizing the double dividend enables a smaller tax to have a larger impact in fighting climate change. Investing in clean energy is a two fold economic benefit, one it helps reduce the economic burden of climate change in the long run, and two we have seen under bidenomics a surge of job growth[11] in green industry that is of immediate benefit to the economy. By initiating investment in green energy projects, Biden has opened the door for a carbon tax to be successfully marketed.

The money raised by a carbon tax will be used to finance green infrastructure projects, this will benefit the economy by mitigating climate change and creating new jobs in green industries.

A final problem with the carbon tax that I have yet to mention, is the idea of leakage. If the US implemented a carbon tax, leakage is when,"companies outsource emissions to countries without a carbon tax"[5]. Companies looking to avoid a US carbon tax would save money by looking to run their business elsewhere. While at one point in time this was a legitimate concern, unfortunately, the reverse is beginning to ring true. The US has lagged far behind other nations in climate policy, and now, other countries that have already implemented a carbon tax have also begun to implement a carbon tariff. In order to truly mitigate the cost of climate change, a majority of countries need to fully buy in. Reflecting this idea, just a few months ago in October 2023, the European Union enacted the Carbon Border Adjustment Mechanism. The policy is a tariff that acts so that, "Imports to Europe will now face a tax based on carbon emissions caused by manufacturing" [9]. Seemingly with every policy we have discussed so far, this legislation works two fold. First, it,"encourages more countries to write laws that reduce emissions", and second,"it ensures that European manufacturers stay competitive with rivals operating in "dirtier" jurisdictions"[9]. Another reason a Pigovian tax is such a useful tool is that the tax fits into the world economy through border tariffs. Dirty economies such as the US, with no carbon regulation, will be affected the most. Across the globe, another dirty economy is reeling from the impending EU carbon tax. In 2012 Australia actually passed a carbon tax that caused immediate reduction in carbon emission by prompting energy providers to lessen their dependence on coal. However in 2014 due to a change in power and short sighted complaints over raised energy prices, the carbon tax was repealed[10]. Australian officials are frustrated that the same high prices will be seen because of the EU policy, but now instead of paying a tax to their own government,"Australian polluters will end up paying foreign taxpayers"[10]. US consumers will now suffer the same fate as the Australians. The US has fallen behind over 40 countries worldwide who have instituted forms of a carbon tax, and it won't just be the EU that is enacting a tariff. Not only will enacting a carbon tax benefit the US economy, but now the economy will suffer if we don't implement one. At this point a carbon tax not only makes sense internally but is necessary to operate in a world economy.

On August 16, 2022 the US passed the Inflation Reduction Act. The bill was a great step in the right direction, a serious set of direct actions the US was taking to address climate change. However the bill focused on promoting green industry with tax cuts and subsidies rather than addressing CO_2 emissions with a carbon tax. By creating a reward system rather than deploying punitive action the US exploited the leakage effect. Luring foreign company business to the US with subsidies, we inflamed the European Union into passing the Carbon Border Adjustment Mechanism. Even by grossly taking advantage of the fact that other countries have a carbon tax, the US will still not meet its weak 2030 carbon emission goals. The US committed to a 50–52% reduction below 2005 levels by 2030. Yet we will fall 23%–37% short of meeting this goal, a goal that is not even in line with limiting global warming to the ideal 1.5˚C[1]. Now is not the time to be bickering and undermining one another. If the US is serious about mitigating the harmful serious effects of climate change, it has the enormous opportunity to step to the forefront of world climate policy and establish a Pigovian carbon tax.

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