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Is there potential for government participation in flexibility mechanisms?

- Evaluating the Finnish case

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Abstract

The European directives on emission trade and flexible mechanisms are making new kinds of economic instruments available for the implementation of climate policies. In addition to the EU-wide trade in emission rights, governments will have the option to allow joint implementation between firms in the member countries. However, they will also have to define the scope for the use of these flexibility mechanisms. This study considers the effects of using these instruments in Finland, baring in mind the role the government might have in connection with the various mechanisms. There are several ways in which the government can affect the cost effectiveness of climate policies by either enhancing the functioning of the markets or by directly participating in them. The study uses the economic-engineering EV-model to assess three scenarios for government participation. We find that there is significant potential for reducing the costs of emission reductions by direct government participation in flexibility mechanisms especially in the long run.

1. Introduction

Trade in carbon dioxide emission permits commenced in the European Union Emission Trading System at the beginning of 2005, making new kinds of economic instruments available for the implementation of climate policies. But Emission Trade is just on of the flexible mechanisms. The Kyoto Protocol also defines Emission Trade between Annex 1-countries, which is separate from the EU ETS, as well as Joint Implemetation, where firms operating in Annex 1 –countries engage in projects aimed at cutting emissions. These projects, once completed, create Emission Reduction Units, which can be traded just like the Assigned Allocation Units that concern the emission allowed by the Protocol. When the projects take place in non-Annex 1 –countries they fall under the definition Clean development Mechanism and create Certified Emission Reductions.

The EU directives on emission trade and flexible mechanisms also give governments the option to link JI and CDM to emission trading, but the scope for the use of these flexibility mechanisms has to be defined in advance, in connection with submitting the national allocation plans of emission quotas. This study considers the effects of using these instruments in Finland, baring in mind the role the government might have in connection with the various mechanisms. There are several ways in which the government can affect the cost effectiveness of climate policies by either enhancing the functioning of the markets or by directly participating in them.

At the minimum, governments are responsible for keeping emission registries. Project mechanisms also require the establishment of bilateral procedures for keeping track of the projects and the emission reductions, as well as inspection and certification methods. Ultimately, the government assumes the responsibility for any sales of emission reductions since these affect the national total.

In section two of this paper, discussion of the role of government is reviewed in some detail. The third section presents simulations for the Finnish case. These simulations evaluate the effects

flexible mechanisms could have on the cost of climate policies. Since the EU ET directive requires the Member States to make a decision on the amount of emission reductions that can be achieved with the project mechanism in advance, evaluating the different options amounts to changing the copes for ET and JI. The final section concludes.

2 The roles for governments in flexibility mechanisms

The Kyoto Protocol, Marrakech Accords and the EU emission trading and link directives define the minimum tasks for the government. In the context of European emission trading, the least the government has to do is to set up the registries and allocation plans and set up the monitoring systems. It would apparently be straightforward to link European emission trading to the emission tading between Annex 1 countries defined in the Kyoto Protocol by bilateral agreements. The project mechanisms CDM and JI are more complicated, however.

According the Marrakech accords, the participating countries have to assign a national JI and CDM authority. The accords also require Annex 1 countries to maintain a reserve of emission permits in order to cover the transfers of permits between firms or states that are due to Joint Implementation projects. The accords also set an important prerequisite for the project mechanisms in restricting the mechanisms only to be applicable for projects that are additional to domestic measures. What is meant by additionality is left for the countries themselves to decide, but in the European context this requirement has been translated into the requirement that not more than half of the country-specific emission reduction targets can be met with flexible mechanisms. According to the link directive, if emission reductions stemming from JI within Europe cannot be credited to a firm without due consideration to the amount of permits it is to be given in the ET allocation of permits. If the project involves a firm that has to participate to the EU ETS, the project-based reductions must in practice be decucted from the amount of permits the firm receives in the grandfathering of permits. This is to ensure that the project mechanisms do not affect the amount of AAUs covered by the emission trading scheme, so that the ERUs created by JI are equivalent the permits basing on AAUs. Outside of the ETS sectors, the use of JI is more straightforward. there is one important restriction still, and this is the exclusion of JI between domestic firms. JI can only be applied in cooperation with firms in other EU countries. There is no clear economic motivation for this restriction and it is hard to see its rationale in the case of firms that operate in many EU countries.

The project-based mechanisms involve many tasks that ETS does not necessitate. The fundamental difference between ET and JI and CDM is that when an emission permit is purchased, it immediately gives the right to emit to the purchaser. In contrast, a firm engaging in a JI project only gets credited for the emission reductions afterwards, if the project is successful, in which case it creates CERs that are transferable much like the emission permits are. The setting-up of the projects is also quite elaborate. Each project and its monitoring and verification has to be approved by both of the countries involved, involving the determination of baseline emissions (to which the achieved reductions are compared) and the verification of the reductions once the project has been completed. In the case of CDM, this process also involves a multinational level. This is not necessary for JI, because the countries assume the responsibility to match the CERs between themselves – CERs created in the host country are deduced from the national allocation of AAUs and credited to the investing country's AAUs. CDM does not involve national AAUs since the developing countries do not have them.

From the vantage point of firms participating in project-base mechanisms, the practical problems lie more in finding suitable projects than in dealing with the complexities of the system. There are no additional restrictions to the projects, but since the matching process and the verification and

monitoring processes require effort from the participating firms, it is likely that transaction costs are higher in JI and CDM than they are in ETS. This may mean that there is scope for active government participation in the role of facilitator, but it has also lead many firms to prefer JI programmes and CDM funds to bilateral participation.

Goverments are ultimately responsible for the emission reduction targets of the Kyoto Protocol. It is obvious that this involves many kinds of uncertainties and risks which the flexibility mechanisms could help to reduce. But active participation could have many other reasons as well. The Canadian Climate strategy, for example, sets a ceiling for the prices of domestic emission permits, which requires active government participation in domestic emission trade and in trade between Annex 1 countries. In Europe, where the ETS covers only 40 to 60 per cent of emissions, cutting reductions in the sectors outside the ETS could benefit from project mechanisms. For example, the Dutch climate strategy is creating a system of price guarantees for reduction stemming from the non-ETS sectors.

The Canadian approach can be seen to tackle one of the major draw-backs of emission trading, namely, price uncertainty. Now that the EU ETS has been functioning for more than a year it is clear that prices can fluctuate a lot, and that they do not always appear to reflect scarcity as expected. Financial markets are more than able to cope with this, but government intervention could be a way to smooth the fluctuations.

The Project mechanisms involve uncertainties and transaction costs stemming from the risks of failure and from the elaborate designing, monitoring and verification requirements. In most countries, there have been pilot programmes for JI and CDM. In the Finnish case in particular the programme has aimed at establishing contacts between interested firms and in helping firms to cooperate with host country bureaucracy and monitoring and verification. One of the lessons form these pilot programmes is that many firms, even large ones, dislike the transaction costs and prefer to participate via project funds rather than engage in complicated and risky projects themselves. The pilot projects might evolve to something like the large international funds or they might not, but so far they appear to have been able to facilitate the participation of firms by sharing their experiences with them.

The government could also participate directly, either as a participant in the projects, or by acquiring ERUs and CERs from the markets. The Irish climate strategy relies on government participation in flexibility mechanisms in acquiring emission righst which are then in effect allocated to the emission trading sector, to guarantee the trading sector can be allocated close to their baseline emissions. The Kyoto protocol does not restrict this kind of use of the flexibility mechanisms, but the EU link directive does contain the additionality restriction and the requirement that the scope mechanisms has to be defined in advance. The directive only deals with project mechanisms, however, whence there are for the time being no rules for emission trade between Annex 1 –countries.

Active participation could also take the form of actively restricting flexibility. This approach has been proposed on the strength of the argument that flexible mechanisms might not create sufficient incentives for innovation and investment in new technologies, since current technologies might also lead to increased cost efficiency. But this is a flawed argument. Temporary restrictions – all that could be applied in the context of fixed-term environmental agreements - would not be enough to permanently affect technological change. Permanent restrictions, were they applicable, could give market power to innovators leading to more innovation, but since this would be at the expense of cost-efficiency in emission reductions, it is not so easy to see whether this route would be useful. Finally, technology policy also often has the aim of promoting domestic technologies. This goal

could probably be combined to project mechanisms, but it would presumably run into trouble with EU competition policies.

3 Three schemes for government participation in Finland

Government participation to flexibility mechanisms can clearly affect the cost of climate policies, since it may alter the amount of reductions that take place domestically. Since the EU ETS only covers part of the economy, there will be reduction costs stemming from other sectors. These costs are directly dependent on the required reductions, which government participation may decrease. If CDM creates emission reductions that are then utilised in the EU countries, the demand for permits may decrease, lowering the price of emission permits in the EU ETS. But as argued above, governments need to get involved to some extent to facilitate these benefits from flexibility mechanisms.

In Finland, it has been estimated that the marginal costs of emission reductions domestically are close to a third higher in the non-trading sector than in the sectors involved in ETS. It has been estimated that the costs for the entire energy system of cutting emissions by three million tonnes would cause a marginal cost of 10 euros per tonne and a total cost in the vicinity of 180 million euros, a princely sum compared to the 30 million than could be achieved with flexibility. It is clear that government purchases of permits or reduction units may be a revenue losing policy, if the acquired emission rights are given away in grandfathering, for example. The spending needs to be financed by raising taxes and this will diminish the potential gains from the policy.

Since the effects of government participation depend on the actual situation of the economy, they can only be studied in the particular context. In this study, we simulate three possible schemes for participation that differ in the extent of government involvement and also in the financing of government purchases of emission rights.

The study utilises the EV-model to evaluate the policy proposals (Forsström and Honkatukia 2002). The EV-model contains a detailed description of the Finnish economy, combining traditional elements from economic CGE-models to engineering approaches for certain key sectors of the economy. The key modelling target in setting up the model has been to capture the essential process-level features and peculiarities of Finnish energy use. The model thus relies heavily on engineering data about the details on fuel use, the often fuel-specific processes that are used in the production of heat and electricity as well as in process industries. By and large, Finnish industry was for a long time characterised by process industry, such as forest industries utilising the country's one natural resource, wood, and metal industries specialising in the manufacturing machinery and equipment, but also to metal manufacturing. Production in these industries is modelled along bottom-up, or engineering, descriptions of the processes. The model also makes a distinction between different electricity and heat generation technologies. This is essential for the analysis of the Finnish energy sector, which contains a lot of combined heat and power generation, as well as communal district heating.

The EV-model distinguishes between several processes for electricity and heat generation. The basic distinction is made according to the fuel used, which is of significance in that the thermal efficiency of generation processes is to an extent dependent on the fuel choice. More importantly,

however, the model defines distinct processes for condensing plants that only generate electricity; district heat processes that only generate heat; and combined heat and power generation processes that generate both heat and electric power. The large-scale use of the latter is a distinguishing feature of the Finnish energy sector and its inclusion is therefore one of the essential elements of the model. The model combines the electricity and heat generated from the various processes either following the technology-bundle described in the introduction or with the full-fledged engineering approach.

The baseline scenario follows closely the Finnish Climate strategy's With Measures baseline. There, industrial production is assumed grow at an average annual rate of 3.5 to 2010, the reference year for the impact evaluations. Emissions are also growing, though at a lesser pace. By 2010, CO2 emissions are expected to be close 67 Mt. To reach the Finnish emission target (1990 levels), CO2 emissions from fossil fuels will have to be cut by 14 per cent (while the other green house gases can be cut slightly more). In the longer run, by 2025, the CO2 emissions are expected to rise above 70 Mt.

The three policies span the alternatives from passive policies, where the governement does not participate in flexibility mechanisms to the most active currently thought admissible (under the EU ET directive), where half of the required reductions could be achieved with the help of flexibility mechanisms. In the passive alternative, the allocation of quotas to the ET sector would be the smallest, with the non-ET sectors consequently having to cut their emissions the least. In the second alternative, the government would acquire emission rights, with the distribution of the rights between the ET and non-ET sectors aiming at equal reduction targets in the sectors (in tonnes of CO2). In the third alternative, the government would acquire the maximum allowed – close to 5 million tonnes for the Kyoto period – and distributes it to the non-trading sector, which would help to lower the reduction target of the ET sector.

In summary, the alternatives for 2010 are:

1) Passive: no government participation in flexibility mechanisms.
2) Equal distribution: the ET sector and non-trading sectors cut their emissions equiproportionately, with the government purchasing 3.7 Mt of emission rights to facilitate this allocation.
3) Active: the government acquires the maximum allowed, 5 Mt CO2.

All alternatives consider permit prices ranging from 5 to 20 euro per tonne CO2. it is assumed that the price of ERUs is equated to the price of permits, but in reality it may well be that some of the reductions are cheaper than permits. In all alternatives, it is assumed that electricity taxes in the non-trading sector are used to finance the government purchases of emission rights. The allocation of emission quotas for the Kyoto period is not yet known, but it is assumed the ET sector would get 19% less quotas than its emissions on the baseline, which has been the starting point of previous policy evaluations.

Previous studies on the effects of emission trading in Finland have shown that it is the share of emission reductions the non-trading sector has to do that has the largest effect on the cost of climate policies. The marginal costs of emission cuts in the non-trading sector are estimated to be much higher than in the ET sector, and, consequently, if the non-trading sector has to cut emissions

significantly, costs will rapidly soar even at the national level, whereas the ET sector can always resort to the markets when domestic reduction costs start rising. Government participation to flexibility mechanisms can affect the split of reduction between the ET and non-Et sectors in a way that lowers the overall costs.

Table 1 reports the macroeconomic effects of the simulations for the year 2010. The alternatives do not differ from each other significantly. The cost-reducing effects of more active purchases are cancelled by the need to raise energy taxes by as much as 90 per cent to finance these purchases.

Table 1 The macroecnomic effects of climate policies in 2010, per cent from BAU

	Passive:5€	Passive:10€	Passive:20€	Equiproportionate: 5€	Equiproportionate: 10€	Equiproportionate: 20€	Active:5€	Active:10€	Active:20€
GDP	-0.5	-0.7	-0.9	-0.5	-0.6	-0.9	-0.4	-0.5	-0.9
Consumption	-1.1	-1.6	-2.1	-1.2	-1.4	-2.2	-1.1	-1.4	-2.2
Investment	-0.2	-0.4	-0.5	-0.1	-0.1	-0.3	0.0	-0.1	-0.3
Employment	-0.2	-0.2	-0.1	-0.1	0.0	0.1	-0.1	0.0	0.1

For 2025, the motivation for the study of the flexibility mechanisms is slightly different from the 2010 case. While nothing has been agreed about long-run reductions, it may be assumed that the Kyoto emission level is the starting point for any future restrictions. In all likelihood, future targets may be stricter than the Kyoto target, and here, we assume that the emission target could be as much as 30 per cent below the Kyoto level, implying cuts of close to 50 per cent from baseline. For 30 per cent cuts, active government participation would mean purchases of almost 19 million tonnes. The question of flexibility thus appears in an entirely different order of magnitude in 2025 than in 2010. We consider only the passive and active alternatives and vary the reduction target.

Table 2 summarises the macroeconomic results for 2025. From the table, it is clear that the macroeconomic costs can be higher in 2025 than in 2010, simply because it is expected that larger cuts are going to be necessary. On the other hand, the emission intensity of the economy is also expected to grow smaller, which has the effect of reducing the relative costs. Nevertheless, the costs in terms of GDP can be as high as 1.4 per cent of GDP, which active participation could almost halve.

At the industry level, an active stance would reduce the costs of climate policies in the ET sector, and especially in the sectors whose cost structure changes significantly because of ET. These sectors include the process emissions-intensive metal industries and mineral industries. The energy sector would not benefit from the policies considered, since it would be hit by the rises in electricity taxes.

Table 2 The macroecnomic effects of climate policies in 2025, per cent from BAU

	Kyoto: 5€, Active	Kyoto-10%: 10€, Active	Kyoto-20%: 15€, Active	Kyoto-30%: 20€, Active	Kyoto: 5€, Passive	Kyoto-10%: 10€, Passive	Kyoto-20%: 15€, Passive	Kyoto-30%: 20€, Passive
GDP	-0.5	-0.6	-0.7	-0.8	-0.9	-1.1	-1.3	-1.5
Consumption	-1.2	-1.5	-1.7	-1.9	-1.4	-1.9	-2.4	-2.8
Investment	0.0	0.0	0.0	0.0	-2.7	-2.7	-2.7	-2.7
Employment	-0.3	-0.2	-0.1	0.0	-0.2	-0.2	-0.2	-0.2

4. Conclusions

The EU ETS requires member states to declare the amount of emission rights they plan to acquire with the help of flexibility mechanisms in advance. This has made the effects of these mechanisms a question worth evaluating. In Finland, the evaluation was part of the background studies for the Energy and Climate Strategy. The study has considered the roles the government has in enforcing and participating in flexibility mechanisms as well as the effects of government participation.

The project mechanisms JI and CDM differ form emission trading in requiring project-specific involvement from authorities just to set the projects up and to monitor and verify their outcomes. there are several ways for the government to reduce the costs of participation of private firms, but the government can also participate directly and affect the domestic reduction targets of the ET and non-ET sectors. This study has evaluated the effects of various stages of government activity ranging from completely passive to the most active admissible.

We find that there is considerable potential for the government to reduce the macroeconomic costs of emission reductions even though the active purchase of emission rights must be financed by raising taxes. In the long run, when it can be assumed that significant emission cuts are going to have to be made, an active participation can halve the costs of emission reductions. In 2010, however, the scope for the mechanisms is limited and the potential savings are not particularly large.

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