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The Belgian Burden Sharing

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IX. The Belgian Burden Sharing

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1 INTRODUCTION

The Kyoto Protocol obliges the EU-15 to reduce their CO_2 emissions by 8% relative to 1990 levels in the period 2008-2012. A European burden sharing agreement distributes the efforts of the Kyoto-objective among the member states[1]. This EU agreement specifies that Belgium should reduce its GHG emissions by 7.5%. As environmental policy is a regional competence in Belgium, the EU agreement was quickly followed by a debate about the burden sharing of the Kyoto-objective among the Belgian regions. More particularly, the debate opposes the Flemish and Walloon regions. This chapter gives the main insights and conclusions of three studies which contributed to this Belgian burden sharing debate. The first two studies use a partial equilibrium approach and the third a general equilibrium approach.

Proost and Saveyn (2002), using regional marginal abatement costs, compare the importance of the Belgian burden sharing with the efficiency gains of international flexible instruments. They look at the total social cost of climate policy. They emphasize that the choice for international flexible instruments is more important for the regions than the burden sharing within Belgium.

The second study (PricewaterhouseCoopers, 2002) is also based on a marginal abatement cost approach. It assesses the costs of climate policy under three different burden sharing scenarios. The main focus is on the effect of climate policy on the *budget* of federal and regional governments. One scenario allows that the regions may get more permits than the national objective allows. The federal government covers the difference by buying permits on the international market.

In the third study, Bréchet, Germain and Monfort (2005) emphasize the importance of regional specialisation and the resulting difference in abatement costs. Using a general equilibrium approach, the marginal abatement cost

[1] Phylipsen et al. (1998) and Groenenberg et al. (2001) contributed to the European burden sharing debate.

functions are endogenous, as they depend on endogenous industrial activity levels. This approach is more general but less operational.

We conclude with a summary of the Belgian burden sharing agreement.

2 BURDEN SHARING VS. EMISSION TRADING

Proost and Saveyn (2002) analyse the cost of emission reduction by using regional marginal abatement costs (MAC). Their model distinguishes between Flanders and Wallonia/Brussels. Based on 1999 figures, Flanders is responsible for 60.3% of the Belgian emissions, while 36.6% originates from Wallonia/Brussels. As emissions have grown considerably since 1990, Belgium has to reduce about 34.3Mton/year.

They assume that the economies of the regions consist of the same sectors and have identical growth rates. We represent the MAC functions in terms of percentage of the total emission reduction to be realized by Belgium (Figure 1).

The steeper slope of the MAC for Wallonia/Brussels is due to their lower share in the total Belgian economy.

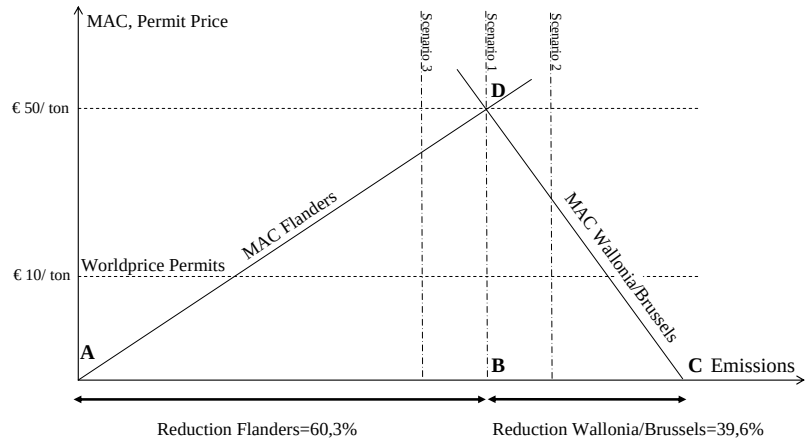

Figure 1: Regional MAC for climate policy

In the first part of their study, Proost and Saveyn look at the Belgian burden sharing agreement when there is no international or interregional trade of permits. They compare three scenarios (Table 1).

In Scenario 1, Flanders and Wallonia reduce their emissions proportionally to the size of their economies. Flanders takes 60.3% of the Belgian reduction, while Wallonia/Brussels take 39.6%. Proost and Saveyn assume that the MAC is €50/ton for both regions (Proost and Van Regemorter, 2000). The first scenario is represented in Figure 1 by the line BD. In Figure 1, it is easy to see the effect of a shift in the burden among the regions.

In Scenario 2, Flanders assumes 70% of the Belgian reduction, while Wallonia/Brussels takes only 30%. This can be represented by a rightward shift

of the line BD. Here, the MAC for Flanders becomes higher than €50/ton, while the MAC for Wallonia/Brussels is lower than €50/ton.

In Scenario 3, Flanders and Wallonia/Brussels equally split the Belgian reduction, each taking 50%. In Figure 1 this can be represented by a leftward shift of the line BD. Here, the MAC for Flanders is lower than €50/ton, while the MAC for Wallonia/Brussels is higher than €50/ton.

The first 3 columns of Table 1 summarize the social cost of the Kyoto policy for Flanders and Wallonia/Brussels as a function of the burden sharing agreement. The social costs are equal to the abatement cost of the firms. The figures in Table 1 can be directly computed on the basis of Figure 1.

First we see that Scenario 1 is the optimal scenario from the Belgian point of view if no international flexible instruments are used. The marginal abatement costs in both regions are equalized to €50/ton CO_2. Scenarios 2 and 3, however, do not equalize the marginal abatement costs across regions, as trade between the Belgian regions is ruled out. This leads to efficiency losses from a federal point of view. Passing on the Kyoto reductions to the other region is not a zero-sum game; it causes efficiency losses to the federal state as a whole.

Annual Cost *Million euro/year*	No Permit Trade			International Permit Trade		
	Flanders	*Wallonia/ Brussels*	*Belgium Total*	*Flanders*	*Wallonia/ Brussels*	*Belgium Total*
Scenario 1 (60.3/39.6)	517	340	857	186	122	308
Scenario 2 (70/30)	697	195	892	219	89	308
Scenario 3 (50/50)	356	541	897	150	158	308

Table 1: Welfare costs of regional climate policy

In the second part of the study, Proost and Saveyn, look at the effect of international trade. The last 3 columns of Table 1 show the welfare cost including the abatement costs and the cost of buying permits. The regions and the federal state have interest in the use of international trade of permits. For all scenarios and for all regions, the cost of climate policy reduces to about a third compared to the respective costs without international flexible instruments. International flexible instruments reduce the cost of regional climate policy more than an advantageous burden sharing agreement within Belgium. Moreover, the more stringent the regional objective, the more a region benefits from international permit trading.

3 RECONCILING REGIONS WITH AN ACTIVE FEDERAL GOVERNMENT

The study of PricewaterhouseCoopers (2002) has been prepared to assist the Belgian government in the burden sharing question. The main focus of this study is on the budget of federal and regional governments and not on the welfare costs as in Proost and Saveyn (2002) or Bréchet, Germain and Monfort (2005). The

study uses a multi-sector framework, and the regional economies no longer have identical compositions. The model distinguishes between the energy-intensive industrial sectors[2] which trade on the world CO_2-market and other industrial sectors which do not trade on the CO_2-markets. The energy-intensive sectors must cover all their emissions with CO_2-permits. The other sectors pay a federal tax equal to €10/ton CO_2. The regional government, however, accounts for their emissions. The MAC of the all sectors are equalized. The study looks at three alternative scenarios.

Scenario 1 analyses a proportional distribution of emission rights to the regions. Each region gets the amount of emission rights equivalent to 92.5% of its 1990 emissions. The total allocation of permits to the regions equals the permit allocation to Belgium.

Scenario 2 combines a proportional distribution with a marginal abatement cost approach. The energy-intensive sectors get permits equal to the emission level when the marginal abatement cost is € 10/ton. These sectors acquire the rest of permits on the world market. The federal government distributes the remainder of the permits among the other sectors proportionally to their 1990 emissions. The total allocation of permits to the regions equals the permit allocation to Belgium. This scenario allows that regions with high abatement costs receive more permits.

In Scenario 3, each region gets the level of permits of its most beneficial scenario (1 or 2). As the energy-intensive sectors in Flanders have higher MACs than the rest of the country, Flanders prefers Scenario 2. Wallonia/Brussels, however, want the level of permits as in scenario 1. Consequently, the allocation to the regions is higher than the permit allocation to Belgium. The federal government covers the deficit by buying permits on the international market.

PricewaterhouseCoopers assess the net welfare cost of the Belgian climate policy around 243 million euro/year, compared with 308 million euro/year in Proost and Saveyn (2002). This cost is independent of initial allocation to the regions if trade is allowed. The direct abatement costs are estimated at 27 million euro/year. The energy-intensive sectors even manage to sell CO_2-permits for 12 million euro/year. The governments cover the remaining emissions by buying CO_2-permits for 228 million euro/year. The CO_2-tax is not considered as a cost as it is simply a transfer from the private sector to the public sector. The use of the tax revenues by the federal government was not within the scope of the study.

[2] As defined in Directive 2003/87/EG

Million euro/year	International Trade of Permits					
	Net Cost for Permit Acquisition				*Tax Income*	*Total Belgian Governments*
	Flanders	*Wallonia*	*Brussels*	*Federal*		
Scenario A	182	32	14	0	580	352
Scenario B	160	51	17	0	580	352
Scenario C	160	32	14	23	580	352

Table 2: Budget effects of climate policy

In all scenarios the federal government receives 580 million euro/year as CO_2-tax revenues (Table 2). The differences in the effects of the various scenarios on the budget are rather limited. In the first column we find that the difference between scenario 1 and scenarios 2/3 is only €22 million/year for Flanders. The differences between scenarios 1/3 and scenario 2 are €19 million/year and €3 million/year for Wallonia and Brussels, respectively.

4 THE IMPORTANCE OF REGIONAL SPECIALISATION

Proost and Saveyn (2002) assumed that all regions had the same marginal abatement cost. PricewaterhouseCoopers (2002) assumes that marginal abatement costs were identical per sector but that the difference in sectoral composition between the regions leads to differences in the abatement costs per region. In this section we use a model that is again more general: the sectoral composition differs between regions but also the activity levels are now endogenous.

Bréchet, Germain and Monfort (2005) approach the Belgian burden sharing from the perspective of regions with different specialisation. Wallonia is characterised by an industry which is more energy intensive. From the point of view of Flanders, the bulk of the efforts should be made in Wallonia, where the abatement costs are assumed to be lower. Wallonia obviously objects. In the context of the Belgian burden sharing debate, it is important to emphasize that higher energy consumption by the activities of a country or region is not necessarily due to their being inefficient. It can also result from the fact that this region specialises in the production of relatively energy intensive goods. This specialisation generates benefits through international trade to other regions and countries.

The authors develop a model of a small open economy, divided in two regions (Flanders and Wallonia), with two sectors (1 and 2)[3]. Both regions produce and trade the two goods, using the same technologies. The economy is also characterised by the following three features. First, sector 1 is supposed to be more energy intensive than sector 2, i.e. the quantity of energy per unit of output is higher in sector 1. Second, the price elasticity of the energy intensity is

[3] The theoretical model developed by Bréchet, Germain and Monfort (2005) could easily be generalised to more than two regions.

assumed to be higher for sector 1 than for sector 2[4]. Third, because of different regional factor endowments (in physical or human capital, labour, infrastructure, and the like), Wallonia is more specialised in the production of the energy intensive good 1.

Two results follow from these features of the economy. First of all, despite the fact that the two regions share the same technologies, the energy consumption per unit of Gross Regional Product is higher for Wallonia. Hence, a first message of Bréchet, Germain and Monfort (2005) is that the ratio energy/GDP does not tell everything about energy efficiency. Differences in this ratio can result from different specialisations.

Next, for a given increase of the price of energy, the relative decrease of the energy consumption is higher for sector 1. Hence, the relative decrease of Wallonia's energy consumption is higher, as it is specialised in energy intensive sector 1.

Given the Kyoto objective for Belgium, the authors study three different burden sharing scenarios and their welfare impact on the two regions. This is done in two different frameworks. First they compare these scenarios in the absence of an international or regional market for tradable permits. The decrease of emissions is obtained through an increase in energy taxes. Second, they use an international permit market.

The first scenario, called the proportional reduction scenario (P), imposes an identical reduction rate of the emissions in both regions equal to the reduction rate imposed by the Kyoto Protocol (i.e. 7.5% for Belgium). The MAC across regions are not equalized. This is in contrast to the proportional reduction of Proost and Saveyn (2002) and PricewaterhouseCoopers (2002).

The second scenario, called the optimal scenario (O), reduces the pollution such that total costs are minimised from a national point of view. This results in the equalisation of the marginal abatement costs across the regions and to regional reduction rates that are no longer equal across regions. All regional efforts, however, should sum up to the national abatement effort.

The third scenario, called the egalitarian scenario (E), keeps the efficiency properties of the optimal scenario (O), but defines an interregional transfer so that the relative losses of welfare are identical between regions.

In absence of the trade of permits, the relative decrease of the Gross Regional Product is higher in Wallonia than in Flanders for scenario (P). This is due to the higher energy intensity of the Gross Regional Product in Wallonia. The same story applies for scenario (O)--again because of the higher energy intensity of Wallonia's Gross Regional Product, but also because of the higher elasticity of this energy intensity to the price of energy.

When comparing the impacts of scenarios (P) and (O), one obtains the following results. For Wallonia, the emission effort is higher for scenario (O) compared to

[4] In the particular case where the two sectors are described by Cobb-Douglas production functions, these first two features are in fact equivalent.

scenario (P). For Flanders, the emission effort for scenario (O) is lower than in scenario (P). This is due to the fact that the increase of the price of energy (through the increase of taxation) is higher under scenario (O) than under scenario (P) for Wallonia, while the reverse is true for Flanders. It follows that scenario (P) is more favourable for Wallonia than Scenario (O); and vice versa for Flanders. Under scenario (P), the impacts of the climate policy are thus more evenly distributed across the regions compared to scenario (O). The latter, however, is more efficient as marginal abatement costs are equalised across the regions.

The egalitarian scenario (E) is efficient and the compensating transfer from Flanders to Wallonia equalises the relative decrease of the Gross Regional Product in the two regions. This transfer changes in direct proportion to (i) the national objective in terms of emission reduction, and (ii) the extent to which the regions are unevenly affected by the climate policy[5].

Region	(No Trade/ International market of tradable permits)
Flanders	O>P>E
Wallonia	E>P>O

Table 3: Scenario Ranking

Table 3 summarizes the preferences of each region with respect to the different scenarios described without any trade. Table 3 also highlights the fact that the results extend to the case with an international market of tradable permits, like the one recently implemented at the European level for energy-intensive industries[6]. Here, the emissions should be covered by emission permits. The international price of permits is assumed to be exogenous, as Belgium is a small open economy.

The study shows that it is not possible to implement a scenario that is simultaneously efficient, egalitarian and without transfers. The choice of a model with specific factors plays a crucial role in this respect. This result gives an insight into the respective positions of Wallonia and Flanders in the Belgian burden sharing debate: namely, Wallonia is more favourable to a proportional reduction, while Flanders favours an efficient allocation.

5 CURRENT POLICY AND CONCLUSIONS

With its decision of March 8, 2004, the Belgian government and the three regions have agreed to share the emission reduction efforts as follows:

[5] That is under scenario (O), which defines an efficient climate policy but without transfers.

[6] Bréchet, Germain and Monfort (2005), however, do not compare the welfare impacts of a given scenario between the two frameworks.

- Wallonia reduces 7.5% of the emissions compared to the 1990 level, assessed at 50.23 million ton CO_2-equivalents/year.
- Flanders reduces 5.2% of the emissions compared to the 1990 level, assessed at 83.37 million ton CO_2-equivalents/year.
- Brussels is allowed to increase its emission with 3.475% compared to the 1990 level, assessed at 4.13 million ton CO_2-equivalents/year.

The regions receive more emission permits than is allocated to Belgium (7.5% reduction compared to the 1990 level). In order to compensate the deficit, the Federal Government acquires emission permits on the CO_2-market. The annual federal effort is assessed at 2.46 million emission permits for 2008-2012. The federal government prefers permits originating from Joint Implementation and Clean Development Mechanism projects.

The decision of the Belgian government on March 8 2004 closely resembles scenario 3 of the study by PricewaterhouseCoopers (2002). Moreover, the federal government clearly opts for flexible instruments, but leaves this option open for the regions.

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