

ENVIRONMENTAL TAXES- THE CASE OF SWEDEN

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Introduction

As environment is a public good having no price, overexploitation has led to acidification, extinction of species, ozone depletion and other serious environmental threats today facing our planet. However, there are a number of measures through which governments can restrict emissions and in that manner promote sustainable development. Among these is the use of environmental taxes and/or charges, both aiming at influencing and speeding up more environmentally friendly approaches towards production and consumption. Hence these instruments are practical tools for linking economy and ecology. This paper will briefly look into the experiences of Sweden and its use of environmental taxes and charges. Within the OECD Sweden is the country which has developed and put in practice most environmental taxes and charges¹.

The review will be structured as follows: the first part aims at explaining how the taxes and charges are supposed to work and how they are set. The second part presents the history of these economic instruments in Sweden and gives a short description of the taxes and charges which are thought to be most important. In connection to each instrument the actual effect is discussed. The paper will be concluded with some general comments and critiques of the taxes. To a large extent the facts in this paper are based on the report "Environmental taxes in Sweden-economic instruments of environmental policy" published by EPA, the Swedish Environmental Protection Agency. The persons I have been in contact with at the Swedish Ministry of the Environment, Ministry of Finance and Naturskyddsföreningen, an environmental NGO, all refer to this report and say that this is the most comprehensive and recent documentation of environmental taxes in Sweden.

I. What are environmental taxes?

By introducing environmental taxes actors in the economy will bear their own costs for the environmental effects from their production or consumption. In this way producers are inspired to choose production methods and emphasis that are less environmentally harmful whereas consumers, for their part, have reasons to take the environmental taxes into consideration since the taxes affect the prices of products that are levied with the tax. Then comes the question; how do you value and put a price on the environment?

There exists a number of different methods in economic theory to estimate environmental assets but usually it is the *avoidance cost method* that is used for determining levels for taxes/charges. Practical estimates are made of the investment costs and increased operating costs which will be incurred in reducing a given emission. It is then, given a certain rate of interest and depreciation period, possible to calculate average marginal cost of treating a given emission and express it in SEK²/kg. The marginal cost usually rises as

¹ Axelsson, Skatteväxling-ekologisk skattereform för bättre miljö och ökad sysselsättning p67

² SEK= the Swedish currency crown. At the time of writing 1 SEK=0,12 US\$

the treatment level increases. The level of the tax/charge is then set according to the desired level of treatment. In practice, this level is set by political decisions.³

The economic instruments I refer to are environmental taxes *and* charges, hence two different economic instruments. Although the difference between them is not always clear cut one can say that a *tax* is a general revenue going to the state budget whereas a *charge* is earmarked for a specific purpose and is returned to those paying it in some form. An example of a *charge* is the nitrogen oxides charge. Total revenues from this charge, apart from administrative costs, are refunded to charge payers in proportion to their share of total energy output. In this way the charge payers as a group do not incur any financial loss as a result of the charge and the state does not receive any financial revenue from it. The intention is to avoid competitive disadvantage for those plants subject to the charge in comparison to others which are not.⁴

One should keep in mind that the use of environmental taxes does not necessarily have to aim *only* at reducing dangerous emissions. The taxes also provide the government with another income source. However, an environmental tax having a pronounced effect on production and/or consumption patterns inevitably results in falling income

Environmental taxes and charges may have either direct or indirect effects, or both. A direct effect means that the environmental cost is reflected in the marketprice and in that way influence consumers' and producers' choices. Economic instruments may also lead to indirect effects in that the money they bring in is used for certain environmental causes, as for example information or measures for recycling.

II. The Swedish experience

Economic instruments have been part of Swedish environmental policy for rather long but did not have their major breakthrough until the late 1980s. The Environmental Charges Commission (ECC) was appointed in 1987 and its reports resulted in the introduction of a number of new economic instruments in environmental policy. The research and introduction of other instruments have continued and Sweden has witnessed an upward trend concerning the interest for the use of environmental taxes and charges. Tax on petrol and motor alcohols was introduced already in 1929 and since then Swedish governments have chosen to tax petrol considerably higher than other fuels (the tax measured in öre/kWh on petrol is double that of all other fuels).⁵ The fiscal reform in 1990-91 implied that the environmental profile of taxes was reinforced. In total the fiscal burden on energy increased by 18 milliard SEK during the reform, corresponding to about 1,2 % of GNP⁶.

³ EPA, Environmental taxes in Sweden-economic instruments of environmental policy p14

⁴ *ibid* p22ff

⁵ SOU, Energi och miljöskatter I Sverige p108f

⁶ SOU p112

The actual state revenue from energy and environmental taxes in 1995 was 46,1 milliard SEK, equivalent to 2,8 % of GNP and 10,9 % of total tax revenue.⁷

The following is a list of the environment taxes and charges levied in Sweden by 1997⁸:

ENERGY

- * Sulphur tax
- * Nitrogen oxides charges
- * Carbon dioxide charge

AGRICULTURE

- * Environmental tax on commercial fertiliser
- * Pesticide tax

TRAFFIC

- * Vehicle scrapping charge
- * Environmental classification of vehicles
- * Differential fuel taxation
- * Environmental charges on domestic air traffic
- * Water pollution charge

OTHER

- * Battery charge
- * Natural gravel tax
- * Charges used to finance specific activities
- * Exemption charges
- * Environmental protection charge
- * Differential refuse collection charges
- * Deposits and charges on drink containers
- * Charges related to producer responsibility for packaging and tyres

Some important taxes/charges:

(i) Sulphur tax

One of the most serious environmental problems in Sweden is the acidification of soil and water. Researchers estimate that one-fifth of the soil in the forests and the lakes are seriously affected by acidification, mainly due to emissions of compounds of sulphur and acidification. The tax on sulphur came into effect 1 January 1991, aiming at reducing emissions from burning oil, coal and peat. For these fuels the sulphur content is measured and the levied tax is set at SEK 30/kg sulphur. Currently there are 260 companies registered for payment of the tax.⁹

The environmental effect of the tax should be summarized as having been successful. The Swedish parliament had set a target of an 80% reduction of total sulphur emissions between 1980 and 2000, which was achieved as early as 1994. The main part of the reduction is due to less use of fossil fuel. EPA estimates the tax to be responsible for 30% of the total reduction in sulphur emissions from 1989 to 1995. Although the sulphur emissions from Swedish industries have fallen drastically, the acidification continues as large quantities of sulphur reach Sweden from abroad.¹⁰

⁷ EPA p134

⁸ ibid p5

⁹ ibid p24

¹⁰ ibid p30

Table 1:
Sulphuremissions, domestic sources 1980, 1990
and 1994, in 1 000 ton.¹¹

Emission source	1980	1990	1994
Roadtraffic	11	8	2
Other means of communication	32	29	22
Combustion of oil and gas	318	34	22
Combustion of coal	6	11	3
Combustion of solid fuels	4	9	11
Industry processes	137	43	36
Total	508	134	96

Source: NUTEK (1996)

Table 2:
Sources of sulphur emissions in Sweden 1980
and 1994, percent.¹²

Country	1980	1994
Sweden	17,2	6,6
Denmark	6,8	4,7
Finland	4,0	1,4
Poland	8,2	9,7
Former Sovietun.	8,2	3,6
Great Britain	9,3	10,9
Former Checkosl.	4,2	3,9
Unknown	24,5	41,4
Total	100	100

Source: NUTEK (1996)

(ii) Nitrogen oxides charge

As with sulphur, emissions from nitrogen oxides in combination with sulphur deposition lead to acidification of water and soil. Since nitrogen oxides (NO_x) are formed during combustion and the actual quantity produced depends on the temperature at which combustion takes place, the NO_x charge must be based on actual recorded emissions. The charge, introduced on 1 January 1992, is levied at a rate of SEK 40/kg NO_x.

Monitoring emissions requires investment in monitoring equipment. Initially the charge was confined to large combustion plants but with time, as the experience of the system has grown as well as the monitoring costs have fallen, the charge has been expanded to also cover smaller plants. About 200 plants were paying the charge in 1996.¹³

The drawback of the nitrogen oxides charge is that it does not reach enough sectors to have an extensive effect. Of the total NO_x emissions in Sweden, the emissions from the boilers subject to the charge account for a very small amount, just over 3% (1994). Most emissions of nitrogen oxides come from other sources not covered by the charge; road traffic (43%), non-road machines (20%) and shipping (18%). For nitrogen oxide, as in the case of sulphur, domestic emission sources account for only a small part of total emissions. Almost 90 % of nitrogen oxides fallout in Sweden come from abroad.¹⁴ Despite the fact that the parliamentarian set target concerning the reduction of NO_x has not been achieved, EPA is of the opinion that the charge has fulfilled its purpose well. 50% of the emissions reduction occurring between 1990 and 1992 were due to the introduction of the charge. Without the charge the emissions from boilers subject to the charge is estimated to have been 80% higher than they are today.¹⁵

¹¹ SOU p.116

¹² ibid

¹³ EPA p31ff

¹⁴ SOU p123

¹⁵ EPA p36

(iii) Carbon dioxide tax

When fossil fuels burn, concentrations of carbon dioxide in the atmosphere is elevated, which is expected to affect the climate and raise the global mean temperature. Carbon dioxide accounts for the main part of man's impact on the environment. Not surprisingly, tax on carbon dioxide is probably among the most discussed and debated economic instrument internationally. In Europe there are, apart from Sweden, four other countries that currently tax this emission, namely Denmark, Norway, Finland and the Netherlands.¹⁶

In Sweden the tax came into effect at the beginning of 1991 and is levied on all fossil fuels, which are also taxed according to the general energy tax. All fuels used for energy generation are exempt from the carbon dioxide tax and energy tax, and instead energy tax is levied on consumption of electrical energy. Furthermore, since the government was preoccupied with the Swedish industry's international competition, in 1993 it decided to lower carbon dioxide taxes paid by industry to one-quarter of the general level. The tax is adjusted annually in line with inflation. Of all the taxes having an environmental impact, this tax generates by far the greatest revenues for the state. Currently there are about 700 taxpayers: manufacturers, importers of fuels and major users.¹⁷

So what has the effect been of this complicated taxing arrangement?

To evaluate the direct effect of the CO tax is rather difficult since the carbon dioxide tax and energy tax are levied on the same fuels¹⁸. However, over the period 1990-1995 the carbon dioxide emissions in Sweden have increased (55,1 million tonnes of carbone dioxide in 1990, 57,8 tonnes in 1995), mostly due to increased use of biomass fuels by the industry. What happened in 1993 when the energy tax was lowered for the industry was that a shift occurred from fossil to biomass fuels (mostly oil) for this sector. The overwhelming increase of oil consumption has occurred in the pulp and paper industry, which increased its oil consumption by 50 % between 1992 and 1995. This development seems to be due to the fact that the pulp and paper industry rather easily change between biomass fuel and oil.¹⁹

As said earlier, the lower tax on fossil fuels for the industry is thought to be necessary in order to enable Swedish industry to compete internationally. This lower rate have, however, created distortion between different sectors and has led to the fact that measures to reduce the emissions are not taken in the most cost-efficient way.

¹⁶ Ola Jonsson 08/18/97

¹⁷ EPA p42ff

¹⁸ Of the two, the CO₂ tax is a considerably more effective tool for reducing emissions since it is levied in proportion to the carbon content of the fuel.

¹⁹ EPA ibid

Others

I will now very briefly touch upon a couple of the other taxes and charges which have been put in place to reduce environmental distortions.

* Within the traffic sector it is the tax differentiation of fuels which has had the largest success. The first step was different rates on leaded and unleaded petrol being introduced in 1986. Since then the tax differentials between unleaded and leaded petrol has increased in a number of stages and by 1994 leaded petrol had totally been replaced by unleaded petrol. Today leaded petrol is not to be found in the market. Even though the government took some other measures to decrease the amount of leaded petrol being used (such as legislation of catalysators on new cars) without doubt the rapid changeover to unleaded petrol is due to the introduction of differential taxation.²⁰

The introduction of environmental classification of diesel and petrol was the next step, and this too has achieved environmental effects in a very cost-efficient way. Both of these measures meant large incentives for oil companies to develop and sell new more environmental friendly fuels.

*Charges on ordinary batteries are too low to affect consumption. The charge on car batteries, however, finances an efficient collection system.

*Swedish municipalities have the possibility to influence waste disposal practices by differential waste charge, for example in order to get households to compost their organic refuse. This seems to have been put in practice in many municipalities.

*Statutory producer responsibility has been introduced in some industries (packaging and car tyres) by the companies themselves as a means to finance collection and disposal in line with statutory responsibility.

III. General comments

On the whole one must say that the Swedish experience of the eco-taxes and charges has been a positive one, from an environmental perspective. These economic instruments have been efficient in reducing emissions in the areas they have targeted. So, emissions *have* decreased in many areas, although not always by as much as was expected. For some industries the reverse has been true, with emissions increasing rather than falling. However, one must also take into consideration what would have occurred if had the taxes/charges not been place or had the rates been lower.

Initially an argument often used against the eco taxes/charges was that they would be hard to administer leading to huge administration costs. This argument has been refuted as the administration costs have proven to be strikingly low.

²⁰ SOU p111

The major argument against economic instruments at the national level concerns international competition, a kind of prisoner's dilemma. "We can not have higher environmental taxes in Sweden than in other countries because then companies will close down or move to other countries with lower environmental targets." In Sweden there have been loud protests by the industry over the last year against raising taxes on electricity from water and nuclear power sources. This is a problem that is difficult to handle: in all countries it is usually the largest industries that are the most important to restrict emissions from. At the same time it is these industries that have the strongest lobbying groups putting pressure on the government. In Sweden the most urgent political issue during the last few years has been the high unemployment level, leaving the government very vulnerable to threats from larger companies that they will move abroad if tax levels are raised.

This dilemma is thus highly politically sensitive, where different political parties have different opinions on what is the appropriate taxation. In Sweden taxes and charges to a certain extent have been changed with different governments, leading to changes in relative prices. This means that many sectors feel insecure about the future, which of course is not good for investment etc. Especially when it comes to energy taxes in general and the tax on carbon dioxide in particular (both economic instruments with long term effects) it is important for their effectiveness that future tax levels can be foreseen by companies and other actors.

As this paper has shown environmental problems are not longer national, but to a large extent they are regional and global. In order to deal with the threats from emissions, chemicals in consumer products, air pollution in big cities etc, there seems to be a need for further international measures.

REFERENCES

Axelsson, S. (1996) "Skatteväxling- ekologisk skattereform för bättre miljö och ökad sysselsättning" Naturskyddsföreningen. Stockholm.

EPA (1997) "Environmental taxes in Sweden-economic instruments of environmental policy". Stockholm.

Ministry of the Environment (1997) "Fact Sheet 8.1"

Personal communication Ola Jonsson, Senior Technical Officer, EPA 08/18/97

SOU 1997:11 "Skatter, miljö och sysselsättning". Slutbetänkande av Skatteväxlingskommittén. Stockholm.