Taxes on Pesticides and Chemical Fertilizers

Taxes on certain pesticides and chemical fertilizers can mobilize fiscal revenues while mitigating the negative effects associated with pesticide/fertilizer application and promoting sustainable agriculture practices.

Key words: Market failure; smart tax; green tax; green fiscal reform; chemicals; pesticides

How does it work?

Pesticides (includes herbicides, insecticides, fungicides, and rodenticides) and chemical fertilizers (includes nitrogen, phosphorus, potassium, etc.) play a critical role in maintaining and increasing agricultural productivity. Nonetheless, the use of certain products containing toxic content can adversely affect the environment and human health, and generate negative externalities (http://www.undp.org/content/sdfinance/en/home/glossary.html) (e.g. water contamination or human-poisoning diseases). A tax on pesticides and fertilizers can correct certain market failures (http://www.undp.org/content/sdfinance/en/home/glossary.html)—e.g. the failure to incorporate in the price of the pesticide/fertilizer its social and environmental costs—and forestall increases in the use of the most harmful pesticides and fertilizers. At the same time the tax generates a revenue stream that could be earmarked to, for example, mitigating the environmental impacts of pesticides and fertilizers, adopting more sustainable agriculture practices and otherwise contributing to the achievement of a country’s sustainable development goals. Such taxes will necessarily complement regulations and standards on chemical and toxic content (e.g. nitrogen and phosphorus in fertilizers).

The design of the tax entails the definition of the tax base (http://www.undp.org/content/sdfinance/en/home/glossary.html), the tax rate (http://www.undp.org/content/sdfinance/en/home/glossary.html), the point of application and the revenue allocation. The tax base (http://www.undp.org/content/sdfinance/en/home/glossary.html) for a specific sub-set or the totality of pesticides/fertilizers can be established on the sales value, dosage, weight of active ingredient or the environmental impact of a product. The tax rate (http://www.undp.org/content/sdfinance/en/home/glossary.html) can be fixed or differentiated among product classes or toxic content; it can be set as a fixed amount or as a percentage. From a revenue-generation standpoint, a singular uniform tax (http://www.undp.org/content/sdfinance/en/home/glossary.html) is the preferred solution because of its simplicity and low administration costs. From an economic perspective, a differentiated tax that takes account of the environmental damage caused by different types of pesticides/fertilizers is the preferred solution, since it provides more targeted price signals to the market and more adequately reflects marginal damages. In the case of Denmark, the initial tax rate applied was 3 per cent over the wholesale price (tax base (http://www.undp.org/content/sdfinance/en/home/glossary.html)). The tax was refined over time with differentiated tax rates: for example, the tax was increased to 54 per cent for insecticides in the 1990s before the system was reformed in 2013. In Sweden the tax on fertilizer was set at approximately 20 per cent of the price.

### Tax Base

<table>
<thead>
<tr>
<th>Tax Base</th>
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<tr>
<td>Value of imports/exports*</td>
<td></td>
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<tr>
<td>Based on active substances identified via environmental and health risk assessments</td>
<td>Farmers</td>
<td></td>
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Pesticides taxes are in place [https://books.google.com/books?id=1MvpPlmECPd&pg=PA41&lpg=PA41&dq=france+environmental+taxes+pesticide&source=bl&ots=tm5R3vT6&sig=qux9zU3wJCI1QZ0oSxR797zuU&hl=en&sa=X&ved=0ahUKEwjlqyspKg5UAhWZKshkHhrDCAQQ6BAgBEwI#v=onepage&q=france%20environmental%20taxes%20pesticide&f=false]. The price of pesticide/fertilizer application levels and their externalities might diverge across different geographic and climatic conditions.

The price elasticity of demand (http://www.undp.org/content/sdfinance/en/home/glossary.html) for pesticides (http://www.sciencedirect.com/science/article/pii/S1573521412000396) and chemical fertilizers tends to be low, meaning that a low tax rate will not have a significant impact on demand and sales. Inelasticity (http://www.undp.org/content/sdfinance/en/home/glossary.html) can be explained by market failures (http://www.undp.org/content/sdfinance/en/home/glossary.html) and information gaps, particularly among farmers, on alternative production practices and less environmentally harmful products.

Therefore, while a tax on pesticides will mobilize revenues, it might result only in a marginal decrease in pesticides use if the tax level is low. Only in Scandinavia (http://www.oecd.org/env/tools-evaluation/taxationinnovationandtheenvironment.htm) (e.g. Denmark, Norway [http://ieep.eu/assets/1398/ETR_in_Europe_-_Annex_2_3_4.pdf] and Sweden), where the tax level was higher and accompanied by complementary policies encouraging sustainable agriculture, was a decrease in the use of pesticides/fertilizers recorded.

Tax rates can also vary depending on the toxicity of the substance, as suggested above. A classification by toxic content is required for defining the applicable tax base and variable rates. Higher tax rates may be applied on products that are more harmful to the environment and human well-being based on their toxic content. Hazard ranking approaches are available to evaluate products on the basis of toxicity to humans, wildlife, and aquatic life, as well as their potential for water contamination. For example, the City of San Francisco Department of Environment provides hazard assessments (http://senvironment.org/sites/default/files/files/files/sf6Ian_guide_to_reduced_risk_pesticide_listposted.pdf) of active ingredients and formulated products. A uniform tax would be a second-best choice in situations where there is absence of information on environmental externalities, rendering the classification on toxic content too difficult or complex. The example of Norway and later Denmark highlight how the categorization of products can inform the tax design.

Farmers and commercial agriculture companies are the tax payers. To reduce political conflicts and tensions, systems can be put in place to channel back revenues to the sector. The revenues can be particularly invested in the promotion of sustainable agricultural practices or transferred more generically to support agriculture organizations. Tax neutrality/no increase in overall taxation/scan also be pursued through reductions in other forms of taxation.

Main stakeholders:

Despite the above negative impact, pesticides/fertilizers can improve crop yields, food security and the quality of produce—resulting in increased profits (and possibly employment) in the countries that still directly or indirectly subsidize pesticides/fertilizers, the priority should be to reform harmful subsidies. The introduction of taxes should be assessed over alternative context should always guide the tax’s design, including the selection of the appropriate tax rate, the timing/phasing-in and the identification of exceptions or complementary measures. In agriculture sector. They are more appropriate where the objective is to facilitate a smooth transition to more sustainable practices through market mechanisms. The economic and social effects is required to inform the design of the tax. Given the importance of agriculture for reducing poverty in developing countries, an assessment of the impacts of the tax on farmers and vulnerable groups should also be included in the feasibility phase.

**Minimum investment required and running costs**

The introduction of the tax requires a legal and economic assessment as well as technical inputs to amend the tax code which might cost between US$50,000-250,000. Advocacy and awareness-raising campaigns may also be needed to facilitate legislative approval and to balance different interests, as well as to change perceptions among policymakers and the general public. While the investment and running costs are small or negligible if the country already has a developed tax collection system, additional scientific research is required if the objective is to determine the optimal tax base and rate.

**In context/when it is more appropriate**

Pesticide/fertilizers taxes are appropriate in all settings where products with high toxic content are used. This is most likely to happen in countries with a large and partially industrialized agriculture sector. They are more appropriate where the objective is to facilitate a smooth transition to more sustainable practices through market mechanisms. The economic and social context should always guide the tax’s design, including the selection of the appropriate tax rate, the timing/phasing-in and the identification of exceptions or complementary measures. In countries that still directly or indirectly subsidize pesticide/fertilizers, the priority should be to perform harmful subsidies. The introduction of taxes should be assessed over alternative regulatory measures, including toxic content regulations and mandatory health and environmental risk assessments.

**What are the main risks and challenges?**

**Pros**

1. Relatively easy tax to collect and administer when a simple design is chosen.
2. Can generate a double dividend ([/content/sdfinance/en/home/glossary.html]) if the resources mobilized are used to reduce distorting forms of taxation or if they are reinvested in organic agriculture or other sustainable agriculture practices.
3. Directly address market failures by incorporating the social and environmental cost of using pesticides/fertilizers.
4. Provide an incentive to shift farmers and commercial agriculture enterprises towards more sustainable cultivation practices.

**Cons**

1. The low price elasticity ([/content/sdfinance/en/home/glossary.html]) of demand suggests that without high rates there will be only minor effects in pesticide/fertilizers use-reduction.
2. Restricting the quantities of pesticide used in fruits and vegetables might cause yields to decrease to a significant extent in the absence of low-toxicity alternatives.
3. Obtaining an accurate estimate of the negative externalities ([/content/sdfinance/en/home/glossary.html]) produced using pesticides/fertilizers is not simple and requires evidence-based research.
4. There is a trade-off between maximizing revenues with a simple and uniform tax against more complex but differentiated rates based on the toxic content, which are more effective from an environmental standpoint.

**Risks**

1. The tax might be regressive and unfair for a certain (vulnerable) segment of the population; the cost of the tax on pesticides/fertilizers may be too high for poor farmers. Several mechanisms and companion policies can be put in place to neutralize these effects.
2. The existence of conflicting interests can create tensions among agricultural producers, agribusinesses, pesticides producers and consumers.
3. Tax evasion can reduce the amount of resources mobilized.
4. The support mechanisms designed to balance the tax’s impact on the poor might not be effective.

**How can the design be ameliorated to improve the impact?**

Pesticides and chemical fertilizers pose a potential risk to human health, other life forms, and the environment. The rationale of pesticide/fertilizers taxation is to decrease applied quantities of toxic pesticides/fertilizers and advance the transition to low-toxicity alternatives. The most immediate impact is on human health. Despite the lack of official statistics ([http://www.who.int/bulletin/volumes/86/3/07-04184/en/](http://www.who.int/bulletin/volumes/86/3/07-04184/en/)), the WHO has estimated that three million cases of pesticide poisoning (intentional and unintentional) occur every year, and result in over 250,000 deaths. These are caused by intentional and unintentional exposures from water, air and food. Studies in developed countries indicate the annual incidence rates of acute pesticide poisoning in agricultural workers to be as much as 18.2 per 100,000 full-time workers. The incidence is much higher in developing countries, with studies from Sri Lanka indicating a rate which is 10 times higher (approximately 180 per 100,000). In India, the first reports of poisoning due to pesticides date to 1956 in Kerala where over 100 people died after consuming wheat flour contaminated with paraathion. There is also evidence of the environmental damage from nitrogen and phosphorus contamination of water sources and soil degradation, which in turn might decrease long-term land productivity.

Despite the above negative impact, pesticides/fertilizers can improve crop yields, food security and the quality of produce/resulting in increased profits (and possibly employment) in the agriculture sector. Thus, the emphasis is not on eliminating the use of pesticides/fertilizers but on transitioning to more sustainable agriculture practices ([http://www.fao.org/3/a­i3940e.pdf](http://www.fao.org/3/a­i3940e.pdf)) with positive or no negative impact on agriculture productivity.

The environmental impact of pesticides/fertilizers taxes can be measured in the reduced use and its link to social/environmental outcomes. The effectiveness of the current forms of pesticide/fertilizer taxation is mixed. The experiences in Europe (https://www.researchgate.net/publication/222679113_Policy_effectiveness_and_acceptance_in_the_taxation_of_environmentally_damaging_chemical_compounds) point to limited successes in the reduction of use but highlight the benefits of earmarking tax revenues for research on sustainable agriculture practices. These limited results might be due to failures in the tax design and/or the selection of tax rates that are too low to reduce the use of fertilizers/pesticides. Despite the lack of conclusive findings on effectiveness and causality (i.e. the reduction of pesticide-use might not be due to the tax), these taxes are believed to have helped Denmark and Sweden reach their reduction targets in the use of pesticides.

Prevalent economic theory suggests setting the tax rate to reflect the marginal net damage of pesticide/fertilizer use. However, gaps in scientific evidence (i.e. valuation of the damage) and political feasibility make this theoretical proposal often impractical. A mix of tax-based instruments partially correcting market failures accompanied by regulatory standards (including bans) is likely to produce more pronounced social/environmental outcomes. An example is seen in France (http://www.mdpi.com/2071-1050/8/4/378/pdf), where a combined system is in place in which a reduced tax rate is imposed on pesticides that are allowed in organic farming, while the regular tax rate is imposed on other pesticides, and a total ban (http://www.reuters.com/article/us-france-pesticides-idUSKCN0WK1KL) is imposed on some widely-used pesticides that are considered to harm bees.

A number of tax design elements should also be considered when seeking to maximize the social and environmental benefits:

- **Administration**, Effective and efficient tax administration is key to avoid evasion, and to offset risks such as hoarding (https://content/sdfinance/en/home/glossary.html). The underlying principles of effective tax administration include clear designation of responsible enforcement authorities, information-sharing amongst enforcement agencies, and strict enough penalties to deter noncompliance.

- **Continuous monitoring**, Tax authorities should stay abreast of economic considerations that may affect the price elasticity of demand, such as inflation and changes in household income levels to adjust the tax rate or related provisions.

- **Use of tax proceeds**, The negative economic impact of pesticide/fertilizer taxes for producers and farmers can be reduced if the tax revenues are channelled back into the sector, as is the case in Denmark and partly in France. The use of the proceeds for reducing other forms of distorting taxation or investing in environmental measures (biocontrol, buffer zones, etc.) can generate a double dividend (https://www.greenfiscalpolicy.org/). For example, the totality of the proceeds from the tax on pesticides are allocated to the Department of Ecology in the State of Washington (OECD, forthcoming-2017). The impact can also be amplified when the tax revenues are apportioned towards organic farming or alternative pest management practices or programmes, including research.

- **Sector policy reforms**, Equally important is to address factors that foster pesticide over-consumption, such as pesticide subsidies, pesticide application recommendations by agricultural extension services or possible conflicts of interest affecting regulatory authorities, research and extension.

- **Complementary measures to access environmentally friendly products**, Government agencies, in co-operation with local partners, can support a smoother transition to more sustainable agricultural practices by easing the import of technology and the access to equally productive but less harmful pesticides and fertilizers. Through extension services, training can be organized along with the provision of monetary incentives.

- **Complementary measures to support the poor and vulnerable groups**, All possible means should be used to protect the most vulnerable groups from sudden increases in the costs of farming inputs. Complementary measures such as coupons, loans for upgrading to more sustainable practices or training should be considered.

### Guidelines and Case Studies

**Detailed guidance**
- Environmental Fiscal Reform: What should be done and how to achieve it (http://siteresources.worldbank.org/INTRANETENVIRONMENT/ Publications/20712869/EnvFiscalReform.pdf)
- Environmental Fiscal Reform for Poverty Reduction (http://www.oecd.org/greengrowth/green-development/34996292.pdf)
- Green Fiscal Policy Network (http://www.greenfiscalpolicy.org/)

**Case studies**
- Sweden and Denmark (fertilizers) (http://ec.europa.eu/environment/enveco/taxation/pdf/ch8_fertilisers.pdf)
- Denmark (pesticides) (http://www.ecocouncil.dk/documents/andet/1732-150417-tax-on-pesticides)
- Vietnam (proposal) (http://eepseapartners.org/pdfs/pdfs/112821.pdf)

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