Nordic Council of Ministers

CLIMATE POLICIES in the Nordics

Nordic Economic Policy Review 2019

Contents

Climate Policies in the Nordics

Lars Calmfors[1]

John Hassler[2]

[1] Research Institute of Industrial Economics and Institute for International Economics, Stockholm University. Email: lars.calmfors@iies.su.se.
[2] Institute for International Economics, Stockholm University and Department of Economics, University of Gothenburg. Email: john.hassler@iies.su.se.

1. Introduction

Climate change has become a key concern for policy makers, business leaders and individuals all over the world. There exists a broad scientific consensus that the emissions of greenhouse gases, mainly carbon dioxide (CO_2), is responsible for global warming that, if not halted, could have unacceptable consequences, including catastrophic ones, in at least parts of the world.

When carbon dioxide is emitted to the atmosphere, it mixes quickly and affects the *global energy balance* – the difference between the energy flowing in to earth in the form of sunlight and the outflow largely in the form of lower frequency heat radiation. This balance is affected since CO_2 and other greenhouse gases easier let the sunlight (the inflow) pass than low-frequency heat radiation (the outflow).

The main argument used by economists to motivate policy intervention against climate change is that emissions of greenhouse gases that drive global warming are an *externality*. The benefits of using fossil fuel accrue to the user, whereas the largely negative side effects are born by individuals spread over the globe and over very long time horizons. Since the externality extends across borders, a global collective-action problem arises with incentives for individual countries to free-ride on the climate policies by others.

The effect on the global energy balance of higher CO_2 atmospheric concentration and the resulting global warming was quantified more than a century ago (Arrhenius 1896). The policy prescription, to tax the emitter to an amount that makes her internalize the costs imposed on others, has been known almost as long (since Pigou 1920). Nevertheless, dealing with climate change has been called the largest challenge to our policy makers. There are a number of reasons for this. First, the natural system that produces climate change is extremely complicated and diverse. Therefore, we do not know with certainty by how much human emissions will affect the climate. Second, although it is often represented by just a single number, the increase in the global mean atmospheric temperature, climate change is immensely multifaceted across the globe. Third, the consequences for human welfare of changes in the climate are very difficult to estimate. This is due to the diversity of climate change

as well as to the fact that we need to judge its consequences over hundreds of years. The calculation of the cost of a unit of emissions requires aggregation across space and time of all possible damages. This cannot be done without taking a normative position on the relative value of damages to individuals living in different countries and time periods. Therefore, it is difficult to agree on a single number for the externality and thus the tax that emitters should bear.

Within states, institutions that can deal with coordination problems arising from externalities have been established. But climate change has no national borders. Therefore, international cooperation is required to negotiate climate polices. It goes without saying that this is extremely complicated in a world consisting today (March 2019) of 195 sovereign countries with different political systems, at different stages of economic development, which have different impacts on global warming and which are differently impacted by it.

International coordination is also key since measures against climate change in one country are likely to affect emissions in other countries through several mechanisms. If one country reduces the use of, for example, oil, the world market price falls. This raises oil consumption elsewhere. Similarly, an oil-and-gas-producing country like Norway can reduce its supply to the world market, but this raises the price of fossil fuel and thus creates an incentive for other producers to increase their supply. The spillovers also work through politically constructed mechanisms like the EU Emissions Trading System where emission rights are traded across the borders of the member states. Moreover, technological developments in energy production in one country will be diffused to others and this way affect emissions there. Finally, the mere observation that a country chooses an ambitious climate policy may affect political processes in other countries through a demonstration and policy diffusion effect.

Since there is no world government, climate policy must be determined by national governments who may feel more or less committed to international agreements. These may be global like the Kyoto Protocol from 1997 and the Paris Agreement from 2015 or regional as the EU's climate and energy policies. To devise policies that really affect the global climate at a reasonable level of cost effectiveness, policy makers must understand the spillovers discussed above. These

issues, seen from a Nordic perspective, form the theme of this volume. It addresses a number of pertinent questions:

- What are the prospects for effective global coordination of national climate policies?
- How does the EU Emissions Trading System affect the effectiveness of different national polices?
- How cost-effective are climate policies in the Nordic countries?
- Is it futile to hope that small countries like the Nordic ones can affect the global climate?
- Is the current Norwegian policy of exporting oil and gas, while at the same time subsidizing domestic reductions of fossil fuel use, a cost-effective climate policy?

2. The articles in the volume

The volume contains five papers with associated comments which were originally presented at a conference in Stockholm on 24 October 2018.

2.1 International climate politics in the post-Paris era

Naghmeh Nasiritousi and *Karin Bäckstrand* assess how the Paris Agreement has changed global climate policy coordination and to what extent this is for the better. They discuss why it is so difficult to reach binding international agreements on emission reductions. It is stressed that this is a particularly difficult collective-action problem because of the large number of heterogeneous actors involved and conflicts about what constitutes fair burden-sharing between economically more developed countries (which have in the past been responsible for large emissions of greenhouse gases) and developing countries (which may find it natural and right to follow the economic development paths of the advanced countries). The authors also provide a history of international climate policy coordination from the 1992 Rio conference, via the 2009 Copenhagen summit to the 2015 Paris Agreement.

Nasiritousi and Bäckstrand argue that the Paris Agreement and the rulebook adopted in Katowice in December 2018 are game-changers, as they provide a framework for scaling up state, sub-state and non-state commitments over time. A key difference between

the Paris Agreement and the previous Kyoto Protocol is the focus on *voluntary* national commitments. In the words of the authors, 'the Paris Agreement marks a shift in global climate policy from a top-down, centralized legally binding response of target and timetables of greenhouse gas emissions to a bottom-up decentralized and voluntary pledge and review system of reduction targets by states'. On the one hand, this set-up has the advantage that the barriers for participation become much lower. On the other hand, the voluntary commitments are far from sufficient for meeting the Paris Agreement's temperature goal of 2°C and even less so for the 1.5°C goal.

The biggest challenge for the Paris Agreement is how to ratchet up ambitious climate action. Here, Naisritousi and Bäckstrand offer a mixed judgement on the prospects for the Paris Agreement to deliver on its goals. They emphasize how the agreement allocates an increasingly important role to non-state actors such as business, regions, cities and civil society. For example, the observer groups present at the annual COPs (Conferences of Parties under the United Nations Framework Convention on Climate Change) are now invited to play a larger role in accelerating global climate action. According to the authors, the Paris Agreement provides a framework through which non-state actors can mobilize voluntary action and increase political pressure on states (naming and shaming) to gradually raise their climate policy ambitions.

At the same time, Nasiritousi and Bäckstrand recognize that the Paris Agreement needs to be complemented with many other initiatives. A rapid decarbonization of the global economy requires both technological and socio-political innovations. One promising proposal discussed is the creation of *climate clubs*. An initially small group of like-minded enthusiastic countries may commit to ambitious climate policies. Within the club, a range of economic instruments, including but not necessarily limited to emissions trading systems or common emission taxes, can ensure efficient mitigation efforts. The club could also devise benefits which accrue only to members and which could therefore entice other countries to join. One such incentive might be a carbon border adjustment tax that applies to non-members. Possibly, such carbon club characteristics could be introduced in the climate policy of the EU. The authors argue that the Nordic countries, with their ambitious climate policy objectives, might have an important role to play in such a context.

2.2 National climate policies and the European Emissions Trading System

Frederik Silbye and *Peter Birch Sørensen* analyze the EU Emissions Trading System (EU ETS). This arrangement requires large emitters in the EU – energy-intensive industries and energy producers – to surrender an emission right (allowance) for each ton of CO_2 emitted. The system covers around half of all emissions within the EU. Since 2008, emission rights can be saved for later use and a large stock of such saved emission rights has been built up. The stock is at a level roughly corresponding to one year of emissions in the system. The build-up of an allowance surplus took place at the same time as the price of allowances fell to very low levels, almost certainly below the social cost of emissions.

As a response to the large allowance surplus and the low and volatile allowance price, the EU ETS was reformed in 2018. A Market Stability Reserve to absorb part of the allowance surplus was established. A key feature of the reformed system is that the yearly supply of emission allowances, some of which are allocated freely and some auctioned, will depend on the size of the stock of previously issued, but not used, allowances. The mechanism is that a fraction of the total allowance surplus in the market will be withheld from the yearly auctions and transferred to the Market Stability Reserve if the surplus exceeds a certain level (corresponding to about half the current surplus). From 2023 there will be a cap on the amount of allowances that can be held in the Market Stability Reserve. Allowances above the cap will be automatically and permanently annulled. Although this cap starts to bind first in the future, the reform immediately caused the price of emission allowances to rise substantially. The interpretation is that the market anticipated the reform to significantly increase the scarcity of emission rights in the future. The value of emission rights that can be saved for future use thus increased already today.

To model the current and future demand for emission rights, Silbye and Sørensen construct a model of emitter demand for allowances which they interact with the supply as dictated by both the old and the new rules for the EU ETS. The finding is that the change in rules will have large effects. The model predicts that accumulated emissions over the coming four decades will be reduced by around 5 000 Megaton CO_2 due to the automatic annulment mechanism.

This reduction is about a hundred times larger than the current yearly Swedish emissions.

Before the reform, the supply of emission rights was predetermined and independent of national policies. Then, if a national government would buy and annul emission rights (a reduction in their supply), the accumulated emissions in the system would be reduced one for one in the long run. On the other hand, national policies to reduce emissions within the ETS, for example through subsidies to renewable energy or a CO_2 tax (a reduction in the demand for emission rights) would only lead to other emitters increasing their emissions one for one in the long term. The analysis by Silbye and Sørensen implies that the reform flips the effectiveness of these two national policies to reduce emissions within the ETS. National measures to reduce emissions will increase the stock of saved emission rights and this will trigger less issuance of new emission rights in the future. Such policies will therefore be effective. By contrast, buying and immediately annulling emission rights at the national level will be largely offset by fewer annulments of allowances held in the Market Stability Reserve, as the initial drop in the allowance surplus will cause fewer transfers of allowances to it.[3] The consequence is a larger issuance of rights in the future, making the national policy ineffective.

Finally, the authors propose further reforms of the EU ETS. Specifically, they propose that the effectiveness of the system could be taken one step further by including explicit floor and ceiling prices when emission allowances are auctioned. Such a system would have similar beneficial effects as the recently introduced annulment mechanism but be much simpler and transparent.

2.3 Are climate policies in the Nordic countries cost-effective?

Björn Carlén and *Bengt Kriström* demonstrate that in a stylized model, without any other externalities than from emissions, a cost-effective climate policy requires that the marginal cost of abatement is the same for all emitters. The logic is straightforward: if two emitters have different marginal abatement costs, abatement

[3] Buying and hoarding emission allowances for a long time before annulling them could reduce emissions. The effectiveness of such a policy depends on how the demand for emission allowances evolves in the long run and whether further EU ETS reforms are undertaken.

efforts should be reallocated towards the one with a lower marginal cost. The cost reductions of the agent with a higher marginal cost are then larger than the cost increases of the other agent. Thus total abatement costs fall.

The authors discuss a number of complications that could potentially overturn the result that marginal abatement costs should be equalized. Among them are distributional issues, carbon leakage and technology spillovers. However, the conclusion is that in the Nordic case, these complications are unlikely to lead to another result than that marginal costs should be equalized.

Carlén and Kriström document the extent to which abatement costs are different across emitters. In particular, they argue that overlapping polices – for example various investment support schemes like the Swedish program *Klimatklivet* (a support scheme for investments deemed to reduce greenhouse gas emissions) – cause large divergences in the marginal costs of mitigation faced by different emitters in the Nordics. When it comes to the transportation sector, the tax rates on emissions are relatively well harmonized within and between the Nordic countries. The tax rates are also close to the mean rates in the EU. However, the Nordic countries have employed a number of other instruments, e.g. CO_2-differentiated vehicle taxation and programs supporting climate investments. These policies are far from uniform across the Nordic countries. Furthermore, the Nordic countries have more ambitious policies for emission reductions in the transportation sector than other EU countries. Therefore, taxes will need to become much higher than in the rest of the EU. In a benchmark calculation, fulfilling Swedish emission targets would require a tax per liter of gasoline that is 0.44 euros higher than the EU median in 2030.

A key point in the Carlén-Kriström paper concerns emission reductions in the non-ETS sector (the sector which is not part of the EU Emissions Trading System), which includes non-energy-intensive industries, households and services, and domestic transportation. For this sector, all the Nordic countries have very ambitious emission reduction obligations according to EU rules (the Effort Sharing Regulation). At the same time, there are significant marginal cost disparities in the non-ETS sectors between the Nordic

countries and several (other) EU-countries. The authors argue that the existing flexibility mechanisms in the EU regulation should be used to arrange non-ETS trades between the Nordic countries and (other) EU countries. This would in effect imply intergovernmental emissions trading on behalf of the actors in the part of the economy not covered by the existing trading system. This can be highly cost-effective. For any given amount of resources expended, such trade will imply larger emission reductions than would otherwise be the case. Alternatively, any given reduction target can be reached at a lower cost. But it does require an acceptance of the idea that the priority is to reduce *global* emissions independently of where the emission reductions take place.

2.4 Global impact of national climate policy in the Nordic countries

Mads Greaker, *Rolf Golombek* and *Michael Hoel* analyze both the rationales for and the effectiveness of the more ambitious climate policies in the Nordics than elsewhere. The authors first document that the Nordic countries do more than what is implied by the necessary obligations according to international agreements and EU regulations when it comes to spending resources on climate policy. It is also shown that the Nordic climate polices are not well aligned.

A key question is why the small Nordic countries have chosen to pursue so ambitious climate policies even though their *direct* effects on global emissions are very modest and the *indirect* effects may be adverse as domestic emission reductions could weaken the incentives for others to act.

Golombek et al. provide a classification of possible rationales for the Nordic policies. The reasons are divided into two groups: those that rest on national self-interest only (but take account of the repercussions on other countries' behavior and how they in turn affect the welfare of the own citizens) and those that reflect concerns also for the welfare of the citizens of other countries. The first category includes strategic motives like promoting green business, developing new technology (which can also be used by others) and demonstrating that abatement costs may be lower than expected. The second category includes direct altruism as well as arguments based on moral obligations.

The classification provides a basis for analyzing different elements of the Nordic climate policies. In particular, it is argued that promoting the development of clean technologies is likely to be the most effective way of reducing global emissions. Here, the authors stress that two ways forward are possible. The first is to focus on clean technologies that have a potential for cost reductions from learning by doing. The Nordic countries are, however, too small to be able to do this effectively in isolation. Instead, coordination within EU and with other large countries is required.

The other way is to focus on areas where Nordic countries have special expertise to make innovations that can have a global impact. An example of such an area could, according to the authors, be Danish wind power, perhaps in combination with Norwegian offshore technologies. Also, Nordic cooperation to promote the development of technologies for carbon capture and storage has a large unexploited potential and could become important on a global scale. However, there are also bad examples where Nordic governments have subsidized technological innovations in green technologies that have been kept secret and thus not possible to use in the rest of the world.

Golombek et al. also argue that the Nordic countries have too much of a country focus. Subsidizing technological developments that only serve as a means to achieve national emission targets seems to be a bad climate policy.

An important recommendation is that the Nordic countries should coordinate their climate policies better to achieve maximum global impact. Doing this is likely both to affect technological developments more and to enhance the demonstration effect of Nordic policies on other countries.

2.5 Supply-side climate policies in Norway

Norway has implemented an ambitious climate policy with fairly expensive measures to reduce emissions within its borders. At the same time, an important share of Norway's national income is derived from the sale of fossil fuel to other countries. *Katinka Holtsmark* discusses this apparent contradiction. She asks whether a policy shift from reductions in Norwegian demand for fossil fuels to reductions in the Norwegian supply of oil and gas would be desirable.

The paper begins by noting that the effect of changes in supply and demand in one country on total world consumption depends on the sensitivity of world market demand and supply to price changes. Suppose Norway reduces its demand for fossil fuel by, for example, subsidizing electric cars. The reduced demand reduces the world market price of oil. If the global supply of oil is inelastic (that is it does not respond much to the price change) while demand is elastic, then Norwegian reduction of fossil fuel use leads to much increased consumption elsewhere in the world. If instead Norway reduces its supply, the world market price increases, but under the assumption of inelastic world market supply the latter does not change much. Thus under these assumptions, reductions in Norwegian oil sales is an effective climate policy, whereas reductions in Norwegian demand for fossil fuel is not. *Carbon leakage* through compensating changes in fossil fuel use in other countries is then small for supply policy in Norway, but large for demand policy.

Now, make the opposite assumption that world market supply is elastic but world market demand inelastic. Then the conclusions are reversed. A demand reduction in Norway reduces the world market price, which causes large reductions in the world supply of oil. A Norwegian reduction in supply will then mainly lead to increased production elsewhere. Leakage is then large for supply policy in Norway but not for demand policy.

Holtsmark's conclusion is that carbon leakage is larger on the supply side than on the demand side. One has, however, also to take the marginal abatement costs in Norway into account. As they are judged to be much smaller on the supply side than on the demand side, the upshot is that reductions of oil and gas extraction should play a considerably larger role in an optimal Norwegian climate policy (maximizing global emission reductions for given costs or minimizing costs for given reductions). Thus, the current focus on demand reductions in Norway is likely to be highly inefficient.

One obvious way of shifting climate policy in Norway from the demand to the supply side would be to leave reserves in the Artic and in the Northern areas of the Norwegian continental shelf unopened. This would also have the advantage that less resources are put into the development of new technology for oil and gas extraction under

extreme conditions that could be used by other producers as well (the opposite of contributing to the development of clean technologies as discussed in Section 2.4). In addition, there might be positive local environmental effects of abstaining from oil and gas extraction in sensitive environments. But a complete assessment must also take distributional effects (both within Norway and between countries) as well as moral demonstration effects into account. It is not, however, obvious in what direction such considerations would change the conclusions.

3. The most important policy conclusions

In our view, the most important policy conclusions for the Nordic countries from the articles in this volume are the following:

- The success of the Paris Agreement builds in effect on whether sufficiently strong *international norms* requiring both governments and other actors to do more to halt climate change can be established. The Nordic countries should together with other ambitious states strengthen their cooperation to achieve this. This could, for example, involve granting special benefits to countries meeting high climate policy standards.
- An earlier feature of the EU Emissions Trading System was that larger reductions of emissions encompassed by the system in one country (through national tax incentives or subsidies to green energy) would not affect total emissions, since these were determined by the overall number of emission allowances. This is no longer so. The emissions trading system has been reformed in such a way that national measures to reduce emissions will increase the stock of saved emission allowances and this way trigger less issuance of new allowances in the future. Furthermore, buying and immediately cancelling emission allowances and annulling them, is no longer an efficient national climate policy since it will lead to more issuance within the system in the future.
- The very ambitious emission reduction obligations for the Nordic countries in the sector of the economy that is not encompassed by the EU Emissions Trading System implies that marginal abatement costs there are substantially higher than

in some (other) countries in the EU. Hence it would be cost-efficient for the Nordics to achieve part of their obligations by paying for emission reductions elsewhere. This is possible according to EU rules.

- Promoting clean technologies may be the most efficient way through which the Nordic countries can contribute to policies against climate change. The focus should then not be on technology that only serves as a means to achieve national emission targets, but instead on technology that can get widespread use globally and where the Nordic countries have special expertise. More Nordic cooperation in developing new technology of this type is likely to enhance the impact.
- Norway represents a special case for climate policy. On the one hand, policy in Norway, like in the other Nordic countries, tries to achieve ambitious national emission reductions. But on the other hand, Norway is a large exporter of oil and gas. A shift in focus from reductions in domestic demand for fossil fuel to reductions in supply would increase cost effectiveness. Such a policy change would contribute to larger global emission reductions at a given cost or lower costs for given global emission reductions. Abstaining from extracting oil and gas in the Artic and in the Northern areas of the Norwegian continental shelf is one way of implementing such a policy shift.

References

Arrhenius, S. (1896), On the Influence of Carbonic Acid in the Air on the Temperature on the Ground, *Philosophical Magazine and Journal of Science*, 41, 237-276.

Pigou, A. C. (1920), *The Economics of Welfare*, London: Macmillan.