



From regressive pollution taxes to progressive environmental tax reforms



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ABSTRACT

European countries have increased their use of environmental tax instruments by designing new tax bases. But many countries face opposition from public opinion, for fear of the distributive consequences of these environmental tax reforms. This paper sheds light on the distributive consequences of environmental tax policies when households are heterogeneous. The objective is to assess whether an environmental tax reform could be Pareto improving, when the revenue of the pollution tax is recycled by a change in labor tax properties. We show that, whatever the degree of regressivity of the environmental tax alone, it is possible to design a recycling mechanism that renders the tax reform more Pareto efficient, by simultaneously decreasing the wage tax and increasing its progressivity.

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1. Introduction

European countries have increased their use of environmental tax instruments by designing new tax bases, like taxes on sulfur dioxide, plastic bags, solid waste and batteries. Even in the United States there are now advocates who strongly support taxation as apposed to the cap and trade approach. They include James Hansen, an American scientist,¹ who claims that raising the price on carbon emissions is the essential underlying support needed to make all other climate policies work: "A rising carbon price is essential to decarbonize the economy, i.e. to move the nation toward the era beyond fossil fuels. The most effective way to achieve this is a carbon tax (on oil, gas, and coal) at the well-head or port of entry. [...] The public will support the tax if it is returned to them [...]". This quite surprising attitude corresponds to a larger movement in favor of the price mechanism. France, following Sweden and other Scandinavian countries, considered implementing a carbon tax in 2010, at a rate equal to €17/ton CO₂. Faced with opposition from public opinion as well as practical and legal difficulties, the government decided to postpone the project until a European policy was put in place. The Swedish presidency of the European Union (second semester of 2009) encouraged the other member countries to implement carbon taxes, bearing on all sectors of activity which are not regulated by the emission quotas system. The newly elected French government in 2012 set up a Commission of Ecological Taxation to put forward new proposals. Despite these changes, many countries have to face opposition from public opinion, for fear of the distributive consequences of these environmental tax reforms.

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¹ An eminent climatologist, he is a former director of the NASA Goddard Institute of Space Studies. After the election of U.S. President Barak Obama in November 2008, J. Hansen sent him a letter to urge him to support a carbon tax.

So what would be the consequences on inequality of a European Carbon Tax Project or of the carbon tax currently under discussion in France? As Hansen suggests, an environmental tax can hardly be considered without adequate revenue recycling in order to enhance the acceptance of the environmental policy. But the aim of such a recycling can therefore be twofold: to reduce, or even annihilate the gross cost of the policy, as measured by the global welfare loss, or to compensate the inequities generated. The objective of this paper is to contribute to this debate by designing an environmental tax reform that could be unanimously accepted.

As with the cap and trade mechanism, the tax allows environmental objectives to be achieved while minimizing the overall cost. One of the advantages of an environmental tax is that it provides public revenues which can be recycled. This is a reason why it may be preferred to subsidies or emission quotas. It has been argued that, as governments use these revenues to decrease other distortionary taxes, an environmental tax may simultaneously improve environmental quality and achieve a less distortionary tax system, i.e. it may lead to a double dividend, according to [Goulder \(1995\)](#). This could be a strong argument in favor of an increasingly green tax system. Following [Bovenberg and de Mooij \(1994\)](#), who initially provided a refutation of the double dividend hypothesis, a large body of literature has analyzed this issue extensively. The double dividend hypothesis is rejected when the economy is made up of one productive sector, using only one productive factor (labor), and one representative consumer ([Bosello et al., 2006](#)). But, when there are several productive factors and/or several consumer groups, the double dividend can be obtained ([Bovenberg and van der Ploeg, 1996](#); [Proost and Van Regemorter, 1995](#)). In particular, [Goulder \(1995\)](#) and [Ligthart \(1998\)](#) have shown that the existence of the double dividend essentially depends on the possibility of transferring the overall tax burden from the wage earners to some fixed production factors or to other consumers, thus emphasizing the role of heterogeneity. For instance, [Proost and Van Regemorter \(1995\)](#) show that the tax burden has to be supported by the pension system, therefore penalizing the retired agents. Heterogeneity of agents is above all a necessary (but not sufficient) condition for the existence of a double dividend.

But one of the disadvantages of environmental taxes is that, like any consumption tax, they often appear to be regressive, i.e. they affect more heavily the welfare of the poorest households than of the richest ones. [Johnstone and Alavalapati \(1998\)](#) argue that in many cases the distributional consequences of environmental tax reform may be distinctly regressive, at least in terms of relative tax burdens. In particular, in the French case, a tax on energy or transport consumption hurts the lowest wage households three times more than the highest wage households ([Ruiz and Trannoy, 2008](#)). [Bureau \(2011\)](#) also shows that the distributional effects of a carbon tax on car fuels in France are likely to be regressive before revenue recycling (see also [Wier et al., 2005](#), for the Danish case).² Moreover, the usual recycling of the environmental tax revenues through a decrease in the labor tax rate could also be regressive ([Metcalf, 1999](#)). Somewhat surprisingly, the analyses of the double dividend issue have until recently neglected the distribution issue of the welfare gain, although it is usually obtained at the expense of some groups of agents.

Previous articles considered the distribution issues between generations by linking the standard double dividend literature with a parallel stream of papers on environmental taxes in an overlapping generations framework. In a seminal paper, [John and Pecchenino \(1994\)](#) examine the effects of an environmental tax whose revenue finances a public pollution abatement activity. [Fisher and van Marrewijk \(1998\)](#), using an endogenous growth model with pollution, derive the conditions under which a pollution tax does not slow economic growth. [Bovenberg and Heijdra \(1998\)](#) examine the effects of a green tax on polluting capital when the tax revenue is redistributed by lump-sum intergenerational transfers. All these papers conclude that environmental taxation implies such a welfare loss for older generations that its implementation is not desirable: it is indeed one of the generations which decides to reform the tax system that will also bear the highest burden of the reform. We have also studied the conditions for the existence of a long term double dividend, taking into account the distinction between wage earners and retired consumers within a Diamond framework ([Chiroleu-Assouline and Fodha, 2005, 2006](#)).³ The same framework is used by [Nakabayashi \(2010\)](#) to examine optimal tax rules and public sector efficiency, or by [Ono \(2007\)](#) who introduces endogenous growth.

In this paper, as in a previous one ([Chiroleu-Assouline and Fodha, 2011](#)), we intend to analyze the distributional effects of environmental tax reforms between different categories of households. To our knowledge, these papers are the first ones to take into account the intra-generational heterogeneity of agents, which has never been considered in depth in the double dividend literature. The overlapping-generations framework is well suited to introduce different sources of households' heterogeneities, which are necessary (but not sufficient) conditions to deal with inequities but also to obtain a successful double dividend. In our works, we take into account different skills for workers, implying different levels for wage rates among households, but also other sources for revenues, as retired agents (when old) do not work.

Besides the heterogeneity of agents, we introduce several features in our model in order to show that, even in very unfavorable circumstances, an adequately designed environmental tax reform can simultaneously lead to a decrease of pollution, an increase of the global welfare and a non-decreasing welfare for each class of households.

Like [Bovenberg and Heijdra \(1998\)](#) or [Heijdra et al. \(2006\)](#), our paper is also linked to the literature on capital taxation since pollution is generated as a by-product of capital used in production (instead of being emitted by the consumption of a brown good or by the output, like in [Bovenberg and de Mooij, 1994](#)). It implies that the tax on capital amounts to an

² Recent literature shows that they can be less regressive than usually argued, if measured using lifetime income or annual consumption rather than annual income ([Grainger and Kolstad, 2010](#); [Hassett et al., 2012](#) or [Stern, 2012](#)).

³ Because they focus on transitional effects, [Heijdra et al. \(2006\)](#) study both the efficiency and intergenerational distribution effects of environmental taxes in a Yaari-Blanchard model of a small open economy.

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