Sample Essay: Environmental Taxes: Are they effective?

LAWS 8366- ENVIRONMENTAL MARKETS
CASE STUDY ON TAXES: PAPER AND PRESENTATION

Question: How effectively do the laws that create and support that environmental market apply the design principles discussed in the course?

CASE STUDY 8: TAXES

INTRODUCTION

Environmental taxes or 'green taxes' have become popular economic instruments through which government can change behaviour by simultaneously financially penalising polluting actors and industries while also accelerating the development and implementation of environmentally friendly methods of production and consumption. Indeed, environmental taxes, if designed properly, can restrict emissions and promote sustainable development. However, these taxes require a robust legal framework that establishes the parameters and objectives of the taxes and also creates the supervisory and regulatory authorities that will be implementing the taxes. Economic or market-based instruments such as environmental taxes therefore require a legal framework within which they can operate. For example, the Swedish Environmental Protection Agency (hereafter 'SEPA') combines both legal and economic instruments in its pursuit of environmental objectives through its *Environmental Code (1999).*[1] The legal framework also provides for sanctions and penalties that is directly linked to important design principles such as efficiency and certainty since divergence from the rules encased in the legislation will lead to certain and foreseeable consequences. This case study will focus on two environmental taxes in different markets where one succeeded in achieving its environmental objectives and the other failed. The legal framework and design principles of each tax will be assessed to determine to what extent the laws surrounding that environmental market appropriately and correctly applied key design principles of efficiency, certainty, flexibility and simplicity. These are the Swedish sulphur tax and the Norwegian carbon tax.

WHAT IS THE PURPOSE OF AN ENVIRONMENTAL TAX?

The term environmental tax or 'green tax' is used broadly to mean any instrument or fiscal policy with environmental applications or implications. This includes both rights and charges;

[1] Swedish Environmental Protection Agency website, 'Legislation and Other Policy Instruments', http://www.naturvardsverket.se/en/In-English/Start/Legislation-and-other-policy-instruments/The-Environmental-Code/ (accessed 18 August 2010)

and charges include taxes, levies, licence fees and duties.[2] The primary purpose of an environmental tax is therefore to change behaviour. In certain circumstances, it may have a secondary or corollary outcome of raising revenue however this should not be seen as its main objective. Buckley reasons that all taxes have secondary effects, some of these having major social and environmental consequences.[3] With respect to environmental taxes, they are deliberately designed to modify taxpayer behaviour with the tax operating as a deterrent to pollution and environmental damaging behaviour. Thus, an effective environmental tax makes the act of polluting too expensive and the alternative and more environmentally friendly methods desirable and artificially cheaper. In this way, they incentivise improvement in environmental management practices and can also encourage developments in technology. Moreover, for many green taxes, the intention is also to halt or reduce the activities taxes so completely that no revenue is raised at all.[4]

There are therefore three reasons that make environmental taxes an attractive instrument. Firstly, there are economic reasons that make environmental taxes desirable. Ideally, they should be able to achieve a set environmental objective at a lower total costs than regulatory or technological instruments.[5] However, they must remain economically efficient with low transaction costs, otherwise this cannot be achieved. Information, metering and administrative costs must remain low. Furthermore, the tax must be carefully designed so as not to encourage perverse incentives or fail in achieving change in industrial and taxpayer behaviour by placing the price signal too low. A key design element therefore for an effective environmental tax is an appropriately placed price signal because if it is too low, it will be ineffective in changing behaviour. Secondly, environmental taxes incentivise socially desirable behaviour without removing individual free choice.[6] One could argue that the freedom of choice is not removed however that choice to pollute or continue to engage in undesirable behaviour or management practices becomes too expensive to pursue. Finally, an environmental tax is able to internalise negative externalities since the environment is a public good with no fixed price or property rights attached to it.

As a result, the key design elements that will be analysed with respect to the two chosen environmental taxes will be their economic efficiency, certainty (this will involve a focus on their scope and content), flexibility, application (whether they are applied universally or equitably) and their environmental objectives.

---

[2] Buckley R, 'Green taxes: legal and policy issues in using economic instruments for environmental management' (1991) 2(1) *Revenue Law Journal* 27 at pp 28.

[3] Ibid.

[4] *See* Buckley *supra* note 2 at pp 29.

[5] Ibid.

[6] Ibid.

CASE EXAMPLE: SULPHUR TAX IN SWEDEN

Within the OECD, Sweden has developed and implemented the most environmental taxes and charges.[7] Sweden introduced an energy tax system in the 1950s however in 1991 it revised its complex tax system to introduce a new system of taxation that included a carbon tax and sulphur tax. This case study will focus on the sulphur tax. The reason why Sweden introduced a sulphur tax in 1991 was to combat acidification of soil and water.[8] In Sweden, the 'environmental market' or environmental problem targeted by this sulphur tax was acidification of soil and water as well as acid rain.

The sulphur tax was introduced on 1 January 1991. It was implemented following an enquiry by the Government appointed Environmental Charge Commission.[9] The aim of the sulphur tax is to reduce emission from burning oil, coal and peat and to reach the national target of 80% reduction of sulphur emissions, using 1980 levels of emission as the baseline.[10] Its scope was therefore limited at heavy fuels, coal and peat used in industrial sector. The tax however does not operate in isolation. The sulphur tax operates in conjunction with other taxes such as those on carbon dioxide and nitrogen oxide that were also introduced in 1991 and it operates in conjunction with tax differentiation on fuels through which oil companies are reimbursed for increasing costs following the use of more environmentally friendly light fuel oils. [11]The target was successfully reached in 1994.

Under the sulphur tax coal, coke and peat fuel were charged SEK 30/kg of sulphur content which is approximately €3.40/kg. Oil and diesel were also charged SEK 27/m^3 for every 0.1% by weight of sulphur content. Sterner calculates a tax of USD$3,000 per ton of sulphur emissions.[12]

---

[7] Nyman P (1998) *UNDP Report Environmental Taxes: The Case of Sweden*, http://hdr.undp.org/en/reports/global/hdr1998/papers/NYMAN-Pia_Taxes-Sweden.pdf (accessed 20 August 2011)

[8] Ibid at pp 4.

[9] Barde & Smith, 'Do Economic Instruments Help the Environment?', (1997) 24 *The OECD Observer* 22

[10] Bränlund R & Kristön B, *Energy and Environmental Taxation in Sweden: Some Experience from the Swedish Green Tax Commission,* Invited Paper on Environmental Implications of Market Based Policy Instruments, Gothenburg, November 20-21, 1997 at pp 6. http://www-sekon.slu.se/~bkr/gbg.pdf (accessed 20 August 2011).

[11] Sterner T & Köhlin G, Environmental Taxes in Europe

[12] Sterner(2003), Policy Instruments for Environmental and Natural Resources Management, Resources for the Future, Washington as referenced in Economic Instruments- Charges and Taxes: Sweden Sulphur Tax, http://www.economicinstruments.com/index.php/air-quality/article/74?tmpl=component (accessed 20 August 2011)

One could argue that the sulphur tax succeeded because of its restricted scope and availability of limited exemptions, economic incentives and rebates/refunds available under the scheme. These design elements were arguably integral in achieving national targets by 1994 by inducing change in behaviour through economic incentives and a relative straightforward tax charge that was calculated in such a way as to promote change as well as induce technological progress. Its limited scope can be attributed to its success however it simultaneously indicates that this tax also has limited application and in terms of fungibility, it cannot be transferred elsewhere.

The Swedish Environmental Protection Agency (SEPA) that administers and regulates the Swedish *Environmental Code* uses both economic and legislative instruments in achieving its environmental objectives. Specifically, Chapter 26 of the *Environmental Code* explicitly devolves authority to SEPA to supervise compliance to *Environmental Code* and any delegated rules created while Chapter 27 deals with charges and fees. Section 6 of Chapter 26 dealing with supervision allows for a collaborative law between the Government, SEPA and municipal authorities. Much deference is therefore given to SEPA in carrying out its functions. Here, the environmental laws allow the implementation of charges or taxes whilst also being flexible enough to provide exemptions. Fuels with a sulphur content below 0.05% in weight are tax exempt. Therefore, a certain threshold needs to be reached before the tax is applied. Similarly, economic incentives are used to induce change in behaviour. For example, if sulphur is removed from the exhaust gases the tax could be refunded.[13] There is also a rebate if sulphur is removed by filters.[14] Refunds are also available if emissions fall and there are deductions for fuels used for other purposes other than energy production. Lastly, the average abatement cost is SEK10 or approximately €1.10. Its economic efficiency is also demonstrated through the relatively low administrative costs involved in the sulphur tax project.

It is therefore evident that profit incentives have been used effectively to reduce emission and encourage industry participation. However, one perverse incentive or distortion created is that a by-product from the manufacture of low-sulphur heavy fuel oils is a residual oil with a high sulphur content which is then exported to other countries with lower environmental standards. The fact that an economic advantage is created in selling this residual oil with high sulphur content to third countries weakens the integrity of the environmental objectives of this project and highlights the potential for distortions when an instrument is not perfectly designed. However, one could argue that this is extremely hard to achieve.

In relation to the environmental objectives met, the sulphur tax and the general environmental tax legislation in Sweden can be considered successful. SEPA estimates the tax to be

[13] Johansson B, Swedish Environmental Protection Agency, Economic Instruments in Practice 1: Carbon Tax in Sweden found on OECD website: http://www.oecd.org/dataoecd/25/0/2108273.pdf (accessed 20 August 2011)

[14] *See* Sterner & Köhlin *supra* note 11 at pp 18.

responsible for 30% of the total reduction in sulphur emissions from 1989-1995.[15] The sulphur tax appears to have been important in reducing the actual sulphur content of fuel oil below the legal limits. In 1991 and 1994 the legal limit was 0.2% and the actual sulphur content was 0.08% and 0.058% respectively.[16] Moreover, the success of the reduction in sulphur emissions cannot be solely seen as a result of the sulphur tax. The sulphur tax complements other forms of charges that are distributed in Sweden's complex energy tax system which includes a carbon tax and nitrogen oxides charge. For example, carbon taxes in Sweden address the energy and transport sectors but rely on other GHG- reduction strategies to reduce overall GHG emissions.[17] Sweden demonstrates the need for complementary and integrated measures, both legal and economic, in this sense with its cross-sectoral instruments such as its participation in the European Union's Emissions Trading Scheme, investment in research and development and local programs.[18]

However, despite its success in lowering emissions, acidification of soil and water remains a problem. This can be primarily explained by the fact that this environmental issue is a global problem and sulphur travels from abroad. Sweden remains affected even if it has attempted domestically to reduce its sulphur emissions. While the sulphur tax's limited and localised scope as discussed above provides certainty, it seems that it requires greater scope in application, that is international cooperation, in order to effectively address acidification of water and soil.

CASE EXAMPLE: CARBON TAX IN NORWAY

In contrast to the relative success of the sulphur tax in Sweden, Norway has experienced certain problems with its carbon tax that can be linked to key design elements. The key problem associated with Norway's carbon tax is that it was perhaps not designed effectively to incorporate external factors such as maintenance or acceleration of national growth and increase in gross domestic product.[19] Furthermore, in contrast to the bottom-up approach adopted by Sweden in its energy tax system where the energy use is used as the starting point and then the tax rate is multiplied for the specific product, Norway adopted a top-down approach which uses the total revenue on the specific energy related tax and then distributes it equally to the used of the energy product. For the carbon tax, the energy accounts are used as sources to determine the allocation of this tax on the various energy products.

[15] *See* Nyman *supra* note 7 at pp 4.

[16] *See* Sterner & Köhlin *supra* note 11.

[17] Sumner J et al (Dec 2009), National Renewable Energy Laboratory, '*Carbon Taxes: A Review of Experience and Policy Design Considerations'*, Technical Report NREL/TP—6A2—47312 at pp 30.

[18] Ibid.

[19] Abboud L, 'An Exhausting War on Emissions' Wall Street Journal, 30 September 2008.

Similar to Sweden, Norway introduced a new system of energy taxation in 1991 which included a carbon tax, sulphur tax as well as taxes on petrol, auto diesel and consumption of electricity. Although initially adopted by domestic legislation, Norway currently participates in the European Union's *Taxation of Energy Products Directive* as well as the Emission Trading Scheme.

Both Sweden and Norway's carbon taxes have revenue raising objectives which in turn are funnelled into general government budgets and government endorsed schemes such as carbon mitigation programs and by doing so they create a double dividend.[20] Aside from being directed into general government accounts, Norway has created a special pension fund that contained $373 billion for Norwegian citizens in 2007.[21]

On the other hand, one could argue that it is difficult to evaluate the effectiveness of a carbon tax in reducing emissions or its overall impact since there are many factors that can affect overall carbon dioxide emissions such as other environmental programs. In Norway's case, economic growth levels played an important role since such strong economic growth was not predicted and factored into the design of the carbon tax. In contrast, Norway's carbon and general greenhouse gas emissions increased by 15% from when it implemented a carbon tax in 1991 to 2008.[22] Norway's 70% increase in gross domestic product explains this anomaly.
In light of this, the legal system covering energy taxation was completely revised in 1998 and in 2000 a basic energy tax on fuel and oil for heating purposes was reintroduced.

Initially, the carbon tax as introduced in 1991 taxed the following sectors: gasoline, light and heavy fuel oil, and oil and gas in the North Sea. The pulp and paper industry, fishing industry as well as domestic aviation and shipping payed reduced rates. In 1992 the carbon tax was extended to coal, coke and mineral oils however coal and coke were abandoned in 2003. In terms of scope and coverage, the carbon tax as a policy price-based instrument was broad and cross-sectoral. When introduced in 1991, the carbon tax rate varied between NOK97 (€12) per tonne of carbon for heavy fuel oil to NOK259 (€32.05) per tonne for petrol. This however, increased several times in contrast to Sweden's carbon tax that was relatively steady from 1993 to 2000 then gradually increased from 2000 to 2004.[23]

A perverse impact of this carbon tax was the boom in offshore production which in turn boosted overall emissions since this sector was not covered by the tax at the time.[24] Many exemptions were also made such as those given to local industries for fear of damaging economic growth and employment.[25] However, at the same time, the carbon tax succeeded in certain areas by promoting industry efficiency and new technologies in the form of carbon

[20] *See* Buckley *supra* note 2.
[21] See Sumner et al *supra* note 17 at pp 10.
[22] Ibid.
[23] Ibid at pp 11.
[24] *See* Abboud *supra* note 19.
[25] Ibid.

sequestration programs. Further, emissions per unit of production were 22% lower in 2003 than they were in 1991.

Therefore, some key design issues that perhaps require greater attention are the tax rate and tax base as well as what to do with the revenue collected. Ideally, the tax rate should be set at the appropriate level and reflect the externality cost. However, the precise information about the level of environmental change and the cost of abatement is rarely available which makes determination of the tax rate difficult.[26] With respect to revenue raised, both Norway and Sweden were successful in recycling revenue back into the polluting industries. Norway has also funnelled revenue into investment subsidies for wind power projects and granted funds for research and development.

In contrast to Norway's carbon tax, Sweden's carbon tax was less elaborate and therefore more certain in scope and coverage by giving industry fewer possibilities to avoid paying excise duties on transport. It was also more transparent. In terms of economic efficiency, implementation seems to have been cheaper and simpler which in turn kept transaction costs comparatively low. There were also fewer exceptions in the Swedish legislation. Perhaps the design principles of the Swedish carbon tax can be attributed to the difference in its objective which was to change consumer behaviour by making energy products that reduce environmental harm more attractive. For this reason, the household sector was also charged. SEPA estimates that approximately 60% of emissions reductions between 1987 and 1994 were attributable to the energy tax system which is the combined effort of the carbon, sulphur and nitrogen taxes and charges.[27]

In terms of equity, the overall Swedish energy tax system (including carbon and sulphur taxes) contains an implicit redistribution scheme where the benefit of tax reductions has been almost entirely confined to consumers whereas tax rises have been borne by both consumers and the service sector.[28]

CONCLUSION

In conclusion, environmental taxes as price-based mechanisms have the potential of altering consumer and industry behaviour as well as pursuing environmental objectives coupled with advances in new technologies. However, an examination of the Swedish sulphur tax shows that loop holes in domestic legislation as well as in foreign jurisdictions allows for a perverse profit incentive to be created where by-products high in sulphur content can be sold to other countries with lower environmental standards thereby weakening the environmental integrity

[26] Speck et al, National Environmental Research Institute Denmark, *The Use of Economic Instruments in Nordic and Baltic Environmental Policy 2001-2005*, TemaNord: Nordic Council of Ministers, Copenhagen, 2006.
[27] *See* Johansson *supra* note 13.
[28] *See* Speck et al *supra* note 26.

of both the legislation and the environmental taxes imposed. Nevertheless, the sulphur tax in Sweden has succeeded in achieving national targets and lowering sulphur emissions whereas its carbon tax has also achieved progress. This has been implemented through domestic legislation as well as EU Directives and Emission Trading Scheme. In contrast, Norway's carbon tax was not adequately designed to incorporate increases in gross domestic product. However, one could rebut this negative outcome by indicating the fall in oil consumption in the paper industries and intermediate product sectors as well as in the household sector[29] as a sign of the relative success of the carbon tax in altering consumer and industry behaviour and encouraging advances in technology through government funded research grants, programs and subsidies. One could argue that Sweden succeeded because of the fewer exception options in the Swedish legislation and the lower transaction costs associated with administering the respective taxes. Furthermore, in relation to the sulphur tax, the Swedish tax was more constrained in its coverage and required emitters to reach a certain threshold before applying the tax. Similarly, Norway's carbon tax was not a flat emissions tax rate but rather targeted at the oil and gas industry and its customers. A discussion of these environmental taxes highlights the need for complementary and integrated policies that are incorporated in both legislative and economic instruments used and that sometimes competing design principles such as certainty and flexibility can require different actions or methods from the same environmental tax. Indeed, Norway's carbon tax tried to balance environmental objectives and the principle of certainty with protections of local industry and employment rates that are factors relevant to discussions on the principle of flexibility.

[29] University College Dublin, School of Geography, Planning and Environmental Policy, Economic Instruments website: http://www.economicinstruments.com/ (accessed 21 August 2011).

BIBLIOGRAPHY:

- Abboud L, 'An Exhausting War on Emissions' Wall Street Journal, 30 September 2008
- Barde & Smith, 'Do Economic Instruments Help the Environment?', (1997) 24 *The OECD Observer* 22
- Bränlund R & Kristön B, *Energy and Environmental Taxation in Sweden: Some Experience from the Swedish Green Tax Commission*, Invited Paper on Environmental Implications of Market Based Policy Instruments, Gothenburg, November 20-21, 1997 http://www-sekon.slu.se/~bkr/gbg.pdf
- Buckley R, 'Green taxes: legal and policy issues in using economic instruments for environmental management' (1991) 2(1) *Revenue Law Journal* 27
- Johansson B, Swedish Environmental Protection Agency, *Economic Instruments in Practice 1: Carbon Tax in Sweden* found on OECD website: http://www.oecd.org/dataoecd/25/0/2108273.pdf
- Nyman P (1998) *UNDP Report Environmental Taxes: The Case of Sweden*, http://hdr.undp.org/en/reports/global/hdr1998/papers/NYMAN-Pia_Taxes-Sweden.pdf
- Speck et al, National Environmental Research Institute Denmark, *The Use of Economic Instruments in Nordic and Baltic Environmental Policy 2001-2005*, TemaNord: Nordic Council of Ministers, Copenhagen, 2006
- Sterner (2003), *Policy Instruments for Environmental and Natural Resources Management, Resources for the Future*, Washington as referenced in Economic Instruments- Charges and Taxes: Sweden Sulphur Tax, http://www.economicinstruments.com/index.php/air-quality/article/74?tmpl=component
- Sumner J et al (Dec 2009), National Renewable Energy Laboratory, '*Carbon Taxes: A Review of Experience and Policy Design Considerations'*, Technical Report NREL/TP—6A2—47312
- University College Dublin, School of Geography, Planning and Environmental Policy, Economic Instruments website: http://www.economicinstruments.com/