Regional double dividend from environmental tax reform: An application for the Italian economy

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A B S T R A C T

The greenhouse effect forces national Governments to design environmental tax policies for facing not only global warming but also the negative economic consequences resulting from the reduction of emissions such as a negative change of GDP. This paper aims at verifying the impact of an environmental fiscal reform able to attain both the reduction of greenhouse gas emissions and the regional double dividend. We have decided to follow the computable general equilibrium approach for modelling the multisectoral income circular flow in the case of a bi-regional economy as described by a Social Accounting Matrix we have built for this purpose. The tools of analysis we chose represent suitable and consistent instruments in order to quantify the effects of an environmental tax reform. They can in fact highlight the possible differences in responses between macro regions in terms of regional GDP changes, regional prices and regional employment rate. In fact, the extended multi-sectoral framework, on which the model is developed, represents economic activities, imperfect labour market and institutional sectors behaviours in each macro region. The simulations performed concern the introduction of a progressive and proportional green tax on each type of commodity according to the corresponding level of CO_2 emissions. Furthermore all simulations introduce a recycling scheme of green tax revenues, whose aim is reducing both the income tax and the regional tax on activities (IRAP). The application is done on a bi-regional Social Accounting Matrix for Italy for the year 2003.

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1. Introduction

The debate on the effectiveness of environmental policy mainly focuses on the analysis of the instruments adopted to achieve environmental targets and its economic costs or benefits (Parry, 2004). Among the economic measures adopted by European countries since the Kyoto agreement, emission taxes and emission permits trading have been most frequently used as environmental policy instruments.[1]

The environmental taxation, in particular, is considered a powerful tool of pollution control. More important, it provides public revenue that can be recycled both at state and federal level in order to influence the main macroeconomic variables as income and employment (Pearce, 1991).

This approach usually refers to the *double dividend* theory which is based on the hypothesis that environmental taxes have two potentially positive effects: first, they encourage the limitation of environmental damages and, second, they provide additional revenues that can be used to eliminate specific "bad taxes" to obtain economic gains (Bovenberg and Goulder, 2002). Thus, according to this theory, the first dividend (*green dividend*) arises because the environmental taxation

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[1] These are widely known as market-based policy instruments dealing with externalities (Baumol and Oates, 1988).

reduces the amount of greenhouse gas (GHG) emissions. At the same time, a second dividend (*blue dividend*) occurs when the environmental tax revenue is recycled to reduce existing taxes generating several non-environmental benefits (Gimenez and Rodriguez, 2010). The second dividend is usually interpreted as an economic welfare improvement arising when the tax revenue stimulates better performances of economic variables such as production, consumption, inflation or income. When the benefit is represented by the reduction in the unemployment rate, according to the literature we acknowledge specifically the employment second dividend (Goulder, 1995).

The assessment of the double dividend hypothesis, especially for the European countries, mostly concentrates on the employment second dividend, as a consequence of the high unemployment rate which typically affects this area. Indeed most of those analyses that aim at quantifying the effects of environmental fiscal reform on labour markets, are developed through the general equilibrium frameworks characterised by rigidity on wage formation and unintentional unemployment.

Empirical studies for several countries, such as Schneider (1997), Bovenberg and De Mooij (1998), Manresa and Sancho (2005), Takeda (2007), Glomm et al. (2008), and Bor and Huang (2010) demonstrate the existence of the second dividend and in some cases even a triple dividend.[2]

This further benefit can be represented by a decrease in poverty (Van Heerden et al., 2006) or a rise in efficiency indicators—e.g. utility change on private commodities consumption, (Manresa and Sancho, 2005).[3]

The possibility of detecting a double and a triple dividend through an environmental policy is realistic but it depends on the pre-existing tax system, the production technology and above all on the structure of the tax reform. Furthermore, in a country characterised by economic differences at the regional and social level, the double dividend could differ between regions or it could not occur for all regions where environmental fiscal reform is implemented (Takeda, 2007). In this respect, empirical studies on environmental tax reforms and double dividend are typically focused on countries rather than regions and accept/refuse the hypothesis of double dividend merely observing the effects of the policy on the macroeconomic variables at national level. In our application the analysis of the environmental tax reform is performed at the regional rather than national level in order to figure out the economic and social differences among regions within the same country and let the regional peculiarities in technologies and habits emerge also in terms of ability in generating ecological dividends.[4]

According to this approach, the paper aims to demonstrate the existence of a "regional" double dividend for the Italian economy when the national Government adopts an environmental fiscal reform. In particular an effort is made to introduce a progressive *green-tax* according to the coefficient of CO_2 emissions by each commodity. Thus the corresponding tax revenue is entirely recycled in order to reduce both the income tax and the regional tax on activities (IRAP). Since the price of final goods may increase as a consequence of the tax burden on total output, the reduction in the income tax has the purpose of mitigating the negative effect of higher prices on households real disposable income. Similarly the reduction in the regional tax on activities is applied to reduce the tax incidence on prices.

The methodology used is represented by a Computable General Equilibrium (CGE) model based on a bi-regional Social Accounting Matrix (SAM) for Italy for the year 2003. The CGE models are widely recognised as straightforward instruments able to assess the quantitative, distributional and allocative impacts of alternative fiscal policy reforms (Radulescu and Stimmelmayr, 2010) and the bi-regional SAM provides the proper full detailed and disaggregated database for the simulations.

Furthermore, the aim to identify the convenient environmentally-oriented tax reform for the Italian economy requires the integration of the SAM with the environmental data set concerning CO_2 emissions by each commodity. The integration between environmental and economic flows is accomplished through the use of the National Accounting Matrix including Environmental Accounts (NAMEA). Indeed, in line with the suggestion of the European Commission, the NAMEA is the basic tool able to supplement the major economic aggregates – total output, value added and final demand – with the GHG emissions data in physical terms according to the input output disaggregation (CE, 1994).[5]

The next section introduces the environmental policy targets for the Italian case and it identifies the most suitable environmental tax reform in order to comply with the current European environmental agreement. The description of the database and the CGE model are presented in Sections 3 and 4. The fifth section shows the results of an application of the environmental fiscal policy proposed for the Italian case in terms of CO_2 emissions, total output, unemployment rate, disposable income and final demand.

2. The environmental tax reform

The analysis developed in this paper has the purpose of verifying the possibility for the Italian economy to approach the objectives of international climate agreements ratified by the European Union. In particular, as the period of this analysis

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[2] According to Bovenberg and Goulder (2002) the conditions under which the double dividend occurs can be summarised in: (i) pre-existing distortionary taxes on production factors; (ii) primary factors inelastically supplied and relatively under taxed; (iii) relative international immobility of capital; (iv) elasticity of substitution between energy (the environmental input) and labour greater than elasticity of substitution between energy and capital; (v) real wages rise little when unemployment falls, so that the reduction in taxes on labour are not offset by wage rises.

[3] These results reject or integrate the results of previous theoretical studies which denied the second dividend existence. Among them it is worth mentioning Goulder (1995), Bovenberg and Goulder (1996, 1997) and Böhringer et al. (1997) which showed that in the presence of a carbon regulation, even if environmental variables improve, the second dividend does not emerge.

[4] A regional application for environmental tax can be seen in André et al. (2005).

[5] This approach avoids the difficulties connected to the valuation of environmental costs in monetary terms.