Experiences with taxes / levies on fertilisers and pesticides in Norway

Per Kristian Rørstad (per.kristian.rorstad@ior.nlh.no)
Department of Economics and Resource Management
Norwegian University of Life Sciences (UMB)

Introduction

At present, only pesticides are taxed in Norway. From 1988 to 2000 there was also a tax on Nitrogen and Phosphorus in mineral fertilizers. There are few studies of the two policy instruments. The assessments below are therefore to a large degree based on official statistics and personal evaluations

Tax on fertilizers containing N and P

Objectives and design

A tax on N and P in mineral fertilizers was introduced in 1988. The background for the introduction of the tax was the North Sea Conferences (1984 and 1987), where the countries surrounding the North Sea committed themselves to reduce the loads of N and P by 50%. However, there were also general concerns about pollution of fresh water in Norway (esp. P). It is estimated that agriculture contributes about 20% of the total Norwegian load of N to the North Sea (http://www.miljostatus.no).

The tax was levied at the producer and importer level and the tax was per kg N and P. From 1993 to the tax was removed, the tax was NOK 1,21/kg N and NOK 2,3/kg P. In 1995 the tax was about 20% of the estimated price on Nitrogen. Even though only parts of Norway drain to the North Sea, the tax was uniform for all Norway. There was no specific use of the tax revenues.

Effects of the tax

From a theoretical point of view such a relative small tax should not change the use of N and P much. Based on model simulations (Vatn et al. 2002), a rough estimate of the reduction in Nitrogen use is 3-5%. The (theoretical) effects on the environment, e.g. losses of Nitrogen, would be smaller due to decreasing marginal N absorption in plants. These estimations are based on the assumption that the farmers are maximizing income.

If we look at the actual use of N after the introduction of the tax (see figure 1), the use of fertilizers containing N increased to about 1994 and has thereafter decreased. There may be more reasons for this, but one main reason is that the price of fertilizers did not increase after the introduction of the tax (see figure 2). This means that the costs of the system were not born by the farmers, but by the producers and importers of fertilizers. The decrease after 1994 may be attributed to generally reduced prices in Norwegian agriculture.

Another possible explanation for the rather low response to the tax is that farmers may not maximize income. Fertilization plans are mandatory in Norway. However, the tools (computer programs) used to produce the plans have no economic valuations. This means that the plans are based on biological and physical grounds and a tax

will have no influence in this process. As a side note: when fertilization plans were made mandatory, fertilization rates increased.

The farmers perceived the tax as unfair. The tax was removed (effectively from 2000) as a mean to reduce the overall costs in Norwegian agriculture (see table 1 for tax revenues). The plan is that the policy should shift toward other types of policy instruments.

Overall appraisal

The taxes on N and P in fertilizers have had little (or no) effect on the use of fertilizers in Norwegian agriculture. This does not mean that environmental taxes don't work, but the taxes must be larger and it must lead to an increase in the fertilizer price. Input taxes are extremely cheap to implement and run compared to other types of measures. It is estimated that the transaction costs of the fertilizer tax in Norway is less than 0.5% of the tax revenue (Vatn, Kvakkestad and Rørstad 2002).

Tax on pesticides

Objectives and design

The tax system for pesticides was changed in 1999 from a flat rate tax to a tax differentiated according to environmental and health risks. The tax was and still is divided into a control tax and an environmental tax. The former is supposed to cover some of the costs of the Norwegian Agricultural Inspection Service (from Jan. 1 2004 it is a part of the Norwegian Food Safety Authority). In the previous system the control tax was 9%, while the environmental tax was 15.5% of the base price.

The new system is based on a tax per area unit treated. However, the tax is levied on pesticides traded, not on actual acreage. A recommended/upper dose is set by the authorities (norm dose) for each pesticide. The tax on the pesticide is then calculated from this dose. As mentioned above, the tax is differentiated according to environmental and health risks (see table 2). In 2004 the control tax is NOK 16/ha and the base environmental tax is NOK 20/ha. The tax is levied at the importer level. The level of the tax varied between 19 and 73% of the price in 2000 (Vatn, Kvakkestad and Rørstad 2002).

The main reason for the change in the tax system was to induce changes from use of pesticides with relatively high health and environmental risk to pesticides with lower risks. It was also the aim to induce a change from chemical pest management to biological pest management with lower risks (Ministry of Agriculture 1998).

Effects of the tax

Figure 3 shows the development of the trade of pesticides from 1980 to 2002. We see a decreasing trend, but there are rather large variations between years. When the change (and increase) in the tax was announced in 1998, this resulted in stock piling for the pesticides in the highest tax group in the last quarter of that year. Also, when it was announced that the tax should increase in 2000, this lead to further increases in stocks. 2002 was expected to be a "normal" year, with a somewhat higher import than the previous years. The rather large increase from 2001 to 2002 is due to increased use of glyfosat (due to an early fall and sowing of winter wheat). Without the doubling of the glyfosat use, the increase would have been about 25%. (Norwegian Agricultural Inspection Service 2003b). It is hard to evaluate if the change

in the tax has induced a reduction in the use of pesticides, since there always will be yearly fluctuations due to different climatic conditions. However, despite the stock piling that took place and the increase in the use of glyfosat, the average amount for the three last years are lower than for the previous years.

The Norwegian Agricultural Inspection Service (2003a) has also estimated the area treated with pesticides in the different tax groups. After the change in the tax system there has been a significant increase in the share treated with pesticides in tax group 2 (low health and environmental risks). They have also assessed the development in health and environmental risks (figure 4). The assessment is based on trade and not on use, and the figure shows that the average risks for 2001-2002 have been reduced (by about 35%) compared to 1996-1997. However, they underline that this change should not only be attributed to the change in the tax system. There have been other changes in policy measures in the same time period.

Regarding economic effects, table 1 indicates an increase in tax revenues after the change in the tax system. However, data from Norwegian Agricultural Economics Research Institute (2003) does not indicate an increase of pesticide costs (rather a decrease). The changes lead to a price increase for some pesticides, while for some the price decreased.

There have been some surveys regarding the change in the tax system (The Norwegian Agricultural Inspection Service 2003a). The importers are rather critical to the tax level and the way the tax is differentiated, and they want the new system removed. Regarding farmers, many feel they lack information about the system. However, almost 50% of them say that the new system has induced then to change to pesticides with lower risks.

Overall appraisal

The change in the tax system seems to have changed the use of pesticides in the wanted direction. Even though the system has some weaknesses, a differentiation according to risks is wise and seems to work. As mentioned above, also other measures have been introduced, and these have probably increased the awareness and thereby increased the effectiveness of the tax system. The costs of running the system are rather low, about 1% of the tax revenue (Vatn, Kvakkestad and Rørstad 2002).

References (all are in Norwegian only)

Ministry of Agriculture, 1998, *Forslag til handlingsplan for redusert risiko ved bruk av plantevernmidler*. http://odin.dep.no/ld/norsk/publ/rapporter/020005-990284/

Norwegian Agricultural Economics Research Institute, 2003, *Budsjettnemda for jordbruket. Jordbruket totalregnskap 1959-2002*. http://www.nilf.no/Totalkalkylen/Bm/TotalkalkylenHoved.shtml

The Norwegian Agricultural Inspection Service, 2003a, *Evaluering av avgiftssystemet for plantevernmidler*, 25p. http://landbrukstilsynet.mattilsynet.no/vedlegg/Rapport_eval_plvmavg2003.doc

The Norwegian Agricultural Inspection Service, 2003b, *Omsetningsstatistikk for plantevernmidler 1998 – 2002*, 11p.
http://landbrukstilsynet.mattilsynet.no/vedlegg/Plvm_stat02.doc

Vatn et al, 2002, *ECECMOD(2.0): An Interdisciplinary Research Tool for Analysing Policies to Reduce Emissions from Agriculture*. Report no. 2/2002, Agricultural University of Norway, Ås, Norway, 45p.
http://www.nlh.no/forskning/mildri/publikasjoner/ececmod_doc.pdf

Vatn, Kvakkestad and Rørstad, 2002, *Policies for multifunctional agriculture. The trade-off between transaction costs and precision*. Report No. 23. Department of Economics and Social Sciences, Agricultural University of Norway, Ås, Norway, 96p.

State budgets: http://odin.dep.no/odin/norsk/publ/budsjett/index-b-n-a.html

Table 1. Total tax revenue from environmental taxes in Norwegian agriculture. All numbers are in NOK millions. Sources: State budget (St.prp. nr. 1) various years.

Year	Tax on mineral fertilizers	Tax on pesticides	Total
1992			179
1993			187
1994			192
1995			186
1996			193
1997	171	21	192
1998	165	24	189
1999	108	35	143
2000	2	53	55
2001	0	35	35

Table 2. Tax on pesticides. Total tax levied includes control tax. Source: Norwegian Agricultural Inspection Service (2003a).

Tax group	Environmental tax	Type of pesticide	Total tax levied (NOK/ha)
0	0*base tax	adhesives	0
1	0,5*base tax	seed protectant and biological	26
2	1*base tax	low health and environmental risks	36
3	4*base tax	one of the risks high	96
4	8*base tax	high health and environmental risks	176
5	50*base tax	for hobby, concentrate	1016
6	150*base tax	for hobby, ready for use	3016

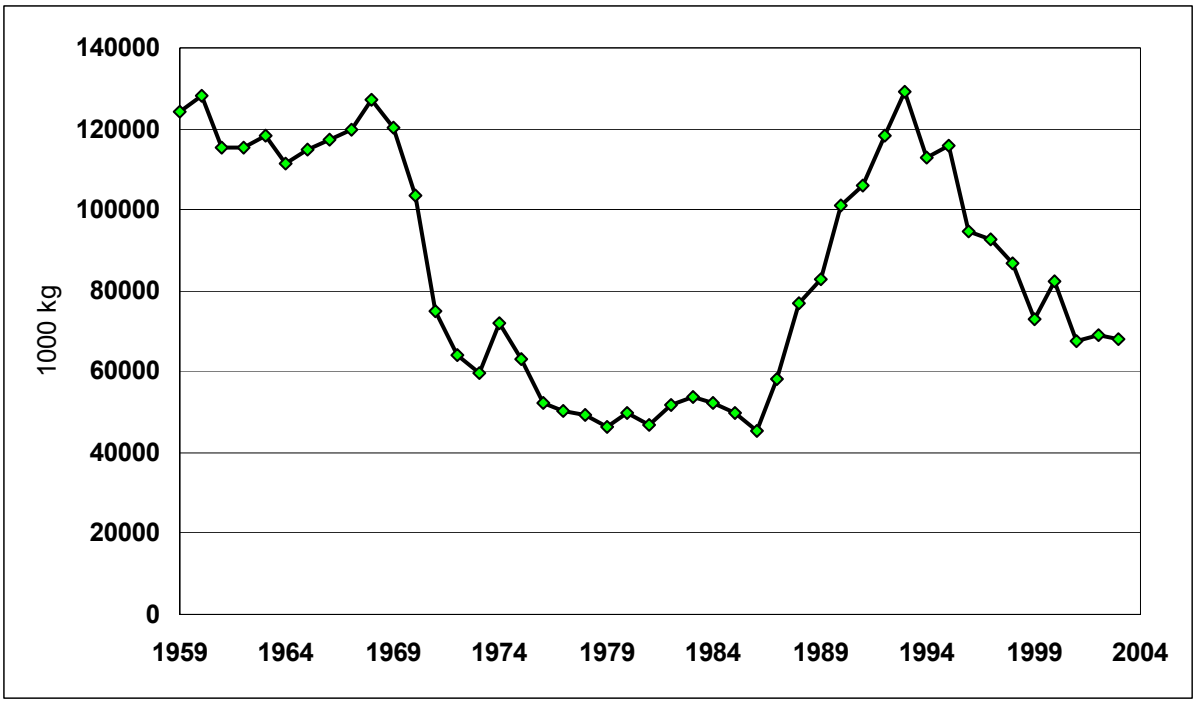

Figure 1. Estimated total consumption of mineral fertilizers containing Nitrogen. Source: Norwegian Agricultural Economics Research Institute (2003).

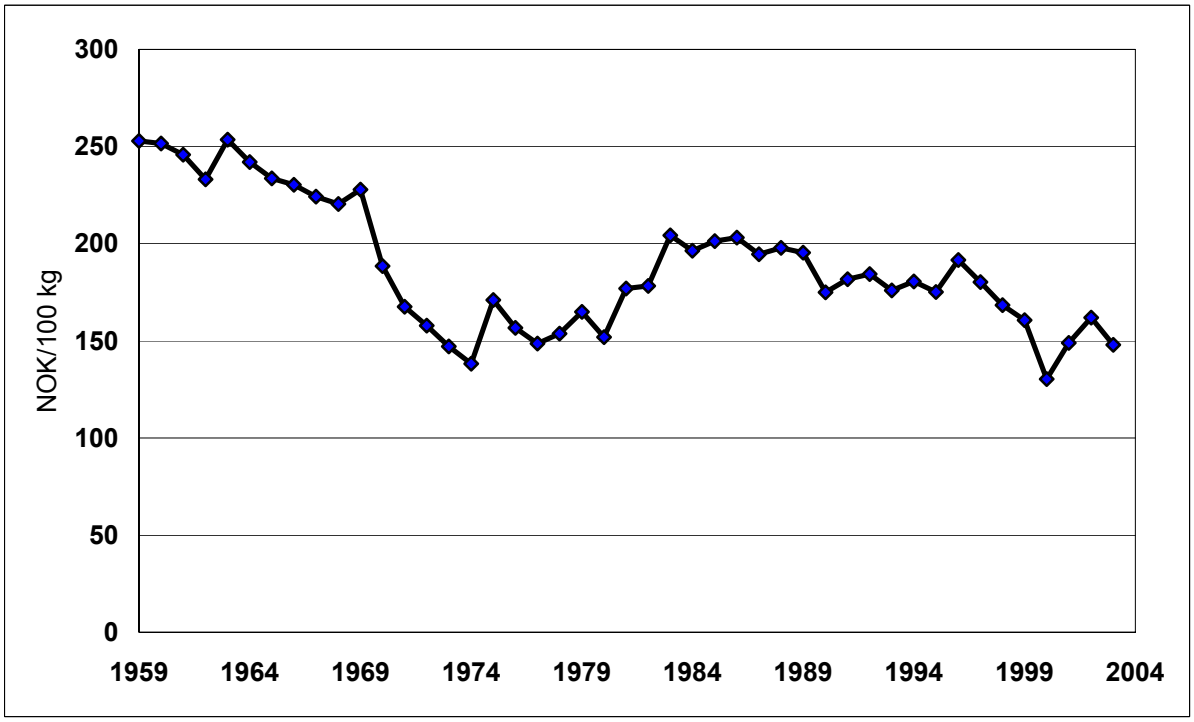

Figure 2. Price on mineral fertilizers containing Nitrogen. Prices are inflated to 2003 level. Source: Norwegian Agricultural Economics Research Institute (2003).

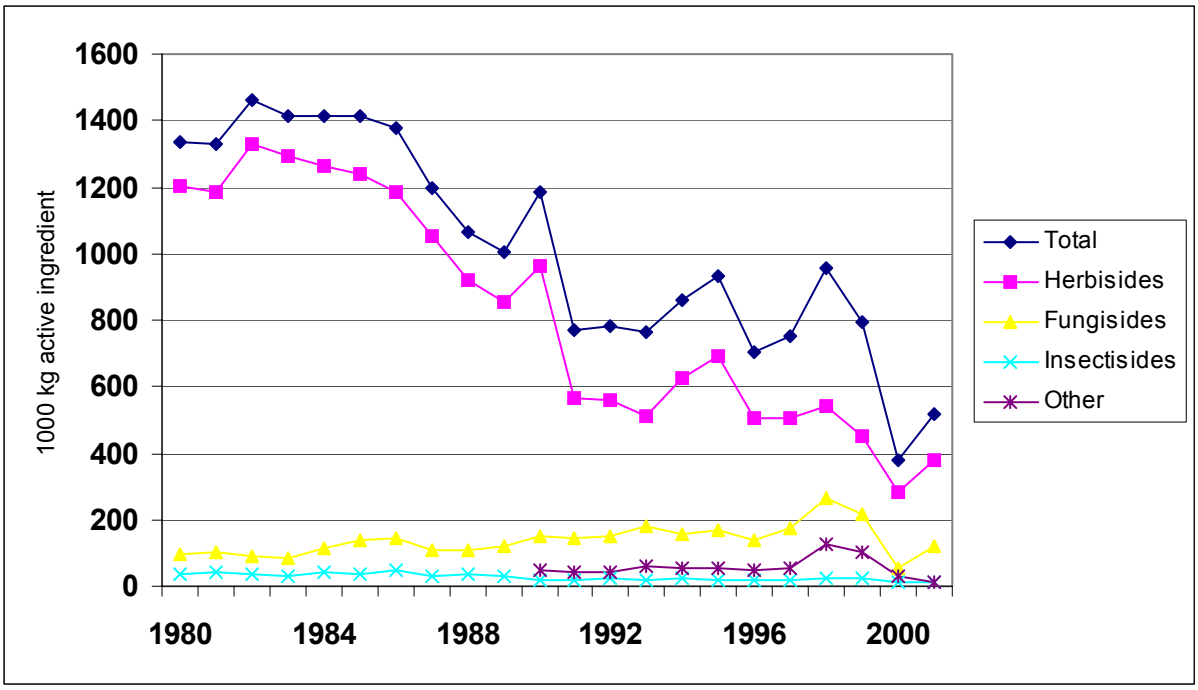

Figure 3. Trade of pesticides (1000 kg active ingredient) in Norway 1980-2002. Source: Norwegian Agricultural Inspection Service (2003b).

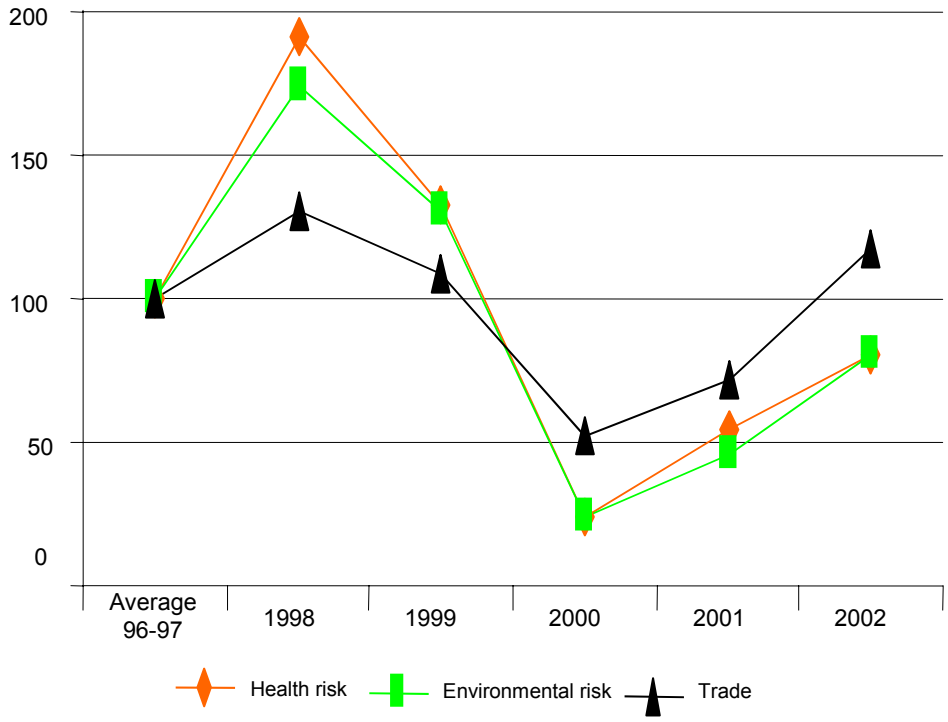

Figure 4. Relative development in health risk, environmental risk and trade (average 1996-1997=100). Source: Norwegian Agricultural Inspection Service (2003b).