

Fertilizer tax in Swedenⁱ

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Brief summary of the case

Sweden's tax on mineral fertilizers had been in place for 25 years when it was suddenly revoked in 2009 in response to the financial crisis. Initially it targeted both nitrogen and phosphorus, but cadmium present in phosphorus replaced the latter taxation base after the first ten years. The tax rate for nitrogen set at SEK 1.80 (EUR 0.18) per kg N was relatively modest, while the tax rate for cadmium at SEK 30 (EUR 3) per gram was more significant.

Two recent analyses have been able to disentangle impacts of the tax with advanced methods, finding a net reduction in nitrogen use of about 6%, corresponding annually to about 10,000 tonnes of N. The cadmium tax component has previously been found to have been effective.

The fertilizer tax was introduced initially to complement a price regulation charge on fertilizers that generated revenues for export subsidies to farmers. The latter was abandoned in anticipation of EU membership, whereby farmers had to accept a new revenue recycling mechanism linked to environmental measures, and without full compensation.

Environmental NGOs have advocated for a reintroduction of the fertilizer tax, whereas farmers oppose it. A parliamentary majority has advised the government against its announced plan to reintroduce the tax. The proposal remains a controversy, particularly among farmers, and currently appears to be stalled.

1 Description of the design, scope and effectiveness of the instrument

1.1 Design of the instrument

The fertilizer tax came into effect in 1984 and was in place until the end of 2009 when it was abolished. The tax initially targeted nitrogen (N) and phosphorus (P) in mineral fertilizers, but from 1994 cadmium (Cd) replaced phosphorus. Cadmium occurs, at varying concentrations, in mineral deposits of phosphate rock (hence phosphate fertilizers are frequently sources of cadmium pollution in the soil).

The initial tax rate for nitrogen was SEK 0.30 (EUR 0.03) per kg N. It was gradually adjusted to reach SEK 1.80¹ (EUR 0.18) per kg N by 1994 and was maintained at that rate until its abolishment in 2009. The tax rate for phosphorus reached SEK 1.20 (EUR 0.12) per kg P (1993). The tax rate for cadmium was SEK 30 (EUR 3) per gram (subject to a minimum threshold of 5 g Cd per ton of phosphorus).

The tax on mineral fertilizers applied to importers and manufacturers. There were no opportunities for reductions. Manufacturers and importers were under a duty to register, submit returns and pay the tax on quantities of mineral fertilizers delivered each month.

¹ SEK fluctuates against EUR; exchange rates as of Oct 2009.

A separate price regulation charge on mineral fertilizers was levied between 1982 and 1992. Its tax base related to the contents of nitrogen, phosphorus and potassium (NPK). This charge effectively increased the price of the mineral fertilizer tax (historical rates are listed in ECOTEC, 2001). The combined price regulation charge and fertilizer tax on nitrogen peaked in 1991 with SEK 2.35 (EUR 0.24) per kg N and SEK 4.99 (EUR 0.50) per kg P respectively.

1.2 Drivers and barriers of the instrument

The tax on mineral fertilizers was introduced for health and environmental reasons to curb leaching of nitrogen into drinking water and the Baltic Sea. In contrast the price regulation charge, that predated the tax, was a financing instrument to support agricultural export subsidies for surplus cereals (Naturvårdsverket, 1997; Rougoor et al, 2010:882).

Following the peaking of world market prices for mineral fertilizers and the financial crisis in 2008-2009, pressures from farmers were building up to abolish the fertilizer tax. The prices of mineral fertilizers up to 2008 increased by about 15-20%. The fertilizer tax prior to these developments amounted to about 20% of the costs of mineral fertilizers.

The motion to revoke the tax suggested that environmental impacts were moderate, citing reductions of 1,500 tonnes of nitrogen leaching per year (Finansdepartementet, 2009). At the same time, Naturvårdsverket, Sweden's EPA, deplored the lack of an adequate impact assessment of the motion to revoke the tax (Sveriges Radio, 2009).

The tax on mineral fertilizers was abolished in return for an increase in the reduced diesel tax rate for farmers (Sveriges Radio, 2010). These changes reflected how concerns of surface water quality had lost prominence to climate change concerns in policy discussions.

1.3 Revenue collection and use

Annual revenues from the fertilizer tax amounted to about SEK 350 (EUR 35) million from 1994 (when it reached its final level) until it was abolished at the end of 2009 (Eurostat, 2014). Annual revenues relating to cadmium have not exceeded SEK 3.7 (EUR 0.37) million (Naturvårdsverket, 1997:61).

From 1984 to 1994 the tax was levied and administered by the National Board of Agriculture. Most of revenues generated between 1984 and 1994 were used for research and environmentally oriented projects under the Board. The projects have included investment in fertilizer management units, advisory services and special information and research programs in the agricultural and forestry sectors. From 1995, the ring-fencing of revenues from the tax to the National Board of Agriculture ended. With the abolition of the price regulation charge, the fertilizer tax rate was increased and its administration shifted to Sweden's taxation authorities with revenues accruing to the national treasury. Some funds were still allocated for environmental improvements in agriculture. The estimated costs of revenue collection were about SEK 0.5 (EUR 50,000) million annually (Naturvårdsverket, 1997:63).

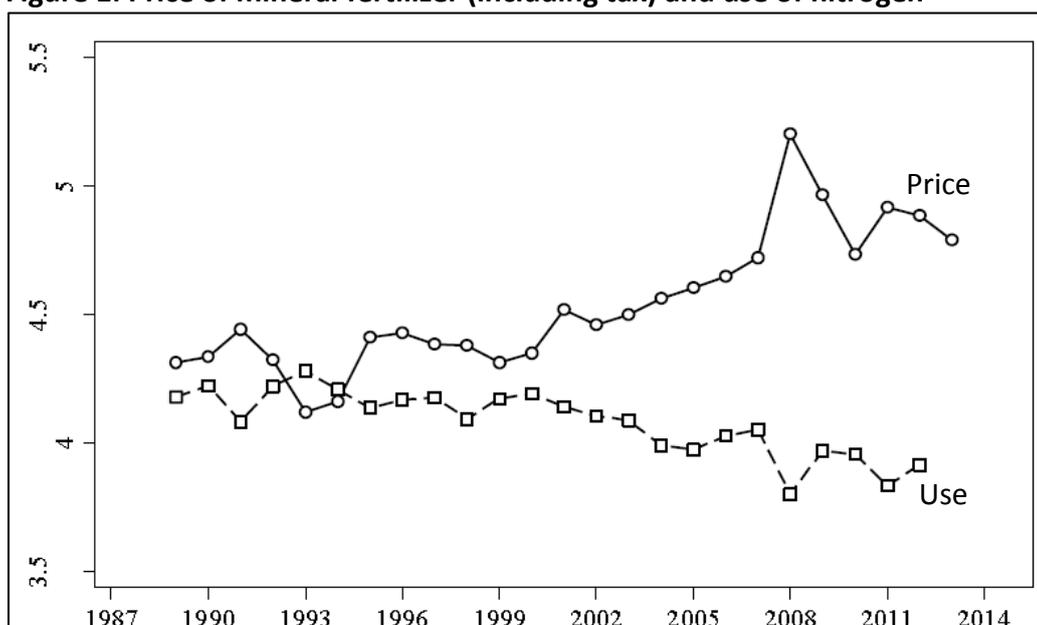
1.4 Environmental impacts and effectiveness

The fertilizer tax provided an incentive to reduce generous and excessive ‘insurance’ applications of fertilizer which were common practices among many farmers as a precautionary measure (Nielsen, 2010). It also promoted substitution through improved utilization of nutrients in organic fertilizer from farm animals and could facilitate manure trade between livestock and arable crop farmers.

The nominal tax rate of SEK 1.80 (EUR 0.18) per kg N was not adjusted between 1994 and 2009, implying a depreciation of the real effective tax rate. Nonetheless, behavioural responses depend on the final sales prices of nitrogen and Figure 1 shows sales prices (which include the fertilizer tax and price regulation charge up to 1992) relative to the consumption of nitrogen fertilizers in Sweden.² As noted above, the combined tax and charge rates peaked in 1991 and made up 30-35% of sales prices (Söderholm och Christiernsson 2008). In 2008 the world market price peaked. Both years see a drop in the purchases of nitrogen fertilizer.

According to estimates from the National Board of Agriculture, the tax lowered the optimal fertilizer dose – for instance for wheat from 145 to 135 kgN/ha (Naturvårdsverket, 1997:66).

Figure 1: Price of mineral fertilizer (including tax) and use of nitrogen



Source: (NIER, 2014:66)

Sweden’s National Institute of Economic Research (NIER) recently published analysis of 25 years of experience with fertilizer taxation in Sweden (Konjunkturinstitutet, 2014). The analysis identifies a long run demand elasticity of -0.4 for mineral fertilizer N. It suggests that if the tax is reintroduced at the previous nominal level of SEK 1.80 (EUR 0.18) per kg N, it would lead to an annual reduction of 10,042 tonnes of nitrogen use, amounting to 6% less total use. The analysis finds that abatement costs per kg of N would be as low as SEK 0.87 (EUR 0.09) per kg N and competitive with most other measures. For higher abatement levels,

² Some illegal imports of mineral fertilizer have been confirmed in court cases, but limited in scale (ATL, 2003).

the analysis shows that unit costs will increase but remain relatively low (up to SEK 6 (EUR 0.6) per kg N).

The nominal tax rate of the cadmium component of the fertilizer tax also remained constant from 1995 to 2010. A governmental assessment (SOU, 2003) found the cadmium tax to have been very effective. The average contents per tonne of phosphorus were reduced from 25 grams in 1995 to less than 10 grams in 2000 (SOU, 2003:145). The cadmium tax has a large incentive effect as farmers using low-cadmium fertilizer (less than 5 g) could avoid paying the tax (OECD, 2004:116).

The phosphorus tax component had been phased out by 1994 as the reduction goal of 50% had been met. In the first two years since the phase out of the tax, consumption of phosphorus increased by more than 20% (Naturvårdsverket 1997:67), but then decreased partly due to the introduction of the cadmium tax (Nordic Council of Ministers, 2002). Although not implemented to reduce usage of phosphate fertilizer, the cadmium tax is believed to have had a negative impact on its consumption (Söderholm och Christiernsson, 2008).

1.5 Other impacts

Fertilizer accounts for about 15% of farmers' operating costs, implying that a 10% tax corresponds roughly to 1.5% of operating costs. On the other hand, the EU basic payment scheme is considerably higher for farm land in Sweden, as corrected by purchasing power parity (121:100 in 2015).

The competitive effects of taxes on fertilizers are difficult to disentangle from other factors. Since most other European countries do not tax fertilizers, there will be negative impacts on competitiveness unless revenues are recycled back to farmers to neutralise the burden of the tax. Swedish farmers were not compensated fully for the tax, and a government investigation observed that the fertilizer tax did impose a competitive disadvantage for Swedish agricultural products, although at a level deemed 'modest' (SOU, 2003).

When the abolition of Sweden's fertilizer tax was announced in autumn 2009, the prices of mineral fertilizers dropped correspondingly. However, prices soon rebounded implying that the costs to farmers returned to the previous level. Hence it is not surprising that no marked increase in fertilizer consumption could be observed in 2010.

A report prepared by an office of Sweden's government (Statskontoret, 2011) was unable to confirm that price levels of mineral fertilizer in the Swedish market fluctuate with prices in the European market. The report deplored the lack of market transparency however concluded that prices of mineral fertilizers were relieved corresponding to the fertilizer tax relief "or slightly less" (Statskontoret, 2011:52), hinting at possible inroads into tax reliefs from the supplier monopoly in mineral fertilizer markets. The question seems to have been whether fertilizer suppliers reaped some of the benefits from the tax repeal.

2 Stakeholder engagement

In the government's 1979 Commission on Application of Chemicals in Agriculture and Forestry Swedish farmers' organizations opposed the recommendation to introduce taxes on fertilizers. In a minority statement they argued, that additional and better advice to farmers was a more effective way to deal with nutrient pollution. Moreover, farmer organizations opposed a role foreseen for regional offices of the Environmental Protection Agency in implementing nutrient policy measures for farmers and preferred the responsibility to rest with the National Board of Agriculture and its regional offices. Finally, farmer organizations called for more research into nutrient leaching.

In 1986 an inter-ministerial government Task Force against Pollution of Marine Waters was established, chaired by the Minister of Environment. Concurrently the Minister of Agriculture set up a committee, named the Intensity Group, to consider policy changes in agricultural support policies to mitigate surplus cereal production and the related pollution challenges. The Federation of Farmers and the Swedish Society for Nature Protection were represented on this committee along with consumer organizations and scientific expertise. One of the recommendations of the Intensity Group was to double the fertilizer tax from 5 to 10%. This would raise more funds for staff and advisory activities at the National Board of Agriculture. Farmer organizations opposed this recommendation and called for regulations tailored more carefully to local conditions, as well as to more attention for run-off from organic fertilizer and manure of livestock. Finally, they demanded economic compensation for costs related to all new policy measures, notwithstanding the polluter-pays principle. As a result the government agreed to continue ring-fencing revenues from fertilizer taxes to agro-environmental subsidies as the tax rate was doubled in 1988.

The above account of events is based on Daugbjerg (1998:99) who also hints that environmental NGO's did not have a significant role in committee deliberations, although they did issue a statement calling for a large increase in the fertilizer tax. It was rather the way the government's National Board of Agriculture defined its interests in relation to the fertilizer tax - with revenues allowing for its activities to increase - that paved the way for a doubling of fertilizer tax rates. It also acted under the shadow of a government with a stable majority supporting its policies in parliament.

3 Windows of opportunity

Policy formulation: The government's 1979 Commission on Application of Chemicals in Agriculture and Forestry was established in response to concerns about nitrates in drinking water. Its 1983 report recommended the introduction of fertilizer taxation (Daugbjerg, 1998:99).

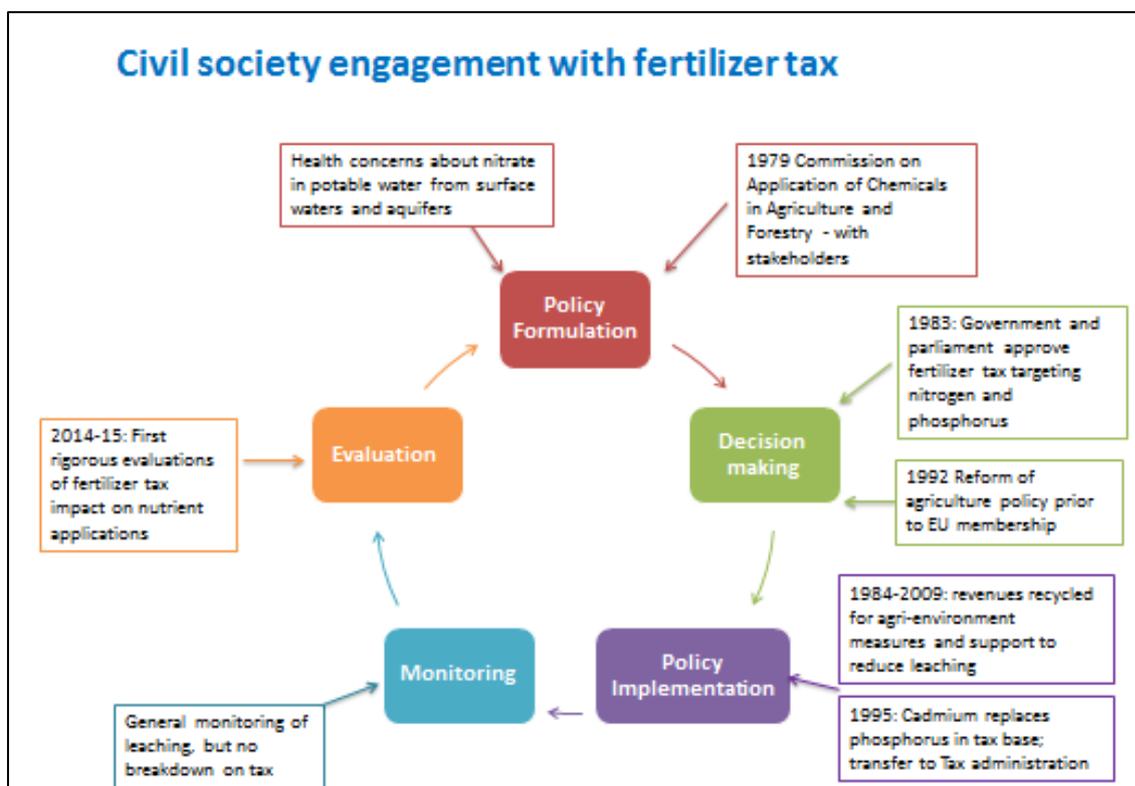
Decision-making: On the basis of the 1983 report, the government proposed a fertilizer tax with a rate of SEK 0.30 (EUR 0.03) per kg N and SEK 0.60 (EUR 0.06) per kg P, or about 5% of mineral fertilizer prices. It began as a small and almost symbolic surcharge on a previously introduced price regulation charge, which had been introduced to finance cereal export

subsidies to farmers and had an already established administrative system for levying the charge.

Policy implementation: From 1984 to 1995 the tax was levied and administered by the National Board of Agriculture. Following the abolition of the price regulation charge, the fertilizer tax rate was increased and its administration shifted to Sweden’s taxation authorities.

Monitoring: Although nutrient leaching is monitored and accounted for, there is no breakdown on impacts from individual policy instruments.

Evaluation: The fertilizer tax has been reviewed and assessed several times (see sections 1.4 and 1.5 as well as reference list).



4 Insights into future potential/reform

4.1 Actual planned reforms and stakeholder engagement

Sweden’s Social democratic-Green government in 2014 announced its intention to reintroduce the fertilizer tax (Sveriges Radio 2014). In 2015 a majority in parliament passed a motion cautioning against it, stressing costs to farmers and lack of environmental effectiveness (SVT, 2015). The tax is a cause of controversy with farmers and appears now to be stalled.

4.2 Suggestions for future reforms – instrument design and civil society engagement

A comprehensive inquiry into taxes on fertilizer and pesticides in Sweden published by a government committee in 2003 (SOU, 2003) provides an overview of approaches and experiences in other EU Member States. In particular it considered Denmark's approach with nutrient accounts and the Dutch MINAS scheme with the taxation of nutrient losses, based on detailed nutrient accounts. The committee found these schemes relatively burdensome and difficult to administer. It also advised against extending the fertilizer tax to include nutrients in animal feed, stressing concerns about compatibility with trade law. The committee concluded that Sweden's fertilizer tax had 'comparatively little impact' citing estimates of a reduction of 1,500 tonnes N annually. It nevertheless recommended retaining the tax. Unfortunately the otherwise voluminous report provides no details or even references for the cited impact calculations.

Two recent reports have challenged previous estimates of the effectiveness of the fertilizer tax. In addition to the report from Sweden's National Institute of Economic Research (NIER) cited in section 1.4, there is also a new study highlighted in a policy brief from the Agrifood Economics Centre (2015). Weckmann (2015) develops a crop and region specific mathematical model and finds environmental impacts in the same magnitude as the NIER report, while the reported costs per unit of N are somewhat higher (SEK 11 (EUR 1.1) per kgN). Weckmann suggests that if a fertilizer tax was to achieve the national reduction targets alone it would require untenable rates, but that a modest tax can provide value for money compared to other measures, for example being four times as cost-effective as wetlands (Agrifood, 2015:6). These two studies are presently informing the policy debate in Sweden. Farmer organizations have responded to these findings with doubts (Landbruksnytt, 2015).

4.3 Suggestions for replicability

A tax on nitrogen in mineral fertilizer is relevant to a range of member states, where excess application is creating health and environmental burdens. Prior to EU membership, both Finland and Austria had taxes on mineral fertilizers, which were abolished to provide a level playing field with other EU-farmers. The analysis cited above shows that with a tax on mineral fertilizer more costly restrictions on land use can be avoided. There are no formal requirements that impede EU Member States from introducing fertilizer taxes. Croatia currently has a fertilizer tax in place to help protect its coastal waters that are essential to its tourism industry (UNECE, 2014).

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