

# Double Dividend from Climate Policies: Can Climate Policies also Reduce Unemployment?

## Introduction

Global warming is probably the most important environmental problem of this century. According to IPCC (2001a), concentrations of atmospheric greenhouse gas emissions ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ , etc.) have increased as a result of human activities, and this will have negative impacts on the economy and human welfare.

What should we do about this? Apart from doing nothing, there are two strategies. The first is to reduce greenhouse gas (GHG) emissions. The second is to adapt to new climatic conditions, e.g. by building dikes, improving infrastructure, adapting economic structure, etc. While the optimal strategy will be a combination of these two, the focus of this short paper is on national policies to reduce emissions and the costs of these reductions.

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## National policies to deal with global warming

The main policy instruments to reduce GHG emissions are carbon taxes (making it more expensive to emit  $\text{CO}_2$ ), standards (e.g., non-tradable permits that put a cap on emissions), tradable permits, and subsidies for non-polluting substitutes such as renewable energy. While some of these instruments are revenue raising, others are not.

National climate policies will result in changes in welfare due to the following effects:

1. An environmental gain related to reduced emissions (environmental dividend);
2. Changes in production such as gross domestic product (GDP);
3. Distributional effects such as effects on households income distribution and sectoral and regional impacts;
4. Ancillary benefits such as reduced traffic accidents, congestion, and reductions in  $\text{SO}_2$ ,  $\text{NOX}$ ,  $\text{PM}_{10}$  having positive effects on environment, health, corrosion etc.

## Double dividend

Let us focus on point 2 above, namely, the welfare effects due to changes in production (economic efficiency). Assume that there are distortionary taxes in the economy, meaning that some inputs are taxed harder than others in order to finance a public sector. Assume also that the public sector wants the same budget after the introduction of climate policies

(revenue neutral policy changes). In this case there are three factors that contribute to the aggregate cost of GHG emissions reductions via the tax system, see, e.g., Goulder and Parry (2000):

*Direct costs:* Cost to the regulated sectors as they need to reduce pollution through changes in production methods or installation of pollution abatement equipment;

*Revenue recycling:* Efficiency gain from using carbon tax revenues to reduce other distortionary taxes;

*Tax interaction effect:* Taxes increase prices on commodities reducing real prices on factors such as labour and capital and function like an increase in factor taxes.

If the revenue recycling effect is higher than the two other effects, costs are negative (positive effect on economic welfare). In this case, we get two dividends: an environmental benefit via reduced GHGs and an economic dividend via higher economic efficiency. This is called a (strong) double dividend. Studies for Europe show the possibility of a double dividend if labour taxes are reduced, but double dividend is less common in US studies, see IPCC (2001b). Few studies exist on developing countries.

There are several conditions for achieving a (strong) double dividend: First, there must be revenue-raising policy instruments, i.e., carbon/energy taxes or auctioned permits. If, for instance, permits are allocated for free there is no revenue recycling effect. Second, there must be prior distortions in the tax system, i.e., some input factors are more heavily taxed than others. Finally, the burden of taxes should be equalised.

The concept of double dividend refers to efficiency. However, we often see a trade-off between efficiency and distribution. One example is that carbon taxes are regressive in most studies, i.e., they fall most heavily on poor households. The most efficient recycling of tax revenue is not necessarily the best due to distributional effects. But efficiency and distribution may not always be opposed. For instance, van Heerden et al. (2006) find a triple dividend (decreasing emissions, increasing GDP and decreasing poverty) for South Africa if environmental taxes are recycled through a reduction in food taxes.

### **Employment dividend**

Another concept in the literature is employment dividend. This is defined as an increase in employment or a decrease in unemployment ensuing from the recycling of tax/permit revenues. This can be achieved by reducing taxes on labour but also other taxes (van Heerden et al., 2006). The employment dividend is easier to obtain than the efficiency dividend, as employment can increase even if production slows down.

One recent study on employment dividend is Fæhn et al. (2004) who study the possibility of reducing Spanish unemployment by recycling carbon permit revenues. Spain faces two severe challenges. As part of EU, Spain participates in the Kyoto Agreement on GHG control, and faces a serious challenge in fulfilling its commitment. Unemployment rates are also very high, and there is deep concern for the unemployment consequences of imposing emission costs on firms. The following questions arise: Can a system of carbon permit auctions accentuate Spanish unemployment, and how can revenues be recycled in order to minimise unemployment effects?

Four different policy options are considered, namely, recycling carbon permit revenues lump sum to households, and reducing payroll taxes on all labour, unskilled labour and skilled labour, respectively.

We find that under lump sum recycling (pure abatement effects), adverse unemployment effects are avoided for both groups of labour, as the labour share is low in carbon-intensive sectors, and the economy is able to absorb the redundant workers through expansion in other relatively labour-intensive industries. By using revenues to reduce distortions in the labour market, unemployment falls compared with no climate policy. This indicates that an introduction of a carbon permit system can actually reduce unemployment in Spain. The highest aggregated effect is found when payroll tax reductions are targeted at skilled labour. There are three reasons for this, partly due to stronger stimulation of the demand for labour and partly due to a weaker supply response to rising wages.<sup>1</sup> First, payroll tax reductions provide more stimulation of demand for skilled labour than unskilled as there is relatively less skilled labour in the economy. Less skilled labour means higher cuts in taxes per worker, and the costs of skilled labour will fall more than would the costs of unskilled labour. Second, while more demand for labour will result in higher wages and therefore a higher labour supply, labour supply for skilled is less sensitive than for unskilled (smaller labour supply elasticity). This means that the labour supply will increase less when tax reductions are targeted at skilled than unskilled labour. Finally, skilled labour work is a less capital intensive part of the economy than the service sectors. This means that less capital needs to be employed in other parts of the economy (aggregate capital is fixed in the model). However, it should be noted that recycling revenues to skilled labour causes a dilemma as the gap between the two skill groups will deepen in terms of unemployment rates and wages.

## References

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1: Note that unemployment is equal to the labour supply minus labour demand. An increase in the labour supply will increase unemployment, while an increase in labour demand will reduce unemployment, all else being equal.