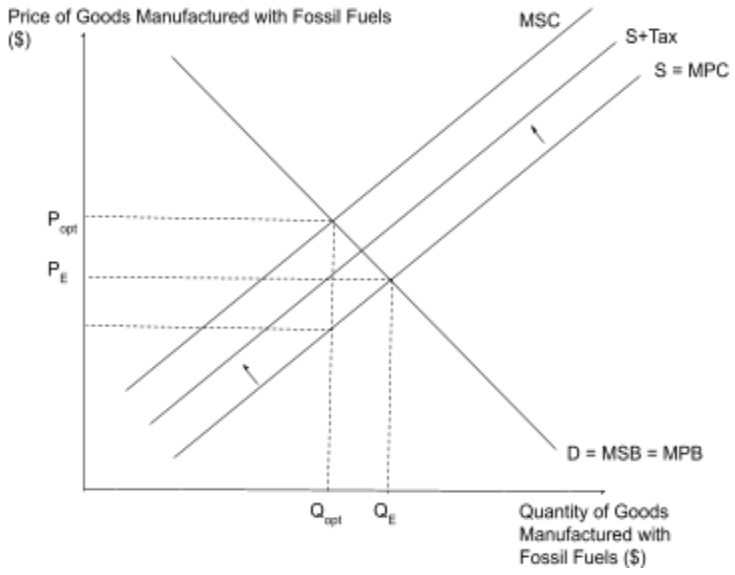
Economics Essay:
Efficacy of Carbon Taxes compared to Subsidies for Renewable Energy

Environment: Carbon taxes have been implemented in many countries, including in Europe and the United States, and are considered to play a significant role in regulating greenhouse gas emissions. However, there are criticisms regarding this approach, such as the argument that it is not effective because enterprises may keep polluting as long as they pay the cost. Additionally, the competitive advantage of imported products from countries without carbon taxes raises questions about its effectiveness. What unique effects can be anticipated from carbon taxes compared to subsidies for renewable energy? To address the concerns currently raised about carbon taxation, what potential alternatives could be considered?

As addressing climate change intensifies, policymakers are exploring financial mechanisms to curb greenhouse gas emissions and foster sustainable energy use. Among the most prominent of these mechanisms are carbon taxes and renewable energy subsidies, each designed to incentivise reductions in carbon footprints. Carbon taxes impose financial costs on emissions, theoretically encouraging industries to diminish their reliance on fossil fuels. Alternatively, subsidies for renewable energy lower the production costs of producing goods by using cleaner energy technologies, promoting a transition toward sustainable practices. This essay will explore the comparative effects of these two strategies, assessing their efficacy in mitigating climate change while exploring alternatives that may offer additional pathways to a sustainable future.



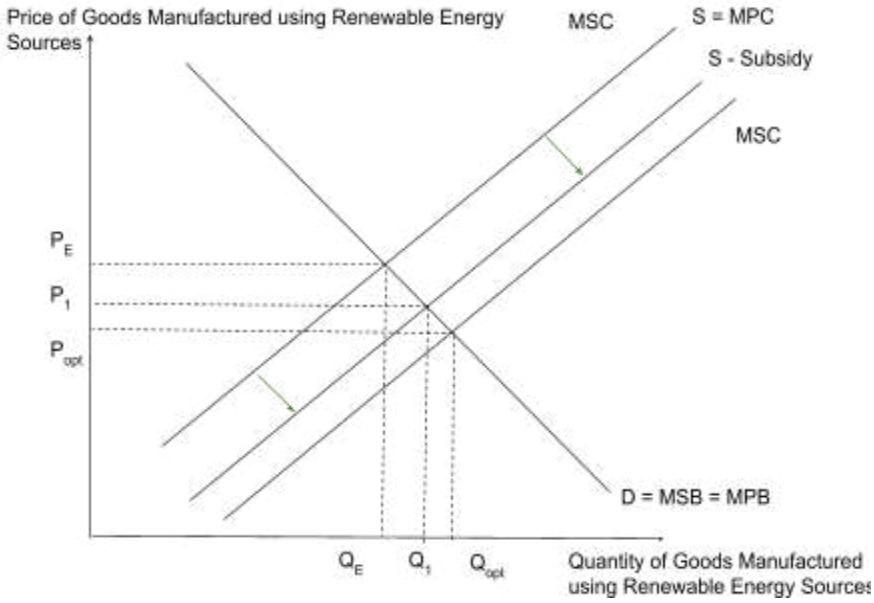
Greenhouse gas emissions from industrial production have third-party costs due to the pollution they cause, which leads to increased global warming. As a result, the production of such goods has a negative externality of production. Hence, MSC > MPC causing an overallocation of resources. The result of the tax is a decrease in production, which moves closer to the allocative efficient level of output

in the market. Nearly all countries in the EU have implemented a carbon tax today, with an average tax of 49.23 euros per tonne of emissions as of April 1, 2024 (Carbon Taxes, 2024). India, through its Coal Cess, has gradually increased from INR50 (in 2010) to INR400 (today) tax per tonne of carbon emissions.

Firms prioritise economic gains over benevolent acts towards society, and the benefits of increasing production outweigh the consequential losses from carbon tax. Producers also start to import or outsource the production of the goods they produce from different countries with significantly lower carbon taxes. This problem can be tackled by neighbouring countries creating agreements to adopt similar carbon taxes to minimize differences in carbon cost across borders.

Carbon taxes may also place burdens on low-income populations, as they are required to spend more relative to those with higher incomes from goods and services that have fossil fuel costs built into their prices. To address the regressive nature of carbon taxes, the addition of rebates or subsidies for low-income households may be considered. The other drawback with carbon taxes is that they may not guarantee emissions reductions as companies that can afford to pay the taxes will continue to emit, or economic growth generally will override the effect of the carbon tax. Unlike taxes, subsidies are an incentive to use renewable resources. The World Bank has emphasized that a properly designed policy package that includes such subsidies can enable a more effective transition towards net-zero emissions by promoting investments(Adrien Vogt-Schilb et al., 2015).

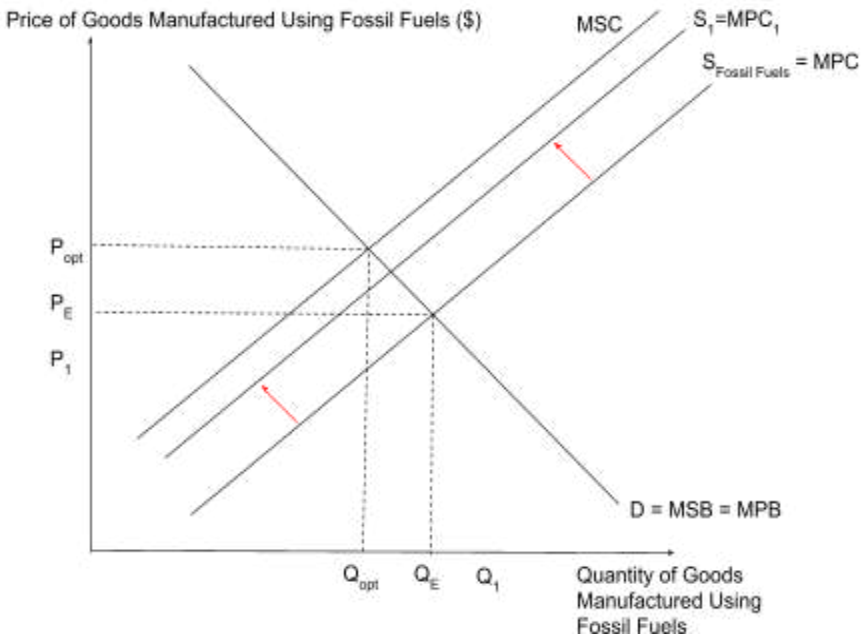
Contrary to fossil fuels, the use of renewable energy sources promotes a greener society, thus creating a positive externality of production. Hence MPC>MSC, which indicates an underallocation of renewable energy sources in the market. The subsidy causes the supply to shift rightwards, increasing production and reducing market failure.



Switching to renewable energy sources requires significant initial investment in infrastructure in the short run and maintenance in the long run, leading to increased costs of production not shown theoretically. The subsidies to producers, usually provided by the government, will bring costs of production down,

incentivising producers to utilise new forms of energy. The extent to which the subsidy covers the cost of switching to renewable forms of energy is variable and changes based on the situation. It could either be marginally greater or lower than the original supply S. The more practical net long-term economic effect is projected to be minimal with quantity and price both stabilising near their original values.

Since energy can be generated by both fossil fuels and renewable energy sources, both sources can be used interchangeably for the production of many goods. Not only are their demands linked, their supply also has a relationship. The subsidy on renewable energy sources to producers reduces the cost of production for producers, usually to levels below the cost of production required for producing using fossil fuels. As a result, producers shift to using renewable energy sources. Hence, the supply of industrial goods manufactured using fossil fuels decreases. As a result, the quantity produced reduces and shifts closer to the optimal production quantity, reducing market failure.



Both carbon taxes and subsidies reduce the harmful environmental impacts of industrial production. The impacts on the various economic stakeholders will be considered when comparing the two policies.

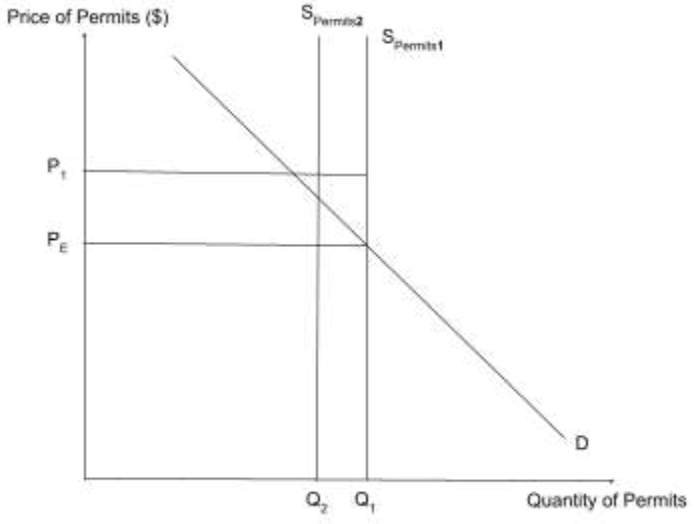
Taxes increase the price consumers pay for goods. Since low and high-income households pay the same taxes, they become regressive in nature, decreasing equity. With subsidies, the impact on consumers depends on whether the subsidy is passed onto consumers as well, in which case consumer price decreases with overall benefits on consumers.

Producers receive greater benefits from subsidies than taxes. This is because producers must pay a part of the tax burden whereas with a subsidy, the net cost to producers is minimal.

The government benefits more from taxes, which provide it with revenue, than it does from subsidies which eat out of its budget. However, the reality of the situation in the case of subsidies is that to afford such subsidies, the government must find new ways to earn revenue. This is usually done by increasing taxes which ultimately cycles back to consumers, producers and society.

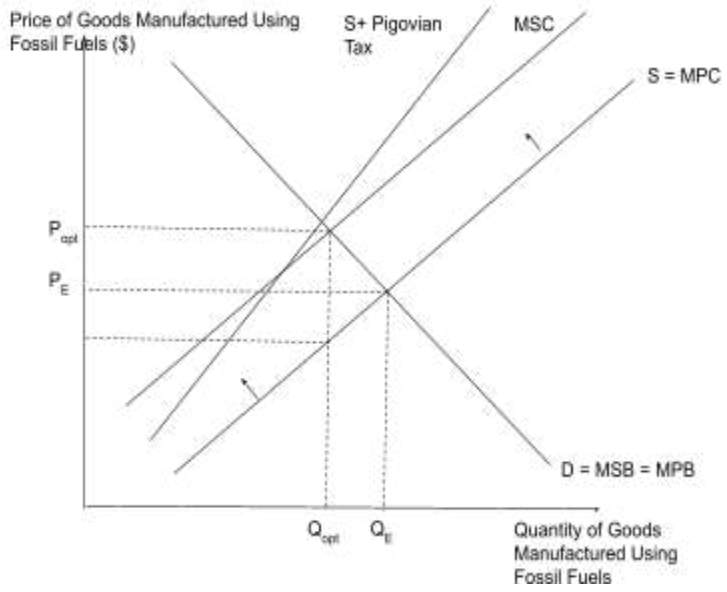
After evaluating both carbon taxes and subsidies, it is clear that there is no one way to eliminate the negative externality created by greenhouse gas emissions. Both carbon tax and subsidies cannot achieve perfect allocative efficiency and each has a negative impact on different economic stakeholders. Moreover, producers can evade the policy by exploiting loopholes such as simply paying the cost to continue polluting and banking on economic prowess. The following three alternatives may be considered to mitigate these externalities.

Governments could consider the introduction of tradable permits (caps), a more definitive way to slow down greenhouse gas emissions. These permits can be sold and bought and there are a fixed number of permits. In the EU, a similar scheme, EU-ETS is enforced (EU Emissions, n.d.).



The supply $S_{Permits}$ is perfectly inelastic. Obtaining such permits can be highly tedious, time-consuming, and financially draining. Thus, many producers may choose not to venture into the market, further reducing the negative effects of the externalities. As producers enter the market, the rate at which tradable permits are handed out may not be sufficient to match the increase in buyers. The increase in demand would only be met with an increase in the price of the permits, encouraging producers to shift to more renewable energy sources. Governments should gradually reduce the number of permits available to producers to make constant progress towards a world with zero emissions.

Governments could also implement a Pigovian carbon tax to penalise major greenhouse gas emitters heavily. Instead of a per cent tax, this policy will be an *emission intensity* tax where producers are charged based on the units of carbon emissions released to manufacture one unit of a good. A Pigovian tax would be a supply curve + tax which is not parallel to the original supply curve. Producers will be incentivized to minimize their emissions while pursuing innovation and reducing emissions to lower the tax burden. In such a case, tax% = f(emission intensity). Currently, this is performed on a macro scale from country to country. However, it is proposed that this policy be implemented on a micro scale from industry to industry within a given country. In order to enforce this policy, surveillance and monitoring will play a major role and must be considered.



Producers will still attempt to import raw materials like steel from abroad and continue polluting the environment. To address these issues, governments may impose a tariff on incoming goods using the same emissions intensity tax principle, thus ensuring that all pollutants entering the country are appropriately taxed.

While this policy does lead to higher prices for consumers, it ensures that consumers consuming very low levels of such goods and not polluting the environment greatly are equitably penalised. The EU's Carbon Border adjustment mechanism is one such example.

Another alternative is setting up product standards with strict environmental criteria for both domestic and imported goods. For example, the Indian government has mandated a 20% blending of ethanol in fuel. Other examples include the Green Steel project in India where steel production emitting less than 2.2 tons of carbon dioxide is classified as green steel.

The analysis of the problem of carbon taxes and renewable energy subsidies contributes to the understanding of the need for proper policy solutions in the fight against climate change. These concerns echo the call for a just transition, which focuses on the well-being of vulnerable populations. The findings from the analysis suggest that while carbon taxes and subsidies are effective mechanisms for mitigating emissions, policies such as tradable permits or

percentage-based tax systems can further provide greater relief to the surrounding environment. Considering how these financial instruments can be optimized to avoid unintended consequences, ensuring a comprehensive approach to environmental sustainability is imperative.

References

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