

The Economic and Environmental Impact of the Introduction of a Carbon Tax for Scotland: A Computable General Equilibrium Analysis

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Overview

Since devolution, the Scottish Government has increasingly adopted a distinctive environmental and energy policy. The Scottish Climate Change Act included a target to reduce CO₂ emissions to 42% below 1990 levels by 2020. This is stricter than the 34% CO₂ emissions reduction adopted by the UK Government in 2010. Moreover, the corresponding Scottish Government target for renewable electricity generation in 2020 is equivalent to 100% of electricity consumption in Scotland and preliminary data suggest that the interim 2011 target of 31% was exceeded by 4 percentage points. However, whilst Scotland has adopted challenging targets, many key policy instruments are reserved to the UK government. At present the main “green” elements of the tax system remain reserved to the UK Government. Many economists regard a carbon tax as the most efficient way to reduce carbon emissions (e.g. Tullock, 1967; Pearce, 1991). It is of therefore of interest, and highly relevant in the context of the more demanding environmental targets set by the Scottish Government and present discussions around increased fiscal autonomy in Scotland, to consider the effect of a Scottish specific carbon tax. In this paper we therefore use an energy-economy-environmental model of Scotland to simulate the impact of the Scottish Government imposing such a tax on carbon emissions.

Method

We briefly review the theoretical and empirical literatures on the likely impact of a carbon tax. In principle, at least, the introduction of a fiscally-neutral carbon tax offers the possibility of a “double dividend”. Not only are CO₂ emissions reduced by the imposition of the tax, but the efficiency with which other elements of the economy operate can be simultaneously improved. In the literature, there is extensive discussion concerning the possible nature of this second dividend. The most popular formulation suggests a cut in the taxes on employment. The reduction in the price of labour to the firm produces a net reduction in costs to labour intensive firms, and encourages the substitution of labour for other inputs in all production. We explore the likely outcome in a Scottish context by extensive simulation of an intertemporal, energy-economy-environment computable general equilibrium model. (See e.g. Allan, *et al.*, (2007).)

Results

Not surprisingly we find that, if the revenues are not recycled within Scotland, the aggregate effects of the tax are contractionary: so emissions decline, but so too does economic activity. If revenues are recycled to stimulate general government expenditure in Scotland, while emissions fall there is no evidence of a double dividend. However, when revenues from the tax are recycled to reduce taxes on employment there is a reduction in emissions accompanied by an increase in Scottish GDP and employment. Extensive sensitivity analysis allows us systematically to compare our results with others reported in the literature.

Conclusion

The debate on constitutional change continues to gain momentum in the run up to the referendum on Scottish independence. However, regardless of the outcome of that debate the Scottish Government is destined to benefit from a significant enhancement in the extent of its fiscal powers. Against this background, it is natural to consider the possibility of a Scottish-specific carbon tax: this would be a genuine option under both “devolution max” and independence. Our analysis suggests that this dividend is likely to be realised provided revenues are recycled to reduce taxes on employment, but not if they are used to finance general government expenditure. In current circumstances there may be considerable mileage in recycling revenues to subsidise employment of the younger age groups who have been most adversely impacted by the recent recession and its aftermath.

References

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