FREE Policy Brief Series

Tax Meat to Save the Baltic Sea

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In a world of perfect markets, where prices are "right", consumers' choice should, with few exceptions, be limited only by their budget constraints. But in the case of agricultural products, the "right" prices are not in place. One reason is that producers in this sector do not bear the costs for the externalities they generate. Focusing on the case of the Baltic Sea, this brief provides some insights into why livestock producers are, by and large, exempted from environmental policies, and raises the question whether something should be done about it.

An Italian expression describes the attempt to juggle too many projects or attain too many goals at once, with the tacit implication that something is bound to fail. "*Avere troppa carne al fuoco*": literally, to have too much meat on the grill. This, in a metaphorical but also quite literal sense, is the dominant impression left by some summer reading about the situation of the Baltic Sea.

The Baltic Sea is home to the world's largest anthropogenic "dead zone". The main culprit is the unsustainable livestock production in the region, generating externalities (i.e., costs that economic actors impose on others without paying a price for it) that short-circuit the functioning of the markets, creating a case for regulatory intervention. The concept of externalities is today most famously related to the issue of carbon dioxide emissions and climate change, felt by many as the most pressing challenge mankind has to deal with at present. In recent years, a lot of brain power has been spent on this, but there is more to environmental degradation and climate change than just CO_2 and rising temperatures. A very conspicuous example is literally under our eyes, in the water body that lies between our lands. What should we do about it?

A Layman Understanding of the Background

For at least three decades, eutrophication (i.e., nutrient accumulation) and hypoxia (i.e., oxygen depletion) in the Baltic Sea has triggered and boosted each other in a vicious cycle. The nutrients discharged in the water fertilize the ocean floor resulting in excess algal bloom. This underwater forest consumes oxygen, thus altering the balance between chemical elements in the water, so that even more nutrients are released and the cycle continues (for further references, see [16, 19, 21]). Beyond the algae and the decreased transparency of the water, these deep changes in the sea environment start to make them noticed in fish stocks depletion, but can more generally become devastating to both the marine and terrestrial ecosystems. Moreover, according to researchers these conditions are going to increase the sensitivity of the area to the global climatic changes expected in the near future. This is seriously threatening a large part of economic activities in the whole catchment of the sea, an area of 22,500,000 km^2 over nine countries with 85 million inhabitants.

Since 1974, all sources of pollution around the sea have been subject to a single convention, the Helsinki Convention, signed by the then seven Baltic coastal states. The Helsinki Commission, or HELCOM, is the governing body of the Convention, whose present Contracting Parties are Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. For over three decades, HELCOM has monitored the situation. Alarming reports have followed one upon the other, together with policy recommendations to the contracting parties.

As stated on its website, *"the work of HELCOM has led to improvements in various fields, but further work is still needed [... and] the remaining challenges are more difficult than earlier obstacles"*. Reductions in emissions achieved so far are low hanging fruits, concerning major point sources, such as larger cities' sewage treatment plants and industrial wastewater outlets. Due to both technical and socio-economic obstacles, achieving further reductions will be a tougher task. This is because it is now time to address diffuse sources of nutrients such as run-off from over-fertilized agricultural lands. Nevertheless, according to numerous studies (among others, [19, 23]), a substantial reduction of the nutrient load discharged into the sea appears necessary in order to reduce further damage; all the more, so given that it takes many decades for the sea to recover. The question is hence whether more stringent policy instruments might be needed.

According to researchers at HELCOM, eutrophication of the Baltic Sea is due to the excess of nitrogen and phosphorus loads coming from land-based sources. About 75% of nitrogen and 52% of phosphorus come from agriculture and the livestock sector. In particular, the main reason for the sharp increase in nutrient loads during the last 50 years is the intensification and rationalization process. This was partly stimulated by the EU Common Agricultural Policy in its early phase, with a geographic separation between crop and animal production [6, 9, 10]. On the one hand, animal farms grew ever bigger, in the order of tens of thousands animals for cattle, hundreds of thousands for swine and millions for chicken farms. These giant facilities produce way more manure than what could be absorbed by crop production in their vicinity. Cheap fodder to these extremely dense animal populations is produced on large scale crop fields elsewhere, too far away for transport of manure to be feasible and instead using high-yield chemical fertilizers. This way, the nutrient surplus is multiplied at both locations; it leaks through the ground or in the waterways from the big heaps of manure that cannot be properly stored or disposed of, and it leaks from the over-fertilized fields (shocking case studies are reported by HELCOM [11]).

However, a different type of agriculture exists in the area known as Ecological Recycling Agriculture (ERA). This is based on more traditional methods and means that farms have a lower animal density and use the manure as fertilizer in an integrated production of crop to be used for animal feed. In this way, ERA manages to better close the cycle of nutrients with very little dispersion to the environment. Scenarios simulations [12] show that, expanding the presence of ERA from the negligible shares it currently accounts for (between zero and a few percentage points, varying by sector and country) would contribute considerably to solving the problem. The nitrogen surplus discharged into the sea yearly could decrease by as much as 61% if all agricultural production in Poland and the Baltic states were converted to the standard of the best ERA facilities currently operating (the Swedish ones), without affecting the current volumes of crop and animal products. However, this is not likely to happen spontaneously, precisely because of the externalities discussed above. As long as the external costs are unaccounted for and ignored, scale economies push in the direction of concentration and intensification, which is the current development path of the sector.

A Difficult Question

Zooming out from the Baltic Sea and looking at the bigger picture, one starts to wonder why the agricultural sector is so seldom a part of environmental policy or even the debate. Recent research has raised awareness about the contribution of the agriculture and livestock sector to climate change [5, 8, 14, 17]. Beyond nitrogen and phosphorus, the expansion of livestock farming is behind the rising emissions of methane. It is the next most common greenhouse gas after CO_2 and responsible for 19% of global warming from human activities. This is more than the share of all transportation in the world combined [18].

A new American Economic Review paper [13] provides a broad picture of the sources of air pollution in the American economy, for the first time computed separately by sector and industry, and with the purpose of incorporating externalities into national accounts. Crop production and livestock production stand out among the five industries with the largest gross external damage (GED), defined as the dollar value of emissions from sources within the industry. In fact, the agricultural sector has the highest GED to value added ratio.

However, greenhouse gases are not the only externality generated by livestock production. The animals' living conditions under modern farming methods favor the emergence of infections and new diseases that reach much further than through direct consumption of related products, as the recent E. coli episode in Europe brought to attention. The generalized use of antibiotics in animal feed, legal and widespread in some countries [3], constitutes an even bigger health threat. This is because it has the potential of generating antibiotic-resistant mutations of bacteria against which we would be completely defenseless should they pass to humans.

Moreover, the public has from an animal-rights and ethics perspective become increasingly concerned about the animals' living conditions. 77% of respondents to the Eurobarometer 2005 believe that the welfare-protection of farm animals in their country needs to be improved. 96% of American respondents to the Gallup 2003 survey say that animals deserve legal protection, and 76% say that animal welfare is more important than low meat prices. Additionally, a comparable share advocates passing strict laws concerning the treatment of farmed animals.

In rich countries, the increased share of meat in the diet, which has been stimulated by decreasing relative prices, constitutes according to some medical research a health hazard in itself. In developing countries, raising livestock is an inefficient and expensive converter of fossil fuels into calories for human consumption. In addition, fodder production often displaces other important land uses such as forests.

It is easy to rationalize the absence of these issues from the policy agenda. It is not just a matter of powerful lobbies. The ownership structure and size composition make the agricultural sector so heterogeneous that the challenges in regulating it can easily be imagined. Adding to this, is the special role of food in culture, the “local” products so often linked to national identity, the romantic idea of the land nourishing its people, and of course the strategic role of being food self-sufficient [7]. In the past, the latter was linked to wars and famines. Perhaps, even in our projections about the future, self-reliance in food production still plays an important role in the perspective of global climate changes and accordingly limited or modified trade flows. However, we cannot afford to grant this sector a special status and ignore all the social costs it generates. Can we learn anything from current research on how all these externalities should be addressed?

Policy Tools

In the terminology of Baumol and Oates' classic book on environmental policy, instruments can be categorized as "command and control". For example, explicit regulation of standards and technologies with associated prohibitions and sanctions; information provision, that then lets the power in the hands of the consumers; and price-based instruments, in the form of taxes, subsidies or trading schemes. These can be imposed on inputs or output, with different implications [4].

The relatively high level standards of EU environmental legislation (legally stipulated maximum livestock density per hectare, requirements of minimum manure storage capacity, ban on winter manure spreading) is effectively enforced in some countries. In the newer members states, on the other hand, issues have been reported [15] in the form of incomplete translation of EU legislation into the national regulations and ineffective enforcing, significant examples of unlawful practices by foreign companies (e.g. Danish companies in Poland and Lithuania) and limited public access to environmental information. When it comes to non-EU members in the Baltic Sea area, these problems are scaled up, with very large animal farms, lack of many important environmental regulations (no limits on livestock density, capacity of manure storage or ammonia emissions from stored and utilized manure, too generous limits for amount of manure allowed, etc.) and an insufficient environmental information system.

Information undoubtedly plays an important role, but to rely on consumers' pressure might not be sufficient to solve this type of issues. Consumers are not famously a very effective pressure group, because of organizational issues and the classic collective action problems. Direct regulation of activities is certainly necessary, especially when it comes to the most important rules of the game for producers. However, the heterogeneity of the sector creates a trade-off between environmental precision and transaction costs of implementation and control in practice. For example, the damage of nitrate leaching depends on the type of soil; the policy measure is precise when it restricts leaching losses on sites that have specific characteristics. However, the costs of enforcing measures only at these sites are high. Alternatively, curbing nitrate use in general has low transaction cost, but because it will also affect sites without problems of nitrate in the groundwater, it also has low precision. This may be considered unfair or illegitimate [24].

Another limit of this approach is the lack of flexibility: once a particular practice becomes forbidden, it is likely that some other behavior emerges from the creativity of the actors involved that was not foreseen by the norm but could potentially present the same problems as the forbidden one. This will happen as long as the private incentives of the actors are not aligned with the policy goal.

Often the best way to curb a particular activity that, as in this case, has a number of unwanted side effects, is not to ban it but to put a price on it. As in the case made for CO_2, a market based approach could also in this area offer the advantage of being cost-effective and at the same time stimulate creative new solutions, e.g. new technologies for manure processing. Therefore, one immediate questions concerns why the agriculture sector is not included in the European emission trading scheme (ETS)?

The European Union launched already in 2005 its version of a cap and trade scheme, covering some 11,000 power stations and industrial plants in 30 countries. As from 2013, the scope of the European ETS will be extended to include more sectors such as aviation, but not agriculture or livestock. The main limitation of ETS is that it does not address spatial concentration problems. When emissions have an immediate effect on the local environment, permit trading does not guarantee the achievement of targets at each location. On the contrary, the possibility of trading emission permits combined with economies of scale

might lead to the emergence of emission hotspots, sites with highly concentrated amounts of pollutants locally affecting the environment and the population. A proposed variation is a scheme for tradable *concentration* permits, either for manure [20] or for animal production [2]. A concentration permit is defined as the permission to deposit a quantity of pollutants at a specific location. The permits can then enter a trading system, but the use of the right remains linked to the site. Some authors believe that in practice, such systems generate high transaction costs and cannot achieve cost-effectiveness.

An input tax, for example on chemical fertilizers or imported fodder, or a direct tax on emissions would only affect the balance between domestic production and imports from countries that do not have the same regulation. Moreover, as discussed above, emissions are far from being the only problem. An alternative, as argued by Wirsenius, Hedenus and Mohlin at the Chalmers University of Technology and University of Gothenburg [22] is an output tax, i.e. a tax on meat consumption, on the grounds that costs of monitoring emissions are high, there are limited options for reducing emissions apart from output reduction, and the possibility for output substitution in the consumption basket are substantial. Moreover, a tax on consumption would avoid international competition from products that are not produced with the same standards.

A meat tax has shortly appeared in the public debate, for example in the Netherlands and in Sweden, but it has failed to gain much popularity so far. Meat consumption in the area has increased considerably in the recent years –between 30% in Germany and 160% in Denmark since 1960 - and relative prices have fallen. By a combination of price and income effects, it has become a norm to eat meat every day, or even at every meal. It must be recognized, though, that while each single policy instrument discussed above has its shortcomings, because of the many interrelated aspects of the problem, a reduction in output, perhaps through a consumption tax, would address in a more comprehensive way all the different externalities related to meat production. After all, maybe there is just too much meat on our grills.

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Recommended Further Readings

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