

Summary of the research project
“Opportunities and limitations for
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1 Introduction

The aim of the research project “Opportunities and limitations for Belgian environmental taxation” was to analyse Belgium’s ability to establish own national environmental taxation programs. In this research project we depart from the idea that the consequences of a severe environmental policy may turn into conflict with the international economic order which is focused on the realisation of free trade. The focus on environmental taxes can be explained by the then prevailing attention to this instrument on diverse policy levels. Though, during the research project, the attention on the international environmental forums shifted gradually from environmental taxes to flexible and voluntary instruments. We account for this evolution in our research project.

On the whole, the research activities of this project can be classified into three main research themes. Firstly, we examine in detail the relationship between the environmental policy and the competitiveness of an economy. We also examine and evaluate the international economic order in detail. Secondly, we indicate how the existing international economic order can be adapted. In this part of the project we give an overview of the instruments that may be interesting in this context. In the last part of the research project we present an analysis of the burden sharing agreement of the European Union.

To conclude this introduction we remark that our research project is closely linked to the program “Leverages for a policy aimed at sustainable development” because Belgium should account for the international economic order if it wants to reach a sustainable development.

2 Methodology and results of our research

A Analysis of the international economic order

We first dealt with the interactions between environmental policy and competitiveness. Through a study of literature we distinguished a couple of hypotheses about the possible impact of a severe environmental policy on an economy's competitiveness. The first Hypothesis states that a stringent environmental policy induces the delocalisation of industries to developing countries, characterised by the lack environmental regulation. The second hypothesis reads as follows; less developed countries use less stringent environmental policy consciously to attract multinational enterprises. Our overview of the empirical literature about these two hypotheses learns that the negative effects of a stringent environmental policy on the competitiveness of the country remain confined. Our own research consisted of an analysis of investment flows from a couple of industry groups. The distinction between the different groups was made on the ground of each industries environmental impacts.

The third hypothesis concerning the link between environmental policy and competitiveness is the Porter hypothesis. According to this hypothesis, a stringent environmental policy can bring along positive consequences for the competitiveness of a country through innovation and competition. In our research project we present the results of our own empirical investigation on this hypothesis. In the conduct of our research we accounted for a frequently returning limitations in other empirical investigations. More specifically, our analysis is carried out at the product level, not at the sector level which is generally the case. We judge it likely that the impact of a change in the environmental regulation, in this case a stricter regulation, on the competitiveness differs for every product individually. In our research project we evaluate the impact of the Montreal Protocol on the American export of a couple of products that make use of CFK's, the coolant that should gradually be replaced according to the protocol. There are some countries and enterprises that made early efforts in the search for CFK replacing products. We evaluate whether these efforts did lead to a positive impact on the export of these countries. The final conclusion of the research was that countries who undertook early efforts experienced a positive impact on their exports of household refrigerators and freezers and industrial refrigeration installations. The impact of a pro-active environmental policy on the export of air-conditioning equipment is not statistically significant. We

conclude that we found empirical support for the Porter hypothesis, though only for some specific products. The Porter hypothesis is thus not generalisable for all products.

In our research we also considered the potential role of export-diversification in the field of environmental policy. The results of our empirical research show that a diversified pattern of exports may be considered as an insurance against changes in environmental regulations. This can be explained as follows, a possible reversion of the export of a specific product caused by a tighter environmental regulation may be compensated by an increase in the export of an other product.

In our research activities we related the moderate drawback of environmental policy on the competitiveness of a country with the costs linked with environmental regulation. We noticed that the costs related to the environmental regulation remain generally modest. In our research project we calculated the marginal emission reduction costs for some American industries. It turned out that these emission reduction costs show a declining trend through the years 1988 – 1993. Sometimes they even turned out to be negative. This may be an explanation for the missing negative impact from tight environmental regulations on the competitiveness of an economy.

Concerning our conclusion so far, a tight environmental policy doesn't have to turn out negative or may even turn out positive for competitiveness, we investigate the valid conditions to establish a national environmental policy. We consider Belgium as a member state of the European Union and ask ourselves the question whether this membership may be a limitation for the conduct of an own environmental policy.

The main aim of the European Union upon its creation was the establishment of a common market. This remains the principal goal of the Union but through the years there was growing attention for other themes, such as the environment. For example, article 2 of the Amsterdam Treaty now encompasses the promotion of a high level of protection and the improvement of the quality of the environment. Also the aim for sustainable development is taken up in this article. Moreover, article 6 of the same Treaty states that environmental considerations should be accounted for in all measures and that special attention should be paid to sustainable development. We found that it is far from evident to come to an environmental policy on the European level for diverse reasons. This shows the need for ongoing national environmental policies. Again, this poses the difficulty that national environmental policies may be in con-

flict with the goals of the European Union, in the first place the aim of a common market. To ensure this, the European Union opted to formulate a number of guidelines for the establishment of national environmental prescriptions. The first general guideline states that every environmental measure should deal with three principles, namely prevention, the polluter pays and precaution. The second guideline relates to import taxes, quantitative restrictions and taxes and measures with equal effects. This guideline contains that every environmental tax that brings along a trade restriction is forbidden. The third guideline of the European Union, concerning internal taxation, states that a country may not impose additional taxes on foreign producers next to the taxes imposed on equal domestic products. The guideline about the harmonisation of indirect taxes is fourth in line. This guideline offers perspectives for the introduction of product and emission related taxes because these are not indirect taxes subject to this guideline. The fifth guideline relates to fair and undisturbed competition and environmental policy. The implementation of some environmental prescriptions may require the cooperation between firms what in turn may impact the competition between these firms. Principally, co-operation agreements and the like who have implications on the competition are forbidden. Though, an exception can be made in case of an environmental goal. The sixth and last guideline relates to state aid. Subsidies are principally forbidden but there exist some exceptions, such as in the case of investments in environmentally friendly technologies. Next to these guidelines there exist a number of principles and conditions valid for national environmental measures. Firstly, a national environmental policy may only deal with an environmental problem if there's no regulation on the European level. The second condition contains that the measure should have a clear environmental goal. That condition states that the environmental measure may not contain any discrimination or disguised protectionism. So we can conclude that the European Union brings along some restrictions for member states in their creation of an environmental policy. Nonetheless, there remain sufficient possibilities to take all necessary measures.

Next to the limitations brought along by the European Union, Belgium has to account for the World Trade Organisations prescriptions aimed at the creation of free trade. The articles of the WTO are valid in regard to the international trade in general but Belgium's environmental policy may not be in conflict with these articles. The environment as such isn't, except from article XX, mentioned at all in the articles from the WTO. Article XX comprehends some general exceptions to the WTO articles. An exception can be made when this is necessary for

the protection of human, animal or plant life and health. An other exception can be made for the conservation of exhaustible natural resources.

The Agreement on Technical Barriers to Trade does take into account that it can be necessary from the point of the environment to create some barriers to trade. This is explicitly mentioned in article of this agreement.

To conclude the research activities in the framework of the first part of the research project we present a more detailed analysis of the concept of sustainable development. We departed from the definition in the Brundtland report stating that a sustainable development is a development that meets the needs of the current generation without compromising the needs of future generations. It's important to realise that this brings along some challenges. For example, we should take into account that the world population is growing exponentially for the moment, that there are limits to the diverse natural resources, that there are boundaries to the carrying capacity of the ecosystem and that large parts of the world face a socio-economic leeway. These are each challenges of direct importance to the creation of a sustainable economy in industrial economies. The International Institute for Sustainable Development (IISD) sums up some principles for trade, development and environmental policies with a view on sustainable development. The definition of the concept sustainable development through principles allows us to check whether the implementation of these principles is possible within the existing framework of free trade. The goal of these principles is to take care that trade and the developing- and environmental policy support the creation of sustainable development. In defining the concept sustainable development the IISD makes a threesome assumptions / boundary conditions. In the first place, the IISD points to the importance of driving back poverty. A world in which poverty exists can hardly be called sustainable. Moreover, people from poor countries will hardly care about the environment. Secondly, both the national and the international environmental policy are of vital importance for all aspects of sustainable development. Finally, the importance of the realisation of free trade is stressed. From this it is clear that sustainable development knows three dimensions. There's not only the need for a better environment, there's also a social and economic dimension.

A first important principle in goal of sustainable development is the strive for efficiency and internalisation of costs. This encompasses that the prices paid by producers and consumers reflect the real costs, including external costs. A second principle, is striving for equality in and between different generations. For reaching more equality, the IISD thinks in the first place of an ongoing liberalisation of trade and increased investments in the developing coun-

tries. The third principle encompasses the recognition of the environmental integrity. This implies amongst other that we recognise the impact of human activity on the environment as well as nature's limited regeneration capacity. While striving for environmental integrity we have to pay attention that the plant and animal populations incur no irrecoverable harm. It's about to expect that this aim can not be realised by internalising external costs, further measures will be required. A fourth principle is about subsidiarity, measures should be taken on a local level as long as this is the most efficient. Nonetheless, we have to point to the importance of the harmonisation of environmental standards if we want to safeguard free trade. The next principle comprehends the enhancement of the international co-operation in the field of the environmental, trade and developing policy. The IISD's sixth principle is related to science and precaution. One can opt to require scientific certainty about the damage before one proceeds to implement environmental measures. Otherwise, one can opt for the precautionary principle and proceed with environmental measures before one is sure about the potential harm. The seventh IISD principle relates to openness and transparency. One can defend the option that a firm should reveal information about its charges on the environment. The experience with the Toxics Release Inventory from the United States teaches us that an obligation to reveal such information can move firms to undertake actions to reduce their emissions. If one wants to come to a sustainable development through these principles, one has to take into account the international economic order. In our opinion, it's possible that the first principle may conflict with free trade if a specific imported product is taxed on the ground of pollution during production. Besides, the international economic order may also harm the realisation of the protection of the environmental integrity. Concerning the other articles, we don't expect a conflict between the aim for sustainable development and the existing international economic order.

So, the main conclusion of this part is that a country shouldn't fear a negative influence on it's competitiveness by implementing environmental measures. The international economic order, which is, through the European Union and the WTO, mainly focused on the realisation of free trade, is the major difficulty in establishing an environmental policy. A detailed analysis of the issue of sustainable development learned us that there are some potential conflicts with the aim of free trade as well.

B Research on the possible adjustment of the international economic order to turns it into a positive incentive for a co-ordinated environmental fiscal policy

The aim of this part of the research project was to work out how the existing international economic order can be adjusted to reach a more efficient environmental policy. We not only stood still by environmental taxes as such but also by other environmental instruments available to policy makers. We extended our scope of view to other instruments because of the increasing attention for these instruments, as already mentioned in the introduction. First of all, we present a definition of all instruments. In the continuation of the second part of the research project, we examine to what extent they can stimulate the diffusion of environmentally friendly technologies.

A consumer subsidy is the first instrument of which we evaluate the potential impact on the diffusion of environmentally friendly technologies. We researched the possible emission reductions when giving consumers a subsidy for the replacement of their heating equipment. A subsidy of 500 € for the replacement of their burner could bring along a reduction of the residential energy use of 25%. The estimated cost of the subsidy for the Belgian government is about 400 - 500 million €. A second subsidy of which we estimated the effect on the emissions is a subsidy of 1000€ consumers can receive when buying a new car that's among the 10% most efficient available. To finance this subsidy we considered an increase in the annual car tax of 8€. The increase of the car tax can be proportional to the age of the car. One can also opt to give a subsidy to consumers who buy a car just missing the category of the 10% most efficient cars. We suppose therefore a subsidy of 500€. In this case, the increase in the car tax should rise to 12€. The final impact on the transport emissions is hard to analyse because a lot of other factors, like the number of cars in circulation and the number of kilometres driven by each car, interact. We accounted for these factors in our analysis but it complicated the estimates of possible emission reductions. In our simulation we come to a decrease in the energy needs of the car fleet ranging from 25 till 31%. Our simulation further learned us that a comparable emission reduction from trucks and buses is possible. We also analysed the potential impact of a consumer subsidy for buying energy efficient equipment. The simulation indicated a reduction in the emissions of 12 million tons through a period of 10 years, this equals 2% of all emissions in the European Union. To conclude this analysis we asked

ourselves the question whether the European Union could have an objection against such a subsidy. We suppose a consumer subsidy may not turn into conflict with the creation of a common market on the condition that every producer has equal opportunity to launch products that qualify for the subsidy.

The second environmental instrument we analysed in detail is the tradable emission permit. Departing from the arrangement that a tradable emission permit can't move firms to produce environmentally friendly products we propose the enlargement of the system of tradable permits with a tradable certificate. These certificates should be distributed among the firms producing goods that bring along lower emissions during consumption. We evaluated the possible emission reductions in the transport sector. A comparison of the emissions during the production and the emissions during the consumption of a car and truck learned us that the potential of a tradable certificate could be large. The CO₂-emissions produced by a car or a truck during consumption are a multiple of the CO₂-emission generated during production. So, it's an interesting line of thought to stimulate producers to produce environmental friendly cars. In the market for passenger cars we calculate a possible CO₂-emission reduction ranging from 25 till 38%, depending on the price of the tradable certificate, in a period of 15 years. In the market of trucks, the potential emission reduction remains limited to maximum 12%. This less spectacular possible emission reduction may partly be explained by the fact that a truck's fuel efficiency is already a very important aspect for transport firms in their investment decisions. This means that truck constructors are for long a long time obliged to take into account the energy efficiency of their products, the trucks.

Subsequently, we analysed the potential benefits related to the pairing of voluntary agreements and emission trading. In our research we argue that it's possible to ask an entrance price to the market of tradable emission permits because the aggregated marginal emission reduction cost in case of emission trading will be lower than the aggregated marginal emission reduction cost in case of a voluntary agreement. Firms are thus willing to pay a price to participate in emissions trading. Once a firm can sell emission permits, it will be stimulated to cut back its emissions further than required by the voluntary agreement. Namely, the firm can sell the emission permits to other firms participating in the voluntary agreement. In our simulation of a voluntary agreement with an option to emissions trading we come to stronger emission reductions than required by the voluntary agreement. This is of course a better result than can be obtained through a voluntary agreement as such. In our simulation we also compared emission trading combined with a voluntary agreement with emission trading without voluntary agreement. The main conclusion of this comparison is that the combination of both

instruments induces firms with the highest emission reduction costs to cut their emissions to. It's important to notice that the flexibility of emissions trading remains untouched by the introduction of a voluntary agreement.

The final instrument we analysed in detail is an environmental tax. We evaluated the potential impact of an environmental tax on a firm's decision on the early replacement of its capital goods. The goal of this environmental tax is of course to reduce emissions. First of all we want to stress that the emission reduction will show a lag compared to the increase in the energy-efficiency if we account for the enlargement investments to. We supposed that the government fixes taxes in function of social welfare and hereby takes into account firms reactions. These reactions can vary strongly. The firm may for example opt to invest in end-of-pipe technology but also to invest in research and development on environmental friendly technologies. We also introduced a variable to measure technological optimism among entrepreneurs. One of our conclusions was that the needed environmental tax to induce firms to invest in R&D is lower as more entrepreneurs are optimistic about technological progress. When we measure social welfare of an environmental tax on the basis of tax revenues we have to conclude that a high level of technological optimism is negative for welfare. Namely, a strong technological progress has an erosion of the tax basis, the emissions, for consequence.

C Possible contribution of our country in the establishment of an international set of fiscal instruments

In their paper Eyckmans en Cornillie (2000) analysed the cost-efficiency of the burden sharing agreement of the European Union. In the first place, they carried out a graphical analysis. It was clear that a uniform emission reduction of 8% brings along great inequality in the marginal emission reduction costs. So, this is far from a cost-efficient distribution of efforts. The burden sharing agreement has as a consequence that the differences in emission reductions costs are less pronounced. Therefore, this agreement is positive from the cost-efficiency point of view. Though, there's no equalisation of the marginal emission reduction costs so an ongoing differentiation of efforts remains necessary. The second method of analysis of Eyckmans and Cornillie (2000) was the calculation of implicit welfare weights bounded to the output of the different countries. From this, it's once more clear that the division of efforts is

far from equal and cost-efficient. The emission reduction objectives assigned to Germany, the United Kingdom and Germany, are, according to the analysis of Eyckmans and Cornillie, not ambitious enough. In contrast, other countries should combat their emissions by more than optimal from the cost-efficient point of view. In their analysis, the authors also accounted for equality considerations. The authors made the assumption that rich EU countries can be asked additional efforts compared to the member states with a lower GNP. When we take into account these equality considerations, the burden sharing agreement is far from cost-efficient because it is particularly the rich countries that are treated favourably. Rich countries should be asked additional efforts from the point of equality. The authors also analysed the situation in which there's emission trading among the European Union member states. When there's no inequality aversion, the implicit welfare weights linked to different countries are equal. In other words, it's irrelevant where the emission reductions are executed. If we do take into account inequality considerations, the implicit welfare weights of the different countries do differ. These results can be explained as follows. The consequence of emissions trading is the equalisation of marginal emission reduction costs. If we strive for enhanced efforts from rich member states, this is not a desirable result. Eyckmans en Cornillie also analysed the impact of a limit on emission trading. Their research shows that this entails an increase in the emission reduction costs for the European Union as a whole.

Furthermore, we paid attention to the costs and benefits linked to emission trading. A study of literature learned us that emission trading is more advantageous as more countries participate. For example, emission trading among the Annex B countries of the Kyoto protocol makes a cost reduction of 50% possible in comparison with the situation without emission trading. The smaller cost savings in case of emission trading on a smaller scale shouldn't be an obstruction for the implementation of emission trading in a limited number of countries. The cost savings that thus will be realised can be a stimulus for other countries to join the emission trading program. Another option is to limit the emission trading to a couple of sectors, for example the energy producing sectors. Cost savings of up to 21% are possible in this case. An extension of the system to the energy-intensive sectors raises the cost savings up to 24%. We should make the remark that the savings in the emission reduction costs are in relation to a situation in which emissions are pushed back domestically in an efficient manner. A uniform division of the emission reduction obligations among the different sectors brings along an increase in the emission reduction costs. The cost savings from the introduction of emission trading will in this case be much more spectacular. In our research project we analysed the EU's proposal to introduce a limit on emission trading. Zhang (2000) illustrated that such a

limit can be advantageous for the European Union. A limit on emissions trading makes it interesting for the European Union to cut back more emissions. Namely, the proposed limit by the European Union doesn't encompass a limitation for the EU itself, so it's lucrative to make excess efforts in order to sell permits on the international permit market. Therefore, we should conclude that as many countries as possible should participate in emission trading and that there shouldn't be any limit on the emission reductions that can be realised through emissions trading.

3 Conclusions and recommendations

The main conclusion of the first part of our research project is that a government shouldn't fear very negative consequences of environmental policy for its competitiveness. Our empirical research of the consequences of the Montreal Protocol is a perfect illustration of the fact that a stringent and efficient environmental policy can even have positive effects on a country's competitiveness for a couple of industries. We do suggest to take into account the prescriptions of the European Union and the World Trade Organisation. This brought us to the next research question : to what extent can the existing international economic order form a threat to the introduction of an environmental policy ? We determined that the European Union in the first place strives for the creation of a common market. This was the original mission of the European Union, meanwhile extended and refined, among others some aims in the field of environmental policy. For the moment, the EU only handles a number of basic principles the member states have to take into account while conducting an environmental policy. Next to the prescriptions of the EU, there are also the WTO articles. Belgium should take into account while formulating its environmental policy. In fact, this means that the environmental policy may not imply any restriction to free trade. Though, there are some exceptions, among others for measures in relation to the environment. In practice, there are severe conditions to fulfil before one can make an appeal on these articles.

The second research question of the project related to the possible adjustment of the international economic order. We came to the conclusion that a lot of instruments can contribute to the diffusion of environmentally friendly technologies. From research it seemed that consumer subsidies, the linking of voluntary agreements and emissions trading, a tradable certifi-

cate and an environmental tax all can contribute to the diffusion of cleaner technologies. Concerning the potential of these instruments, one can recommend the Belgian government to take initiatives in this field. Some of these initiatives can be translated into national measures. In the case of other measures, European initiatives will be required. In the last case, Belgium will have to bring up these issues on an European level.

The third and last part of the research project presented an economic analysis of the burden sharing agreement of the European Union. We determined that the division of efforts could create a decrease in the total emission reduction costs. At the same time, we determined that the less thriving member states are still required to take to much action. Furthermore, it seemed from our research that considerable cost savings can be realised through emissions trading. The installation of a limit on this emissions trading encompasses that a part of these cost savings can not be realised. The European Union defends such a limit on emissions trading. In the view of the higher costs accompanied with this limit, this may seem a strange attitude. Though, a study of Zhang shows that the limit proposed by the EU, encompasses advantages for the union itself compared to unlimited emissions trading. We also determined that the former Sovjet Union can profit from free emissions trading. This free trade allows the former Sovjet Union to cash their 'hot air'.

The results of the third part of our research project plead for the fact Belgium should start a discussion on the European level concerning the burden sharing agreement. Belgium should stress that the burden sharing agreement doesn't go far enough in the division of efforts. At the same time, a reallocation of efforts should be overweight. Furthermore, Belgium could start a discussion on the European level about the global negative consequences of a limit on international emissions trading.