

CHAPTER 12

LONG AND SHORT TERM RESULTS: A CRITICAL POLICY EVALUATION

12.1 INTRODUCTION

It is evident from both the short-run and long-run policy simulations that South African policy makers should carefully consider their policy objectives before implementing environmental management measures such as environmental taxation. Apart from the consequences that environmental taxation has for the environment, it also holds important consequences for employment, welfare distribution and economic growth. This Chapter serves to highlight the economic consequences that an environmental taxation policy in South Africa could have.

12.2 ENVIRONMENTAL TAXATION AND THE ENVIRONMENT

The results from both the short-run and long-run policy simulations indicate that a tax on coal would do very little to decrease the domestic demand for coal in South Africa. Table 12.1 compares the change in the demand for coal in the short-run and long-run policy simulation in which all other exogenous variables were left unchanged (i.e. no tax revenue returns or technological changes).

Table 12.1: The change in the domestic demand for coal in the short-run and the long run

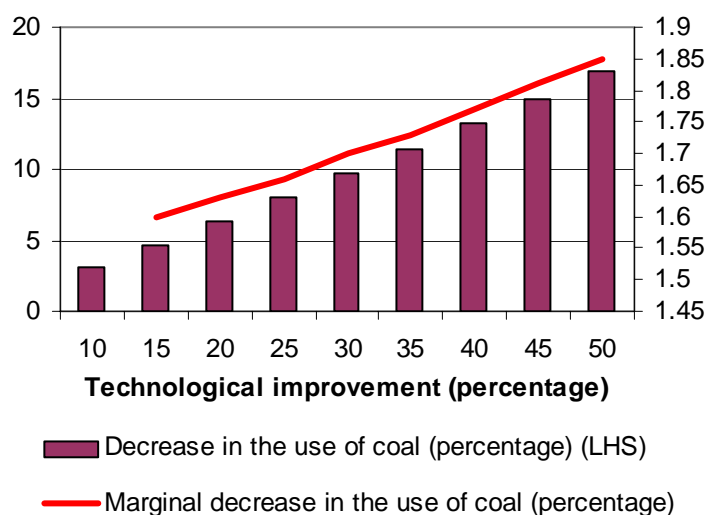
	Change in domestic demand (%)	Rand value of the change in demand R millions (2001 = R11 782)	Approximate change in quantity (millions of tonnes) (R62/tonne)
Short-run	1.39	R163	2.63
Long-run	1.13	R133	2.15

Although an environmental tax would result in a decrease in the domestic use of coal, it is unlikely that a reduction of 1.39 percent (in the short-run) or 1.13 percent (in the long-run) would have significant environmental benefits. Policy makers should bear in mind that these reductions would be achieved by levying an environmental tax of 50 percent on the use of coal, which is, by most measures, a relatively high level of taxation.

The reason for the lack of any significant environmental success with a tax on coal is the current lack of a feasible substitute for coal. This lack of a substitute is especially evident in the electricity, synthetic fuel and basic iron and steel industries. The lack of a coal substitute makes the demand for coal very inelastic and any decrease in the demand for coal is the sole result of a decrease in aggregate domestic demand.

Given the lack of any feasible alternative to the use of coal, it is important that South African policy makers recognise the important role of technological innovation in the management of South Africa's environmental resources (with specific reference to the use of coal and the pollution problems that emanate from the use of this natural resource). Technological innovation is more likely to occur over the long-term and for this reason long-term policy simulations are performed that incorporates technological change that increases the efficiency of the use of coal in the production processes in South Africa. Figure 12.1 reflects the percentage change in the domestic use of coal that is associated with different levels of technological innovation. It is evident that the marginal decrease in the use of coal increases up to (and including) a level of 50 percent of technological innovation.

Figure 12.1: The percentage change decrease, and marginal percentage decrease in the domestic use of coal due to technological improvement



This result indicates that the authorities that are involved in environmental management will have to consider a strategy to induce technological innovation that decreases the dependence of the economy on coal. The suggested environmental taxation will have little effect on the environment if technological innovation is neglected.

12.3 ENVIRONMENTAL TAXATION AND GOVERNMENT REVENUE

Because the price elasticity of demand for coal in South Africa is currently very inelastic, the short-run and long-run simulation results indicate that a tax on coal will generate significant indirect tax revenue for the government. In the short-run, the 50 percent tax on coal (with all other exogenous variables unchanged) will increase the government revenue by approximately R5.044 billion. This represents an increase of 2.2 percent in total government revenue (2001/2002 fiscal year).

Although the increase in indirect taxes is relatively high, the CGE model that was used in this study does not include the effects of the tax on other sources of government revenue. These include corporate taxes and personal income taxes, which are ultimately the main drivers of government revenue. If one makes the assumption that companies pay corporate taxes based on their levels of gross operating surplus, and that households pay income taxes based on some level of nominal consumption expenditure, tax revenue collections from both these sources will decrease as a result of the environmental taxation. Nominal consumption expenditure will decrease by 1.79 percent across all households in the short run and by 2.38 percent across households in the long run. Gross operating surplus decreases by 1.93 percent in the short-run and by 1.61 percent in the long-run.

The short-run simulations in which the government returns the indirect tax revenue to the economy by means of a lump sum transfer to poorer households, or by means of a subsidy on the cost of food and agricultural products, indicate that the government will be able to significantly reduce the negative effects of the tax on coal on personal- and corporate income taxes. By redistributing the tax revenue by means of a subsidy on food and agricultural products, the gross operating surplus would only decline by 0.28 percent, while nominal consumption expenditure only declines by 0.17 percent across households that do not receive the transfer. Nominal consumption expenditure increases by between 20 and 40 percent for households that receive the subsidy.

The results from the long-run policy simulations, in which technological changes are introduced (for example in the case of Simulation 2 in Chapter 11), indicate that an improvement in technological change holds the biggest benefit for South African government revenue. Although the reduction in the use of coal implies a decrease in government revenue collected from this source, the increase in economic activity would actually result in an increase in indirect tax revenue collection from other sources of expenditure. It should also result in an increase in tax revenue

collection from corporate taxation (as gross operating surplus would increase by 0.69 percent) and personal taxation (as nominal consumption would increase by 1.28 percent across households).

12.4 ENVIRONMENTAL TAXATION AND THE UNEMPLOYMENT PROBLEM

Given the assumption (in both the short-run and long-term simulations), that the unskilled and informal sector labour supply is perfectly elastic, while the highly skilled and skilled labour supply is perfectly inelastic, the results of the CGE simulations provide valuable insights into the effect that environmental taxation would have on the South African labour market.

As expected, both the short-term and long-term policy simulations indicate that an environmental tax policy in which tax revenue is used to increase government savings (zero revenue recycling scenario) would result in a decrease in the employment of unskilled and informal sector labour. The simulation results indicate that, in the case of a 50 percent tax on coal, the short run effect (of such a zero revenue recycling policy on employment) would be a slight increase of 0.008 percent in the number of unskilled workers and a decrease of 0.51 percent in the number of informal sector workers employed. This represents a head count of 3 954 and 5 202 lost job opportunities in the unskilled and informal sector labour markets, respectively. The negative effect of the tax on coal is even more pronounced in the long-run, where the demand for unskilled and informal sector labour decreases by 0.65 and 0.95 percent respectively. This represents lost job opportunities of 15 375 and 9 689 in the unskilled and informal sector labour markets respectively.

As discussed in Chapters 4 and 5, the double dividend literature indicates that there is a possibility that the labour market could reap positive benefits if the Government recycles the environmental tax revenue. This possibility would appeal to policy makers with political ambition, and for this reason it was tested within a short-term framework by:

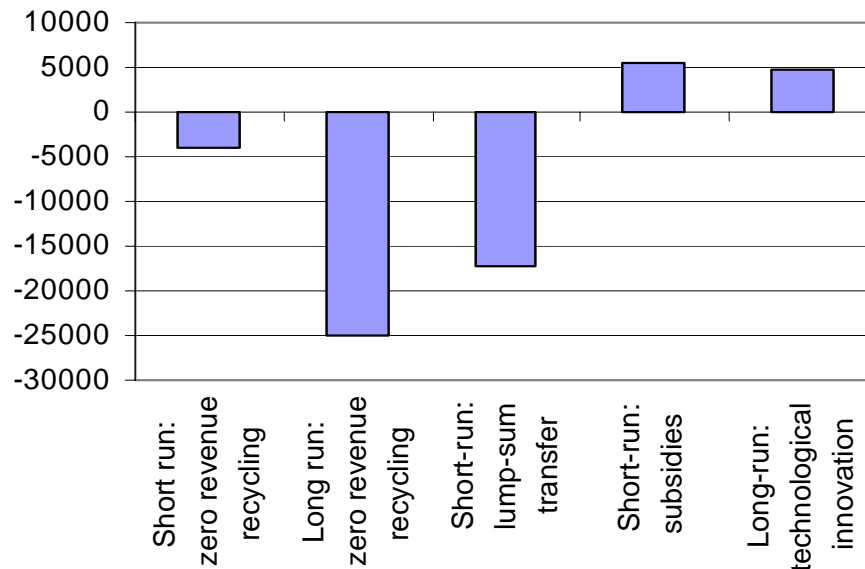
- i. Recycling the tax revenue as a lump-sum transfer towards the poorest households; and
- ii. Recycling the tax revenue as a subsidy on agricultural - and food products.

The simulation results indicated that a lump-sum transfer would actually increase the negative effects of the environmental tax on the economy over the short-term, the reason being that the positive effect that the tax policy has on exports is reduced in such a setting (see Chapter 11). Employment of unskilled labour will decrease by 15 375, while employment of informal sector labour will decrease by 1 783.

A positive effect could, however, be achieved by subsidising labour intensive products such as food and agricultural products. The policy results indicate that employment of the unskilled and informal sector labour force would increase by 5203 and 387 employment opportunities, respectively. Policy makers should keep in mind that tax revenue from personal income and corporate taxes would (in all probability) be negatively affected in this policy setting. This could decrease the ability to subsidise labour intensive products.

A long-run simulation, which incorporates a 50 percent tax on coal and technological innovation that reduces the use of coal by 50 percent in the production process, shows that employment would increase by 3 400 job opportunities. This increase represents a decrease of 700 opportunities in the unskilled labour market and an increase of 4 100 opportunities in the informal labour market. Figure 12.2 compares the effect of the different policy proposals on the South African labour market.

Figure 12.2: Environmental taxation and the demand for unskilled and informal sector labour: a comparison of policy results



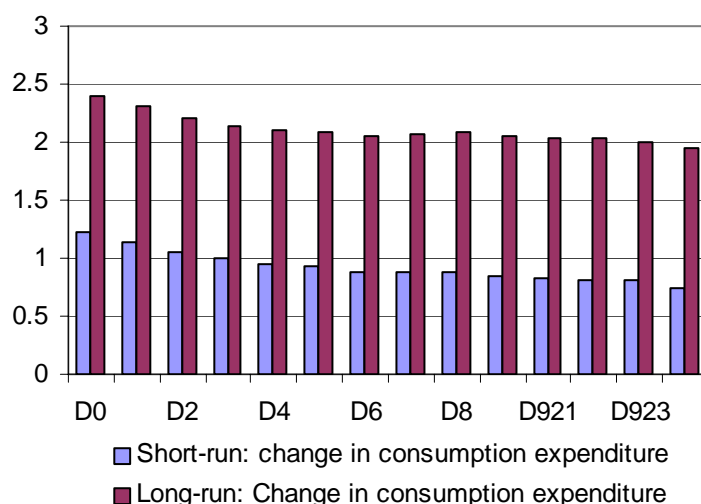
The conclusion that can be reached from the different policy simulation results is that the negative effects of environmental taxation on South Africa's labour market could be negated, and even reversed, if policy makers apply the revenue in a fashion which would stimulate the demand for labour, i.e. increase the demand for labour intensive products. There is, however, a degree of uncertainty as to the revenue that would be available to the Government in order to affect stimulatory policies in the labour market. It is evident that environmental technological innovation

holds benefits for the South African labour market, but without uncertainty about government revenue collections.

12.5 ENVIRONMENTAL TAXATION AND THE REDISTRIBUTION OF WELFARE

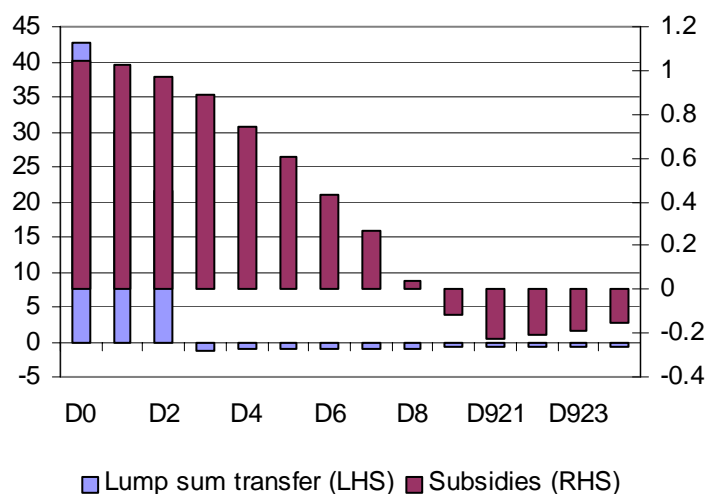
If it is assumed that consumption expenditure serves as a proxy for welfare, it is evident that an environmental tax policy with zero revenue-recycling would have negative effects on welfare and welfare distribution across all households in South Africa in both the short- and long-run. This is reflected in Figure 12.3.

Figure 12.3: Decrease in real consumption expenditure in the short and long-run: zero revenue recycling.



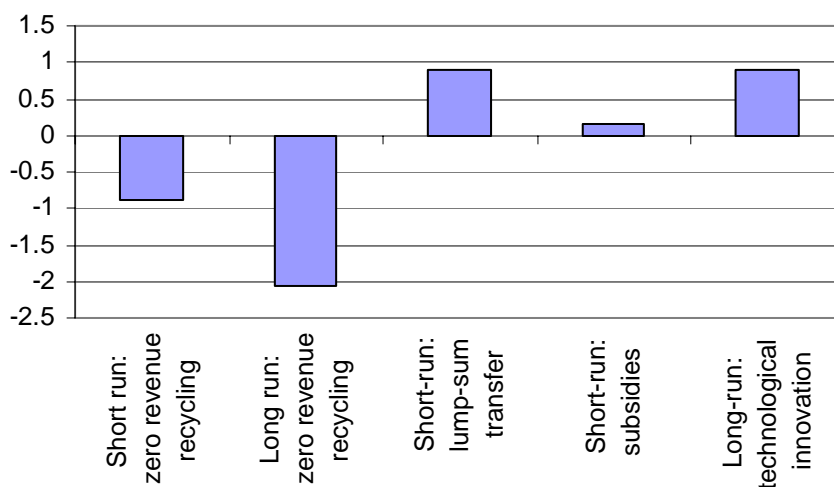
Given South Africa's welfare problems and skew income distribution, such a policy would be difficult to sell to policy makers. The policy results indicate that the Government would be able to address these problems in the short-run by using tax revenue either as a lump sum transfer to households at the lower end of the income distribution, or as a subsidy on products that constitute a significant portion of the budgets of poorer households. Figure 12.4 compares the results of these two policy simulations with one another. Not surprisingly, a lump-sum transfer would benefit all households that receive it, while the benefit of a subsidy would be the highest for low-income households and gradually decrease towards higher income households. The aggregate welfare increase is positive in both cases.

Figure 12.4: A comparison of changes in real consumption expenditure: lump-sum transfers and product subsidies



The long-run policy simulation results indicate that an environmental tax that is accompanied by technological innovation will also hold positive benefits for aggregate welfare the economy. A 50 percent tax on coal, which induces technological innovation, in turn reducing the use of coal by 50 percent, would result in an aggregate increase in real consumption expenditure of close to one percent. Although such a policy would result in a redistribution of welfare, it would increase aggregate real consumption across all households by approximately the same amount (0.9 percent). Figure 12.5 compares the change in aggregate consumption expenditure for the different policy simulations.

Figure 12.5: Change in aggregate consumption expenditure



As is the case with unemployment, the policy simulation results indicate that the South African government should be able to address the negative welfare effects of environmental taxation by recycling the revenue in an appropriate fashion. Technological innovation would, however, be critical in the long-term.

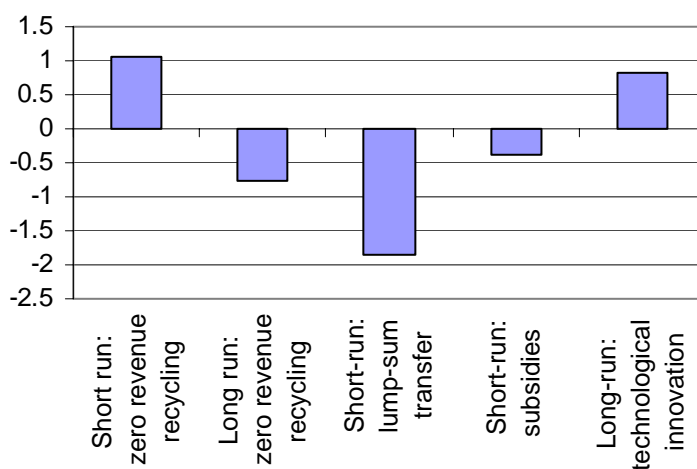
12.6 ENVIRONMENTAL TAXATION AND EXTERNAL COMPETITIVENESS

The policy simulation results indicate that a zero-revenue recycling policy would have a positive effect on South Africa's competitiveness in the short-run (exports would increase by 1.06 percent). This is because the fall in the price of fixed factors of production would result in a decrease in the price of South Africa's aggregate exports. A zero-revenue recycling policy would, however, result in a decrease in South Africa's exports in the long-run (0.76 percent).

It is interesting to note that revenue recycling would negate the positive effect on the country's competitiveness in the short-run. A policy that returns tax revenue in a lump-sum fashion would decrease South African exports by 1.86 percent, while a policy that subsidises food and agricultural products would reduce exports by 0.39 percent.

Technological innovation would induce positive benefits for South Africa's competitiveness. A technological improvement that reduces the use of coal by 50 percent would increase South Africa's exports by 0.82 percent. Figure 12.6 compares the effect of the various different policy results with one another.

Figure 12.6: Environmental tax policies and South African exports



12.7 CONCLUSION

There are two important policy conclusions that follow from the various simulations performed in this study.

Firstly, in the short-run, it can be concluded that the economic costs from environmental tax reform would be high, and that South Africa's economic structure would make the attainment of a double dividend difficult. The main reason for this is that there is currently no feasible alternative for the use of coal in South Africa. A tax on coal would thus not have significant environmental benefits. Although the tax on coal provides higher intermediate tax revenue collections, it is very likely that it would reduce personal income taxes and corporate taxes significantly. Although a lump-sum transfer of tax revenue to poor households could hold welfare benefits for the poor, it would not negate the negative effects on aggregate welfare, economic growth and employment. A policy that uses coal tax revenue to reduce the price of food and agricultural products could hold positive benefits. Before such a policy is implemented, further analyses will have to be done in order to assess the effect of the tax on total government revenue.

Secondly, in the long-run, the policy simulations indicate that the development of technology that will reduce the use of coal in the production process (i.e. increase the "productivity" of coal) will have significant benefits for the economy and the environment. South Africa's policy makers will therefore have to consider an environmental policy that will enhance technological innovation in the relevant industries. Coal tax revenue could be used to fund the development of such technologies. If successful, such policy would increase employment, economic growth and welfare, while reducing pollution in South Africa.