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**A Painless Solution?**

**An Analysis of two Alternatives for  
Global Taxation for Financing Climate  
Activities under the United Nations Umbrella**

editor

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## *Preface*

To provide an interdisciplinary analysis on these rather complex matters, we have gathered a group of people from different institutions. Vetle Hvidsten and Birger Vikøren from Norges Bank (the Central Bank of Norway), are dealing especially with the “Tobin tax”, Jan Fuglestad from CICERO writes on how air traffic affects climate, Hans Christian Bugge from the Legal Department of the University of Oslo focuses especially on the technical and legal aspects, and Asbjørn Aaheim and Rolf Selrod from CICERO have concentrated on climate issues and a possible tax on aviation. We have also gained valuable assistance from the Norwegian Civil Aviation Administration, the Institute of Transport Economics and Karl Georg Høyer at Vestlandsforskning.<sup>1</sup>

Several aspects related to a possible aviation tax and its possible implications need further analysis beyond what has been possible in this paper.

The report is written for the Ministry of Foreign Affairs, Multilateral Department.

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<sup>1</sup> The terms taxes and charges are used as synonyms in this report. World aviation is defined as both domestic and international civil aviation.

## **TABLE OF CONTENTS:**

*Preface*

*Abstract and conclusions* **1**

*Chapter 1 Current growth in greenhouse gas emissions and responses to counteract this development* **3**

*Chapter 2 National versus international measures* **4**

*Chapter 3 The search for global financing schemes* **5**

*Chapter 4 Tax on world aviation* **8**

*4.1 Introduction*

*4.2 How aviation affects climate*

*4.3 Possible levels of taxation and its effects*

*4.4 Alternative taxation basis*

*4.5 Legal and technical issues*

*4.6 Concluding remarks*

*Chapter 5 Tax on foreign currency transactions* **16**

*5.1 Introduction*

*5.2 Raising funds*

*5.3 Monetary policy and exchange rate fluctuations*

*5.4 Legal and technical issues*

*5.5 Concluding remarks*

*References and literature* **21**

## ***Abstract and conclusions***

It is a widely held perception that the UN is unable to challenge the increasing number of global issues due to the lack of funding. Consequently, there has for some time, been a discussion of alternative ways of financing UN activities. This is also the case for activities under the UN Framework Convention on Climate Change.

The level of global efforts to reduce greenhouse gas emissions is lower than the declared willingness of many countries to invest in such actions. Given this point of departure, one must anticipate that time is ripe to search for mechanisms that may close this mismatch.

We believe that such funding schemes must relate to specific international agreed needs, not distort market conditions, and reflect a fair burden-sharing between countries. If the system also may be close to “painless” for individuals, industry and countries, that is, if the charge is regarded as a fair payment for the service rendered, we may have an interesting proposal at our hand.

The report mention some global financing schemes discussed over the last years. Most of these earlier suggestions for automatic financing schemes have not possessed the above mentioned characteristics, and thus failed to meet universal support.

We focus, however, on two alternatives for “automatic” financing, as possible sources and systems of funding. The funds will be for the benefit of developing countries and countries that are undergoing the process of transition to a market economy, to fight global environmental problems, specifically in the area of climate change.

One of these, an international charge on civil aviation will, in addition to its revenues, also contribute directly to reduce greenhouse gas emissions. It will initially, albeit in a small scale, reduce demands for air traffic and may, dependent upon the chosen base for taxation, also contribute to development of better energy saving technologies etc. The other alternative, an internationally agreed tax on foreign currency transactions, may in addition to its revenues also discourage currency speculation. This alternative has been discussed as a possible source of funding in a more general financing context within the United Nations system.

This report concludes that a small charge on aviation seems to meet most of the criteria mentioned above for a possible successful mechanism for financing UN activities in the area of climate change. It seems right in a “polluter pays” context, in a north-south context, and as a practical, fair and almost painless solution with small side-effects. It seems also to be relatively easy to collect and control. The tax base may be related to the number of passengers, the number of passenger kilometre, the number of flights or as a fuel tax. This issue as well as the level of the tax may be agreed through negotiations between countries, Parties to the Climate Convention, or through other chosen international organisations. What seems most challenging is to initiate protocol negotiations under the Climate Convention, were an agreement would have to be ratified by the governments to create legally binding commitments.

To establish a fund with an illustrative figure of 10 billion USD revenue per year, one would need about 9 USD as an average charge per passenger (departure tax), or about 0.5 US cent per passenger kilometre, or a tax on an average flight of about 650 USD. Both a fuel tax and a tax on passenger-kilometres might be preferred as it is close to taxing emissions of carbon dioxide. However, as a fuel tax will discriminate those countries and companies with older and less energy-efficient air-planes, one might concentrate on the passenger related charge, either passenger/kilometres tax or a passenger/departure tax. The latter may be preferred for environmental reasons, as short journeys are more polluting because of the high energy intensity of the start and landing phases. A combined solution may be considered, for instance to charge according to standard intervals of flight distance of 380 kilometres.

Several studies on a possible international tax on foreign currency transactions have voiced considerable scepticism. This scepticism is shared by the authors of this report for several reasons. First, a currency tax will only to a limited extent curb speculation. Secondly, there are significant legal and administrative problems when introducing a global transaction tax, and the effectiveness of the tax would be greatly reduced if some governments decided against it. Finally, it is reasonable to assume that financial innovations and use of vehicle currencies would make tax evasion easy. Due to these weaknesses, we conclude that other funding alternatives might be more attractive to pursue.

## ***Chapter 1 Current growth in greenhouse gas emissions and responses to counteract this development***

Unless strong counteractive measures are introduced the expected emissions of greenhouse gases (GHGs) will, in the coming decades, quickly outgrow the political commitments made by the industrialised countries under the United Nations Framework Convention on Climate Change (FCCC) to stabilise their GHG emissions. This mismatch is even greater when we look at the needs to reduce emissions as defined by the world scientific community and the actual measures implemented by countries to meet the objective of the Convention.<sup>2</sup>

The expected global growth of carbon dioxide emissions- 21.7 billion tonnes in 1990, 25.1 billion tonnes in 2000, and 32 billion tonnes in 2010 - makes the present commitments under the FCCC seem highly inadequate.<sup>3</sup> A stabilisation of emissions will necessitate significant changes in current energy planning and development, as well as changes in the consumption behaviour in many affluent societies. A co-operation between industrialised and developing countries for finding equitable funding systems to counteract a “business as usual” development, presents a great challenge.

Global stabilisation of carbon dioxide emissions has been estimated to cost about 1.5 to 2.5 % of the world GNP in the first half of the 21st century and about 3 % in the second half.<sup>4</sup> The realisation that financial resources are scarce, especially with regard to global environmental issues surrounded by scientific uncertainty, is also reflected in the Convention text. Among the principles adopted by the Parties, are that it should be taken into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.<sup>5</sup>

However, the FCCC presently establishes no legally binding commitments to reduce GHG emissions. Until reduction targets are legally binding in terms of quantities and time framework, the role of the FCCC in curbing GHG emissions will be uncertain and the incentives for emissions reductions will continue to be weak and insufficient.

The Global Environment Facility (GEF), is chosen as the financial mechanism of the FCCC and some other environmental agreements and issues has less than 2 billion SDR for the 3 year period 1994-96. In the previous period, about 40 % of the funds were used for climate purposes. In addition to the GEF-funds one may expect some extra resources through the mechanism of “Joint Implementation” some time after the turn of the decade. All in all, these prospects are highly inadequate for the funds needed to curb climate change.

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<sup>2</sup> The term “the world scientific community” is here used synonymously with the Intergovernmental Panel on Climate Change (IPCC)

<sup>3</sup> IEA, World Energy Outlook (Paris, 1994)

<sup>4</sup> William R. Cline, *The Economics of Global Warming* (Washington, D.C.: Institute for International Economics, 1992), p. 191.

<sup>5</sup> FCCC, Article 3.3

## *Chapter 2 National versus international measures*

Several countries have announced goals for stabilisation of their emissions of CO<sub>2</sub>. However, most countries have been hesitant in carrying out any measures, although some have introduced a tax on carbon-emissions as a first step towards such a goal. Compared with the emission-goals set by the same governments, these measures are far from being sufficient. This is a clear indication of a mismatch between political goals and willingness to act internationally and what is regarded as politically possible to carry out in a national context.

Most measures suggested to decrease emissions of CO<sub>2</sub> relates to reductions in the consumption of fossil fuels. To carry out a climate policy effectively, therefore, one should introduce a general charge on the combustion of fossil fuels, which would make enterprises and single consumers shift towards activities with lower emissions, and thereby achieve the policy target in the most cost-efficient manner.

Other options to reduce emissions are to invest in carbon sequestration or to invest in new and more energy efficient technology. UNEP has examined potential projects aiming at a reduction of emissions of CO<sub>2</sub> in a number of developing countries.<sup>6</sup> For Brazil, Thailand and Zimbabwe, they found that 55 - 60 million tonnes of emissions of CO<sub>2</sub> could be reduced per year by 2010 at practically no cost, so-called “no-regret” options. At a relatively small cost, the amount of reductions would be substantially higher.

*Table 1. ‘No-regret’ reductions of CO<sub>2</sub>-emission in selected countries by 2010*

	Reduction in CO <sub>2</sub>		Population	Per capita tonnes CO <sub>2</sub>
	%	mill. tonnes		
Brazil	3.5	26.9	150.4	0.179
Thailand	7.2	25.9	57.2	0.453
Zimbabwe	14	4.6	9.3	0.492

One should, however, be careful in concluding firmly about a world scale potential from these figures only. The potential ranges from less than 0.2 tonnes per capita in Brazil to 0.5 tonnes per capita in Zimbabwe. Nevertheless, they indicate a significant potential of ‘cost-less’ reductions of CO<sub>2</sub> emissions in developing countries.

One might question why these projects need funding. If they are “no-regret” options they ought to be carried out regardless of any external funding assistance. It is, however, many restrictions that may prohibit bright prospects to be initiated, and many projects may be subject to a high degree of uncertainty. Although it is often neglected, the social cost of credit restrictions and uncertainty may be substantial. Thus, many apparently profitable projects are not carried out. The effect on emissions may, however, be quite predictable and make the project favourable from an

<sup>6</sup> UNEP (1994): *UNEP Greenhouse Gas Abatement Costing Studies, Phase Two Report Part 1: Main Report*. UNEP Collaborating Centre on Energy and Environment, Risø National Laboratory, Denmark.

environmental point of view, thereby reducing the expected social costs of the project. A calculated no-regret option may therefore be an attractive climate measure if funded with a reasonable amount. National restrictions, for instance in the international credits market, may in terms of costs, vary considerably between countries. It is therefore difficult to indicate the costs of emission reductions. It is, however obvious that assistance through international financial resources are needed to fight global warming in a cost-effective way.

### ***Chapter 3 The search for global financing schemes***

The search for global taxation schemes has a long history. Many proposals have been made for the purpose of financing general UN activity, while others were put forward to mobilise new resources for official development aid (ODA). It was not until 1977, however, when the Plan of Action to Combat Desertification was approved by the UN General Assembly that governments officially accepted the principle of automatic funding. The plan called for the establishment of a special account that could draw resources not only from traditional sources but also from additional measures of financing, “including fiscal measures entailing automaticity”.<sup>7</sup>

The traditional assessed contributions from governments seem not to reach a level that will meet the current needs of the UN system, neither will any systems of voluntary funding. Voluntary funding may solve smaller and concrete agreed needs, but as the flow of resources is totally at the discretion of the respective donors, such systems will hardly provide the necessary predictability and security needed for a long term effective planning and management of international activities.

Over the last years, several UN-commissions and individuals have revisited ideas for different global financing schemes, especially with a reference to address common global problems within the field of environment.<sup>8</sup> In this area some have seen it appropriate to suggest charges for the use of common global resources, in line also with the widely accepted “polluter pays principle” and being able to more accurately reflect environmental costs.

Based on earlier unsuccessful attempts to create new funding systems, it seems important to recognise that such funding schemes must relate to specific international agreed needs, that they do not distort market conditions, and that they reflect a fair burden-sharing between countries. If the system also may be close to “painless” for individuals, industry and countries, that is, if the charge is regarded as a fair payment for the service rendered, one may have an interesting proposal.

The major drive for new financial resources are sought for global purposes, and thus in addition to ODA. However reoccurring suggestions are also put forward for

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<sup>7</sup> The World Commission on Environment and Development, *Our Common Future*, Oxford University Press, 1987. p.341

<sup>8</sup> See e.g. “The Brandt Commission”, “The Brundtland Commission” and lately the “Carlsson Commission”: *Our Global Neighbourhood*, The report of the Commission on Global Governance. Oxford University Press, 1995.



development purposes, especially by the Nordic countries. The main call is that industrialised countries should honour their target of 0.7% of their GNP as an ODA allocation.

Suggestions for new funds to be established include *inter alia* a Planet Protection Fund proposed by former Prime Minister Rajiv Gandhi of India, a Global Human Security Fund proposed in the 1994 Human Development Report and a Global Climate Fund proposed by the Netherlands. Several innovative ideas for financing such funds also been launched. Many of these relate to revenues from the use of international commons and global resources. One of these, a proposal to simply add one dollar on air tickets to be allocated for environmental activities has an Egyptian origin.

Of the many sectors or activities suggested as a possible taxation base for a global fund, we list some of those suggested over the last years:

- activities of multilateral companies;
- ocean maritime transport and fishing;
- activities in Antarctica;
- sea-bed mining,;
- parking of communication satellites;
- international trade, either general or on specific commodities;
- surplus in the balance of trade;
- energy, (barrels of oil and defined units of coal);
- consumption of luxury products; and not the least,
- a proportion of reductions in military spending, the so called “peace dividend”.

Some of these suggestions might, however, accumulate large funds. The World Watch Institute calculated that an extra tax of 10 USD per ton emitted carbon from the industrialised countries (excluding Eastern Europe and the former Soviet Union) might generate about 25 billion USD per year.<sup>9</sup>

The most discussed alternatives are probably different alternatives for green taxation such as a general carbon tax and systems of tradable permits for emissions. These are, however, primarily thought of as direct measures to reduce emissions of CO<sub>2</sub>, and not as instruments for the creation of an international fund. Both have quite complicated implications, and have so far not caught global affection.<sup>10</sup> The European Union has recently decided that CO<sub>2</sub> taxes might be established on a voluntary basis in its member states, but only the Nordic countries have, so far, introduced a significant level on their carbon taxes.

The most recent recommendation from a UN organisation on this issue is perhaps from the UN Commission on Sustainable Development (CSD) who in their third session in New York in April 1995 suggested to initiate a feasibility study for a small levy on the price of aviation fuel for the benefit of a general sustainable activities.

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<sup>9</sup> World Watch Institute: *State of the World 1991*, p185

<sup>10</sup> The main reason why many people have resented the idea of tradable permits, is that the system would give some companies, not only the right to pollute, but also profit on selling pollution rights. A report is written on a possible market for CO<sub>2</sub> emission entitlements. UNCTAD: *Combating Global Warming*, New York 1994

First established as a voluntary fund, later replenished on the basis of assessed contributions, the Global Environment Facility has already been working for some years to assist developing countries with grants and concessional funding, to integrate global environmental concerns into their development goals. An other initiative under the Climate Convention is the mechanism of Joint Implementation, now being scrutinised through a pilot period, has been launched to test its potential and adequacy. The mechanism is based on the fact that it is more economical to invest in emission reductions in other countries than to invest the same resources at home.<sup>11</sup>

The two proposals for analysis in the coming chapters, one for a tax on aviation and the other a tax on currency transactions, has both a potential of raising a substantial amount of money by means of a rather modest tax. Aviation tax is considered a mean to raise resources for climate measures, while tax on currency transactions may be considered in a more general context.

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<sup>11</sup> Several papers on Joint Implementation (Activities Implemented Jointly) have been published *inter alia* by CICERO. A co-operation to further explore this mechanism, has recently been initiated between the Government of Norway and the World Bank.

## ***Chapter 4 Tax on world aviation***

### ***4.1 Introduction***

As presented in Chapter 2, cost-effective measures to fight global warming necessitate financial assistance to developing countries and countries that are undergoing the process of transition to a market economy. Such measures must be in accordance with the development objectives of the involved countries and will most often have other beneficial national effects.

The suggestion of a small tax on aviation in order to fund climate measures sounds right to many people for several reasons. Arguments for choosing an aviation tax lie in the air traffic emissions of greenhouse gases, and that prices today do not reflect the environmental damage done by these emissions. In accordance with current international agreements, there are no taxes on jet fuel. A tax on aviation is seen to have a politically right burden-sharing effect between rich and poor, both when it comes to individuals and countries. Besides, the proposal seems elegant, easy to implement and to have few side effects. There are today several charges in force as payment for service rendered in international aviation. Collection and control of taxes should therefore not involve major difficulties.

Economists and financial experts will probably argue that in general, a tax on a particular commodity or service will lead to reallocation and thus to inefficient use of resources. Moreover, if the climate measures are likely to be beneficial, they should be carried out regardless of any tax. If conditioned upon the tax, they are unlikely to be beneficial, and should therefore be discarded.

This reasoning does not say that it is wrong to tax aviation nor to fund climate measures - it is to link the budget for climate measures to the income from the tax that may lead to a bias. The reason is that the tax aims at making air flights more expensive relative to other goods and services and thereby reduce the demand for flights. The cost of beneficial climate measures is of course independent on the revenues of such a tax. The best situation one can achieve by linking the two is to end up with one of them optimal and the other sub-optimal. However, if the tax is the only way to raise the required fund, it may be accepted as better than the initial situation, provided that it neither leads to over-taxation nor to over-investments.

### ***4.2 How aviation affects climate***

The combustion of fossil fuel by aircraft gives emissions of pollutants well known from other environmental problems: CO<sub>2</sub>, carbon monoxide (CO), nitrogen oxides (NO + NO<sub>2</sub> = NO<sub>x</sub>), hydrocarbons (HC), sulphur dioxide (SO<sub>2</sub>) and soot/particles, in addition to production of water vapour (H<sub>2</sub>O).

Aircraft's emits about 3% of the global emissions of CO<sub>2</sub>, thereby contributing directly to the enhancement of the greenhouse effect and climate change<sup>12,13</sup> Due to the

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<sup>12</sup> Miljøseksjonen, (1994/1995) En Miljøanalyse fra Luftfartsverket

long lifetime of CO<sub>2</sub>, the climate impact of CO<sub>2</sub> emissions is independent of the spatial location of the emissions. This is not the case for emissions of NO<sub>x</sub> and this gas has received much attention due to the effects on the concentrations atmospheric ozone (O<sub>3</sub>) which is an important climate gas.

The global emissions of NO<sub>x</sub> from aircraft are estimated to 0.4 million tonnes N/year.<sup>14</sup> NO<sub>x</sub> is produced during the combustion when nitrogen (N<sub>2</sub>) from air reacts with oxygen under high temperatures. The emissions per unit fuel are largest during start and take off. The emissions follow the traffic pattern and are largest at middle northern latitudes and 75% of the total emissions are occurring at cruise altitudes of 8-13 km. The present mean rate of increase in NO<sub>x</sub> from aircraft is 4%/yr.<sup>15</sup> Compared to other sources of NO<sub>x</sub>, the aircraft source is small. Fossil fuel combustion (excluding aircraft) emits 24 million tonnes N/year and biomass burning 8 million tonnes N/year, and the aircraft's sources are 1.3% of the NO<sub>x</sub> emissions from these sources.

NO<sub>x</sub> emissions from aircraft are injected directly into a chemically sensitive region of the atmosphere and are very efficient in enhancing tropospheric ozone. Compared to emissions from ground sources, NO<sub>x</sub> from aircraft is 10-20 times more efficient in enhancing tropospheric ozone.<sup>16</sup> In addition to the high chemical sensitivity in the region of aircraft emissions, the changes in ozone are here significantly more efficient in disturbing climate than ozone changes at lower altitudes.

However, the overall effect is moderate due to the relatively small total emissions of NO<sub>x</sub> from aircraft. Due to the highly complex nature of the chemical and physical interactions in the atmosphere there are still significant uncertainties related to quantification of such effects. If the upper limit for the effect of NO<sub>x</sub> on climate is selected, the climate impact of NO<sub>x</sub> could be of same magnitude as the effect of CO<sub>2</sub> from aircraft's.<sup>17</sup>

The other gases emitted from aircraft's may also affect climate (both cooling and warming), but the effects of these emissions are, so far, to a lesser extent quantified.

### ***4.3 Possible levels of taxation and its effects***

Governments that have expressed a high willingness to act by their emission goals have, so far, been reluctant when it comes to initiation of climate measures. This results not only in too small amounts allocated to abatement-costs, but also in underpricing of activities that causes emissions of greenhouse gases. This is the case for international transport in particular. At the same time, the transport sector is expected to be the main contributor to the increase in future emissions of CO<sub>2</sub>.

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<sup>13</sup> IPCC 1994

<sup>14</sup> million tonnes = 1 Tg. NO<sub>x</sub> emissions may be given either as nitrogen (N) or as nitrogen dioxide (NO<sub>2</sub>). To convert from TgN to TgNO<sub>2</sub>, multiply by 3.28.

<sup>15</sup> Baughcum et al., 1993.

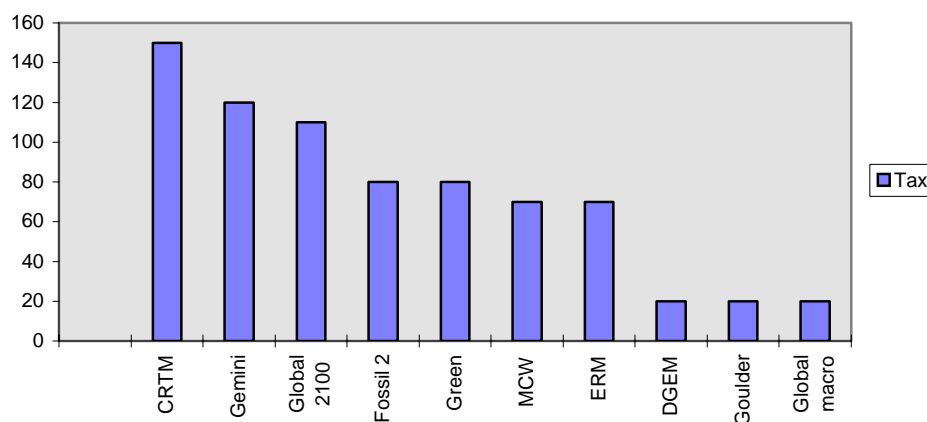
<sup>16</sup> Johnson et al., 1992; Hauglustaine et al., 1994; Fuglestedt, 1995

<sup>17</sup> IPCC, 1994

Because of the general scepticism towards international climate measures, one may expect that a substantial charge will be met by considerable resistance. It is therefore vital to address that the proposed charge is close to painless, at least in the phase of initiation. This means, *inter alia*, that the demand for air travel should not be affected significantly. In order to examine this, we have to compare the present proposal with other analyses of climate policies.

Even though measures for reduction or stabilisation of emissions of GHGs must encompass all gases and a wide number of sectors and activities, most studies have focused the required charge on the combustion of fossil fuels, to achieve a stabilisation of global emissions of CO<sub>2</sub> at their 1990 level. Results from ten studies are displayed in Figure 1.

Figure 1 Required charge in year 2010 for stabilisation of CO<sub>2</sub> emissions at 1990-level. USD per tonnes carbon.<sup>18</sup>



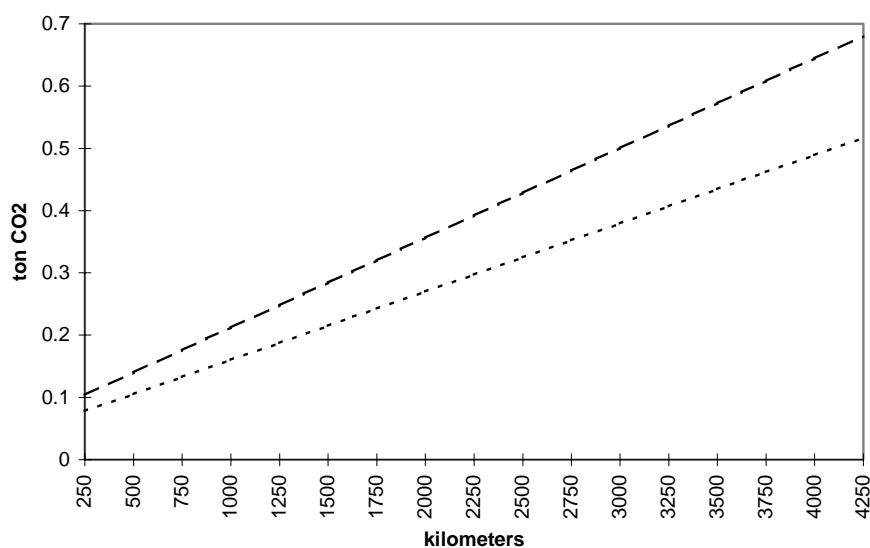
As presented above, the estimates for a required general carbon tax vary greatly, from 20 USD to 150 USD per tonnes carbon, dependent *inter alia* on the model in use, the baseline assumptions, and not at least the choice of exogenous variables. The reductions in ‘world GDP’<sup>19</sup> from stabilisation range from 0.2 to 0.7 % in year 2010. However, stabilisation of CO<sub>2</sub> emissions does not necessarily mean that emissions from air-transport will stabilise. The level of general carbon taxation suggested in Figure 1 implies a tax on jet fuel between 3 and nearly 25 US cents per litre.

<sup>18</sup> The abbreviations are: CRTM: Rutherford (1992), Gemini: Cohan and Scheraga , Global 2100: Manne and Richels (1992), Fossil 2: Belanger and Naill , Green: Martin and Burniaux , MCW: Mintzer (1987), ERM: Edmonds and Reilly (1986), DGEM: Jorgenson and Wilcoxon (1990), Goulder: Goulder , Global Macro: Pepper.

<sup>19</sup> World GDP is itself a dubious figure.

Figure 2 displays a high and low proxy for emissions of CO<sub>2</sub> per passenger for average medium-distance air planes, under an assumption of 60 % utilisation of capacity. The low charge for stabilisation presented above, at 20 USD per tonnes carbon (3 US cents per litre) would give a total charge of nearly 9 USD per passenger for a ‘standard’ distance of 380 kilometres (For a 4000 kilometres journey, a total charge of nearly 40 USD would be required if carbon emissions were charged at 20 USD per tonnes).

*Figure 2 Approximate CO<sub>2</sub> emissions per passenger at 60 percent utilisation of capacity*



A global tax on 10 US cents per litre is expected to reduce the growth rate to 1.2 - 2 % in the same period. If we apply the same elasticities as Michaelis and Shaw<sup>20</sup> for the taxes suggested in Figure 1, we obtain an annual growth rate at approximately 2 - 2.3 % with a 3 US cents per litre tax, and - 0.2 - 1.5 % with 25 US cents per litre. In other words, only the extreme case with high required stabilisation-tax and high price sensitivity in aviation demand gives an actual reduction in air transport towards year 2010.

However, even a charge at 3 US cents per litre is far above the level of a charge required to fund global climate measures. We assume from the analysis mentioned above, that the charge discussed in the sequel has a small effect on the demand for air travel.

<sup>20</sup> Michaelis L. and P. Shaw, 1995. *Policies and Measures for Common Action, Case Study: Aviation Fuel taxes*, OECD/IEA Paper

#### 4.4 Alternative taxation basis

The choice of taxation basis is important for the global distributive effect of the tax. Following the polluter pays principle, the most “just” alternative would be those corresponding best to the climate cost, which are the flight kilometres or the fuel used. If the fuel is chosen as the tax base, one might also differentiate on the basis of the carbon content of the fuel. This choice will have the best direct effect on emission reductions, but will discriminate those countries and companies with older technology and less energy-efficient aircraft’s. Even if the difference in cost may be small, such an extra burden on some companies might cause them to loose in the international competition in civil aviation. A tax related to the passenger directly, either as a “departure tax” or a “passenger/kilometre tax” might have a better distributive effect. Neither does such a tax discriminate between old and new equipment.

If we look at the scenarios for these alternatives as future tax basis, we find that both, fuel use and number of passenger, seem to carry a quite “handsome” growth.

The fuel consumption in world aviation is by Michelis and Shaw expected to increase by 2.4 % annually till 2010 without extra taxes.<sup>21</sup> About the same figure is presented by the International Civil Aviation Organisation (ICAO). Civil aviation used 138 million tonnes jet fuels in 1990, giving 434 million tonnes of CO<sub>2</sub> emissions. The perceived growth as presented below would in the period from 1990 to 2010 give a 65 % increase, which will mean a figure of 220 million tonnes fuels.<sup>22</sup>

Table 2 Percent growth in use of jet fuel up to the year 2010

Variables	1990 - 2000	2000 - 2010
Growth in air traffic	+ 5.5	+ 5.0
Change in the aircraft fleet & fuel intensity	- 1.9	- 1.0
Improved traffic regulation & aircraft technology	- 0.5	-1.0
Better utilisation of capacity	- 0.7	-0.5
Total	+ 2.4	+ 2.5

Source: Miljøseksjonen, Luftfartsverket: *En miljøanalyse 1994/95*

If we will look to the number of passengers as the base for taxation, the forecast presented below is in addition to the growth, also giving us a changing picture for world aviation. Europe and North America are clearly growing slower than the Asia and Pacific region where the number of passengers will more than double.

<sup>21</sup> Michaelis L. and P. Shaw, op.cit.

<sup>22</sup> Balashov B. and A. Smith, 1992. *ICAO Analysis trend in fuel consumption by world's airlines*. ICAO Journal, August 1992

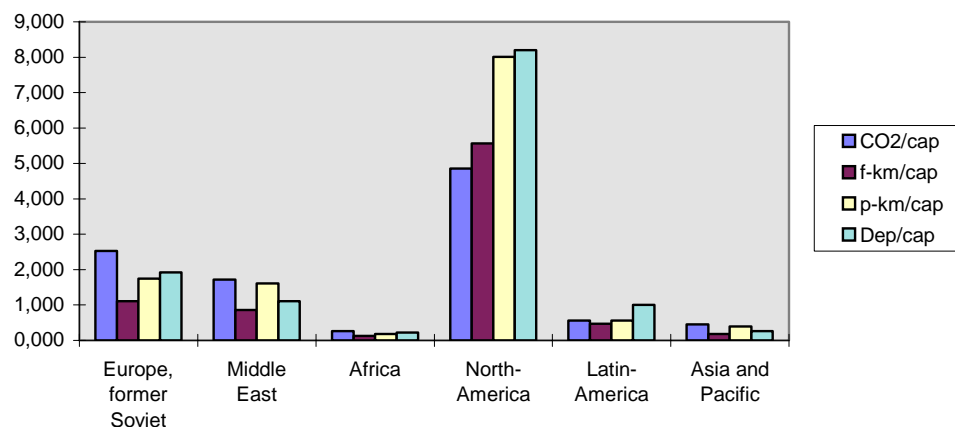
Table 3 ICAO forecasts of scheduled passenger traffic by region

Region	Passenger kilometres (billion)		Regional share of world traffic (%)	
	Actual 1992	Forecast 2003	Actual 1992	Forecast 2003
Africa	44.0	65	2.3	1.9
Asia/Pacific	406.7	980	20.8	28.6
Europe	551.7	800	28.3	23.4
Middle East	53.1	100	2.7	2.9
North America	806.4	1340	41.3	39.1
Latin America and Caribbean	90.7	140	4.6	4.1
World	1952.6	3425	100.0	100.0

Source: Michaelis and Shaw, 1995

Figure 3 shows regional distribution of alternative taxation-subjects and distribution of total CO<sub>2</sub> emissions per capita in world regions.<sup>23</sup> The alternatives displayed are flight kilometres (f-km/cap), passenger kilometres (p-km/cap) and departures (dep/cap). The figures suggest how biased alternative taxation subjects will turn out compared with carbon dioxide emissions. We see that all the three alternatives yield a distribution of the tax that is roughly in accordance with emissions, although passenger kilometres attain a distribution that is in a better accordance with emissions than the other alternatives.

Figure 3 Regional distribution of CO<sub>2</sub> emissions and alternative tax basis.



We also note that North America would have to pay a higher share than their emissions indicate in all alternatives. Europe will pay a lower share. The plausible explanation is that Russia and Central Europe are included in the figures for Europe. This region has extremely high emissions from stationary sources, which makes the aviation tax favourable to them. For Western Europe, the pattern is probably similar to that of North America.

<sup>23</sup> ICAO, 1994 and Statistics Norway, 1993



If we, as an illustration, would target a total revenue on 10 billion USD per year, this would enhance the total cost of an average air flight by approximately 650 USD. This target could also be achieved by an average charge per passenger of about 8.7 USD, which corresponds to 0.5 US cents per passenger-kilometre. If we were to choose a tax based on the standard intervals of flight distance of 380 kilometres, each standard interval would have a charge of close to 2 USD.

#### ***4.5 Legal and technical issues***

The financing scheme described in this paper raises certain legal and technical questions. First - By what international body and procedure should the decision to introduce the tax, and the decisions on tax base, tax level, implementation and enforcement issues be taken? There is no global supra-national authority which can make decisions binding for UN member states in this area. As a consequence, the tax system has to be based on voluntary participation of states. At present, two alternative solutions seem to be most relevant in this respect, as the institutional basis for a tax system.

The first is to leave these matters to ICAO. Decisions may be taken in the form of Resolutions by ICAO Assembly (all 183 member states) or its executive body, the ICAO Council (33 states). The new tax could then be seen in connection with other aviation charges and be discussed and implemented within the framework of an already established system for aviation charges. ICAO Resolutions are not binding on member states, and there is no formal sanction system in cases for non-implementation. Even if a Resolution is adopted, its implementation by member states may be uncertain.

The second is to use the FCCC as the institutional framework. An international system of air-flight taxes with the purpose of combating the greenhouse effect, would then be discussed primarily in the context of legal and economic instruments to reduce the emissions of GHGs. Necessary decisions could be made in the form of one or several special Protocols on the subject, in accordance with article 17 of the FCCC. Article 17.3 states that the requirement for the entry into force of any protocol shall be established by the protocol itself. This gives a certain flexibility. However, to negotiate a global tax solution within the framework of the FCCC could take time. An adopted protocol must be formally ratified by member states. When a protocol has entered into force, it is legally binding on the states that have ratified it.

A third possibility is to leave the issue to relevant regional organisations. This may make it easier to reach consensus, but will of course exclude a unified global solution. A fourth possibility is to establish a new independent international instrument for this particular purpose, with its own rules of procedure etc. Since there are already numerous organisations and instruments on the international environmental scene, this solution does not seem very attractive at this stage.

A new aviation tax raises the question of how it could be collected and administered. There are good reasons to base the implementation on already established national

systems for taxes in this field. The practical solutions will depend on what the tax is levied on. A passenger related tax should probably be collected by the airline in connection with the issuing of airline tickets, and transferred to the relevant governmental authority. Flight related taxes, including a tax on fuel, must be paid by the airline company directly to the government authority in question. Since there are already several charges in force in international aviation, these technical issues should not involve major difficulties.

The last question relates to the transfer of funds from national governments to the international body responsible for the use of these funds, and decisions on how to use the funds. This depends *inter alia* on the purpose of the tax and is not discussed further here.

#### ***4.6 Concluding remarks***

Aircraft's emit about 3 % of the global emissions of CO<sub>2</sub>. Their emissions of NO<sub>x</sub> is, however, small and shrinking compared to land based sources. We may, however, expect a yearly growth in aviation in the order of about 2.5 %

It seems appropriate to charge for the use of common global resources, especially when they are undercharged as is the pollution of the atmosphere by aviation. In accordance with international agreements, there are no taxes on jet fuel today.

A relatively small charge on aviation whether on the basis of the number of flights, number of passengers/flight kilometres, or jet fuel will give a revenue from all countries, but with a fair distribution according to who are the largest polluters, who may afford to pay most, and in accordance with the declared intention of the industrialised countries, that they should take the lead in the fight against climate change. This source of funding would be "over and above" the voluntary ODA contributions, and additional to the assessed contributions of governments to the UN.

It is expected that if such a levy on aviation might cause an interest, it may be further analysed and prepared *inter alia* by the subsidiary bodies of the Climate Convention or relevant ICAO bodies, and negotiated by these parties.

Compared with the charges needed to stabilise GHG emissions, the charge discussed in this report is likely to be small and will probably have a very small effect on the demand for air travel. A tax may in the longer term cause a substitution towards other means of transportation on short distances. The introduction of an aviation tax is therefore in addition to its revenues for climate purposes, also expected to have a small direct effect on reduction of GHG emissions.

Our conclusion is that a small charge on air traffic seems to meet most of the criteria needed for a possible successful mechanism, both in a north-south context, and as a practical, fair and almost painless solution, with small side-effects. There are today several charges in force as payment for service rendered in international aviation. Collection and control of taxes should therefore not involve major difficulties.

To yield a 10 billion USD revenues per year, one would need about 9 USD as an average charge per passenger, or about 0.5 US cent per passenger kilometre, or a tax on an average flight of about 650 USD. A charge on jet fuel or passenger-kilometres is closest to taxing emissions of carbon dioxide, and might be preferred. This choice will have the best direct effect on emission reductions, but will discriminate those countries and companies with older technology and less energy-efficient aircraft's. Such factors may favour a "departure tax". If the latter is chosen, short journeys will suffer compared with long journeys. A combined solution may therefore be considered, for instance to charge the tax according to the standard intervals of flight distance of 380 kilometres.

## ***Chapter 5 Tax on foreign currency transactions***

### ***5.1 Introduction***

A global tax on foreign currency transactions was first proposed by Nobel prize-winning economist James Tobin in 1978.<sup>24</sup> According to Tobin, a currency transaction tax was meant to be *sand in the wheels* of the excessively efficient money markets. This tax would therefore curb short-term speculation and consequently allow a greater autonomy to national monetary policy.

In recent years, a global tax on international currency transactions has also been proposed as an efficient way of raising funds for global purposes. According to the 1994 Human Development Report, this tax could cover large parts of the financial needs for UNDP-projects in the area of social development. Moreover, the "Carlsson" Commission on Global Governance proposed a tax on international currency transactions as a possible way of financing global environmental projects.

The purpose of this chapter is to examine the consequences of introducing a tax on foreign currency transactions. In chapter 5.2, we present some estimates of the potential revenue from the tax. Chapter 5.3 examines to what extent a currency transaction tax will affect monetary policy and exchange rate fluctuations. Chapter 5.4 describes legal and technical problems related to a global transaction tax, and chapter 5.5 summarises the discussion.

### ***5.2 Raising funds***

The net turnover of the international foreign currency markets has been estimated at around USD 1.3 trillion pr. business day in April 1995, an increase by 47 % from

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<sup>24</sup> Tobin, J. (1978): "A Proposal for International Monetary Reform", The Eastern Economic Journal 4, 153-159.

USD 880 billion in April 1992<sup>25</sup>. The daily turnover in April 1995 was about 1.8 times larger than the international reserves held by industrial countries and 100 times the value of daily exports in the world. According to the 1992 BIS survey, 70 % of total reported turnover were between dealers (mainly banks) whether at home or abroad.

We are aware of two estimates of possible revenues from a foreign currency transaction tax. James Tobin's proposal of a foreign currency tax, which was originally published in 1978, was repeated in the UNDP Human Development Report 1994. Based on a 0.5% two-sided tax on foreign currency transactions and total transaction values of USD 1 trillion a day, Tobin estimated the revenue potential as high as USD 1.5 trillion a year. If all kinds of foreign currency transactions are in the tax base of Tobin's estimates, his revenue figures imply a turnover reduction of about 40 % due to the introduction of a 0.5 % tax. The Human Development Report 1994 proposed a rate of 0.05 %. According to the UNDP estimations, this tax has a revenue potential of USD 150 billion a year.

Najman and d'Orville estimated that a tax rate of 0.25 % would give a revenue of USD 115 billion a year.<sup>26</sup> They assumed that roughly a third of the trading volume is handled by brokers whereas the rest of the turnover is generated by central banks, sovereign actors and international organisations. They further discounted 20 % from the total turnover due to evasion, but did not assume a reduction in trading volume due to the imposition of the tax. Najman and d'Orville's revenue estimates indicate that their estimated tax base is about 10 % of the value of the total foreign currency transactions before the imposition of the tax if they assume the same trading volume as Tobin did.

The degree of turnover reduction due to an introduction of a foreign currency transaction tax will depend on the size of the tax rate, but cannot be accurately estimated as there is no experience with such a tax. It is unclear how the tax will affect transactions for hedging purposes. The share of "speculative" transactions, which are assumed more tax sensitive, is not known. Speculative transactions are parts of the interdealer transactions as well as transactions between dealers and customers. A 0.5 % tax rate will have a substantial larger effect on these transactions than a 0.05 % tax rate. A proportional relationship between the tax rate and revenue, as it seems to be assumed in the UNDP Human Development Report 1994, is not realistic.

Let us for practical purposes assume that due to reduced transaction volume and evasion, an introduction of a 0.5 % tax on foreign currency transactions will give a tax base that is 10 % of today's trading volume. Based on this assumption the total revenue can be estimated at about USD 340 billion. If a tax rate of 0.05 % takes away half of the tax base, the revenue will be about USD 170 billion. It is worth noting that

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<sup>25</sup> The April 1995 data are based on preliminary data from the ten largest financial centres in the BIS survey on the turnover in the foreign exchange markets in April 1995 (Source: *The Economist*, September 23rd 1995). April 1992 data are from the BIS report "Central Bank Survey of Foreign Exchange Market Activity in April 1992".

<sup>26</sup> Najman, D. and H. d'Orville (1995): *The Feasibility and Impact of New and Innovative Financing Mechanisms For Multilateral Activities*, Interim report, mimeo

London has about 1/3 of the total foreign currencies market. If a tax rate of 0.5 % would be realised and result in a USD 340 billion revenue, London will collect international currency taxes worth 4/5 of the Norwegian gross domestic product.

### ***5.3 Monetary policy and exchange rate fluctuations***

During the 1970s and 1980s, capital controls were abolished in most of the industrial countries. The main motivation for this deregulation was that free movement of capital across national borders would promote an efficient allocation of capital. National savings would be directed to investments with the highest expected return, wherever these may be located. However, according to professor Tobin the amount of international currency transactions has become much larger than what is needed to ensure an efficient allocation of capital. There are several negative consequences of this excessive capital mobility. Countries with floating exchange rate regimes are experiencing significant fluctuations in their exchange rates. We know that such fluctuations have a potential negative impact on international trade and investment. For countries having fixed exchange rate regimes, the high degree of international capital mobility entails that domestic interest rates must be used to defend the current exchange rate parity. Thus, there is no scope for an independent monetary policy in these countries. Moreover, in recent years we have seen that excessive speculative transactions have forced several countries to let their currencies float.<sup>27</sup>

Tobin claims that a global tax on currency transactions is a viable solution to these problems. The main advantage of the tax is that it has a particularly strong impact on short-term speculation. The reason for this is that a 1% tax (2% on a round-trip transaction) represents an annualised cost of nearly 8,000% on a one-day shift, 180% over a week, 27% over a month and only 0.2% over ten years.<sup>28</sup> Thus, a tax on foreign currency transactions would deter short-term speculation and force market participants to put more weight on long term fundamentals. This might reduce exchange rate volatility and increase the scope for an independent monetary policy.

It is important to stress that there is considerable uncertainty when assessing the economic consequences of introducing a global tax on foreign currency transactions. The most obvious reason is that we have no experience with a global tax. However, this issue is also complicated by the fact that there is a large number of participants in the foreign currency markets and these participants have different trading strategies and different objectives. In addition to the arguments put forward by Tobin, we believe that there are some other considerations that need to be taken into account.

Firstly, a foreign currency transaction tax will not necessarily stop short-term capital movements. If market participants expect a small change in the exchange rate, a currency transaction tax will presumably deter speculations. However, this tax would not be able to stop speculation when there is a large expected change in the exchange rate (as was the case for some Nordic- and ERM-countries in 1992). Secondly, it is an open question whether short-term speculation has a stabilising or destabilising effect on asset prices (e.g. exchange rates). Empirical studies have not been able to find any significant relationship between the volume of short-term transactions and asset price

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<sup>27</sup> e.g. Norway, Sweden, Finland and some of the ERM-countries

<sup>28</sup> see Eichengreen and Wyplosz (1993), p 120

volatility. Thirdly, we have recently seen significant exchange rate changes that are due to the fact that international investors recognise actual or potential weaknesses in some countries' macroeconomic policy. Thus, one might argue that free movement of capital is forcing governments into more credible and consistent policies (the recent policy changes in Mexico and Sweden can serve as an illustration). Finally, financial institutions hedge currency risks and other investment risks by short-term liquidity trading. Since a currency transaction tax could make this liquidity trading more difficult and more expensive, the tax might increase the risk exposure in some financial institutions. It is important to remember that active hedging will be affected in the same way as active speculation by a transaction tax.

It is worthwhile to note that if the tax rate on foreign currency transactions is sufficiently high, it will eventually deter short-term speculation. However, a high tax rate will also affect international trade, because a transaction tax will have the same effects as a tariff. The tax rates that have been proposed to finance global projects have varied between 0.05% and 0.5%. We believe that tax rates at the lowest end of this interval will not have any significant impact on international trade.

#### ***5.4 Legal and technical issues***

A universal tax on foreign currency transactions as a fund raising tool would require an unprecedented degree of co-ordination between the countries of the world. Global agreement on both the design of, and administration standard for such a tax is a prerequisite for its implementation. The international society would have to agree upon a common tax base as well as methods of assessment, audit and collection mechanisms. The agreement would have to include virtually all countries of the world to avoid market transactions moving to countries that do not want to introduce the tax or to countries with lax standards of administration. We find it difficult to believe that all countries of the world will comply with such a proposal.

The question of the choice of tax base is even more complex than the political and administrative implications of the proposal. Tobin suggested an international uniform tax levied on spot transactions in foreign exchange (including deliveries pursuant to futures, contracts and options). A major question is whether the tax base can be limited to the foreign exchange market or if it would have to be extended to include all financial markets to avoid tax evasion. As a result of national and international deregulation of financial markets, domestic and foreign markets as well as different markets and products within the same jurisdiction have been increasingly linked. Introduction of a tax in one part of the international financial markets will most likely move transactions to close substitutes.

It seems obvious that currency swaps as well as currency indexed contracts would have to be covered by a Tobin-type tax. In their criticism of the Tobin proposal Garber and Taylor claim that *“if foreign exchange is defined as an exchange of one bank deposit for another in a different currency, gross trading in these claims will be effectively eliminated in favour of T-bill swaps in currencies with liquid (same day) T-bill markets. The swapped T-bills will be immediately sold for deposits. The foreign currency market will shift to this form, no tax will be paid, and position taking will be*

*unaffected.....The tax would have to be extended out of straight foreign exchange to transactions in an ever widening ring of securities and derivatives markets”.*<sup>29</sup>

Depending on the size of the rate, an introduction of a new foreign currency tax will most likely start a process of financial engineering by the financial community to avoid the taxation. New products and intermediaries in the foreign currency markets will probably emerge. Export enterprises could play the same role as the banks today by taking over foreign currency payments for other enterprises and thereby circumvent the taxation. The following example can illustrate this: Assume that Enterprise A is an exporter with a dollar account with a bank abroad and that Enterprise B is an importer. The payments for Enterprise A's exports in dollars are credited its accounts abroad. According to an agreement between Enterprise A and Enterprise B the latter's imports could be paid for in dollar by debiting the former's accounts. The clearing between them can later be made in a domestic bank in local currency.

To evade a foreign currency transaction tax it is likely that some transactors will shift to using foreign currencies for transaction purposes domestically. The exchange rate risk by doing this would be limited if the vehicle currency is closely linked to the local currency (e.g. ECU in the case of European currencies).

## **5.5 Concluding remarks**

The idea of taxing international currency transactions has been seriously discussed and examined in a number of countries and institutions. In 1994, a commission with representatives from the Ministry of Finance and Norges Bank analysed in detail the consequences of a currency transaction tax.<sup>30</sup> Internationally, this issue has recently been examined by the Bank of International Settlements (BIS), the Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF). These studies have led to considerable scepticism to the idea of taxing foreign currency transactions. We share this scepticism for several reasons. First, a currency tax will only to a limited extent curb speculation. Secondly, there are significant legal and administrative problems when introducing a global transaction tax, and the effectiveness of the tax would be greatly reduced if only a few governments decided against it. Finally, it is reasonable to assume that financial innovations and the use of vehicle currencies would make tax evasion easy. However the large revenue potential from the tax will make it hard to permanently dismiss the tax as a way of financing global projects.

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