ECOLOGICAL TAX REFORM – A VALUE CHAIN LEVEL APPROACH

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ABSTRACT

A few studies about the macro-economical effects of the ecological tax reform – which means increases in the taxation of energy and environment compensated by cuts in the taxation of labour - have been completed. These studies have indicated that the effects of the reform will be marginal. However, the effects of the ecological tax reform can vary significantly between different industries and even different enterprises within an industry. The effects depend on the energy-intensity of the sector as well as business strategies of the enterprises over the whole value chain of a product or a service they provide. So far very few studies on this type of corporate level value chains have been made.

In order to acquire quantitative data on the effects of the ecological tax reform on a value chain level, the authors analyse three case companies and a product or a service they provide. In the study, the tax reform is implemented by increasing the taxes on electricity and fuels. The increase is based on the future price of carbon dioxide (CO_2) and specific CO_2 emissions of fuels. The tax increase is compensated to the industry by decreasing the obligatory national pension fees paid by the employers. The model is designed to be fiscally neutral towards state revenues.

Keywords: ecological tax reform, competitiveness, value chain

1. INTRODUCTION TO ECOLOGICAL TAX REFORM

Ecological tax reform - where the increase in the taxation of energy and environment is compensated by simultaneous cuts in the costs of labour – is one of the possible environmental policy instruments. It has been discussed in many countries, primarily within European Union, as a way to reach both environmental and employment benefits at the same time.

The approaches towards an ecological tax reform have been quite diverse in European countries. There has been little progress on the implementation of an ecological tax reform on the European Union level, although this issue has been in debate for years. In 1992 the 5th Environmental Action Programme of the European Union (EU) recommended a greater use of economic instruments such as environmental taxes. In 1997 the Commission adopted a communication on Environmental Taxes and Charges in the Single Market (COM(97)9). It aimed at clarifying the legal framework, and thereby gave guidelines to Member States wishing to introduce an ecological tax reform. In 1998 Cardiff Manifesto proposed the introduction of an ecological tax reform on the EU level.

The latest proposal for the introduction of an EU-wide energy tax proposes minimum levels of taxation for a wide range of fuels with a gradual increase over time. This so called Monti Directive (COM(97)0030) is still waiting for any decision although a vast majority of countries support the proposal. Due to the EU requirements on unanimity when decissions on fiscal issues are voted, the refusal of few countries can prevent development. However, at Member State level and in other European countries, there has been an increase in the use of environmental taxes (OECD 2000).

1.1 Expected effects of the tax reform

In addition to affecting on the state of the environment and employment, an ecological tax reform is assumed to have an effect on the competitiveness of the industries. This effect depends centrally on how the reform is implemented and how wide the coverage of the reform is. On macroeconomical and industry levels a number of studies about the effects of an ecological tax reform on competitiveness have been completed. These studies have indicated that the effects of the reform on competitiveness would be marginal. Some differences between sectoral effects have been noted. Not surprisingly, energy and resource intensive industries have been found out to suffer while labour intensive industries might benefit from an ecological tax reform.

The ecological tax reform will have direct and indirect as well as expected and unexpected effects. The effects depend largely on the design and implementation of the tax reform. On the basis of the recent literature, the expected effects of an ecological tax reform are:

- Marginal effects on economic growth and competitiveness on the macroeconomical level[2,3] (Holger and Hansen 1999, Ecotec 1999, Kohlhaas 1999, Köppl 1999)
- Partly notable positive and negative effects on the individual companies[4] (Holger and Hansen 1999, Kohlhaas 1999)
- Structural change of the economy[5] (Ekins 1999, Koschel and Weinreich 1999)
- Decrease in energy consumption and CO_2 emissions (Talousneuvosto 2000, Bosquet 1999, Ecotec 1999)
- Reduction of investments[6] (Bosquet 1999, Meyer and Welfens 1999)
- Increased employment[7] (Kohlhaas 1999, Bosquet 1999, Alatalo 1998)
- Changes in income distribution (Talousneuvosto 2000)

Other possible effects of the ecological tax reform include high adjustment costs, potential displacement of companies (Koschel and Weinreich 1999), and reduction of industry output. Phase-in increases and predictability of the future taxation may lower adjustment costs.

1.2 Alternatives to implement an ecological tax reform

There are several alternative ways to implement an ecological tax reform. Generally an ecological tax reform can be defined as using economic instruments to promote the use of production factors in a more sustainable way. The reform shifts the tax burden from environmentally less harming, and often under-used activities eg. labour and services, towards economic activities which directly use materials or energy or indirectly create activities that either promote energy or material intensive production and consumption patterns. An ecological tax reform can be implemented by removing current subsidies and tax releases, by changing the rate of current taxes and introducing new taxes. In spite of several alternatives for the implementation of an ecological tax reform, the reform as an

[2] It is assumed that the tax reform is implemented according to the principle of budget neutrality at the state level and the reform is carefully designed.

[3] It is argued that because budgetary effects are neutral, the expected impact of the reform will not be high (Holger and Hansen 1999).

[4] The effects of the tax reform are expected to be sharpest in the energy-intensive sectors such as iron and steel, cellulose etc. The price reductions are greatest in those sectors where labour costs constitute a high proportion of gross output. These include engineering, construction and various service branches (Kohlhaas 1999). Education and health may be among the greatest beneficiaries of such a tax reform (Ecotec 1999).

[5] Affecting most heavily the environmentally intensive sectors, environmental taxes may encourage structural change in the economy away from those sectors (Ekins 1999, Koschel and Weinreich 1999).

[6] To solve this problem an element of innovation promotion as a part of the tax reform has been demanded. In addition to reduced social security, raised research and development promotion financed from ecological tax revenues should be introduced. This would stimulate growth and avoid the reduction of output. (Meyer and Welfens 1999.)

[7] The effect of a tax reform on employment depends on a variety of issues. These include the amount of revenue used for decreasing labour taxes, adjustment costs, changes in wages, and mobility of the production factors (Talousneuvosto 2000).

increase in the taxes on energy and its compensation by decreasing employers' social security contributions has been most often in discussion (OECD 1997).

Taxes can be used as a climate policy instuments or to complement other policy instruments. The use of an ecological tax reform as an important climate policy instrument has been discussed at least in Norway, France and Great Britain. The Norwegian Government proposed the introduction of a tax of NOK 100 (USD 11) per tonne CO_2 in sectors that are currently exempt or where the tax rate is lower than NOK 100 per tonne (Ministry of the Environment 1998). In January 2000 the French Prime Minister announced a plan for cutting greenhouse gas emissions by introducing a tax on carbon at a rate of FF 150-200/t CO_2 (USD 20-27) in 2001 and possibly rising to FF 500/t CO_2 (USD 67) by 2010. In Great Britain, a Climate Change Levy is planned to be introduced in April 2001. The levy will be charged on the business use of fossil fuels and electricity. Revenues from this levy will be returned to business in the form of reduced employers' National Insurance Contributions. Additionally, some of the revenues will be earmarked to improve energy efficiency in business.

In Denmark, the industry will be compensated by decreasing employers' social security contributions and by financing energy saving investments by maximal 30 % of the total investment. Pay-back time of these investment should be over 2 to 3 years (Energy Taxes – The Danish… 1998). In addition, Danish companies can gain tax returns if they enter a voluntary energy saving agreement (Holger and Hansen 1999). Taxes could also be used to sanction companies which do not reach certain emission reduction targets. Revenues of environmental taxes could be used for financing emission reduction activities in other countries (CDM and JI activities) (Metz 2000) or the revenue from CO_2 emissions trading could be used to cut business taxes (Hamilton and Turton 1999).

2. RESULTS OF THE STUDY

2.1 Methodology

A study conducted by the authors analysed the effects of the ecological tax reform on the price competitiveness of the selected value chains. The three value chains analysed in detail were the service provided by 1) elevator, 2) printed newspaper, and 3) truck components.

A special calculation method for the assessment of price competitiveness of the value chains over the period 1998-2020 was developed. All the data was collected from 1998 and this served as the base year for the cost calculations. In order to study the changes in the value chain cost structure during 1998-2020, the costs were projected for the years 2002, 2010 and 2020.

Phases of the calculation of price competitiveness were as follows:

1. Cost structure of each main phase within the value chain in 1998 was defined.
2. Any cost units over 2 per cent of total value chain costs were included as separate value chain layers. Cost structure of these cost units was defined following the format of the main value chain phases.
3. Cost structure for 1998 was set as the reference year (index 1998=100).

4. Based on the tax model, changes in labour and energy costs were projected to years 2002, 2010 and 2020

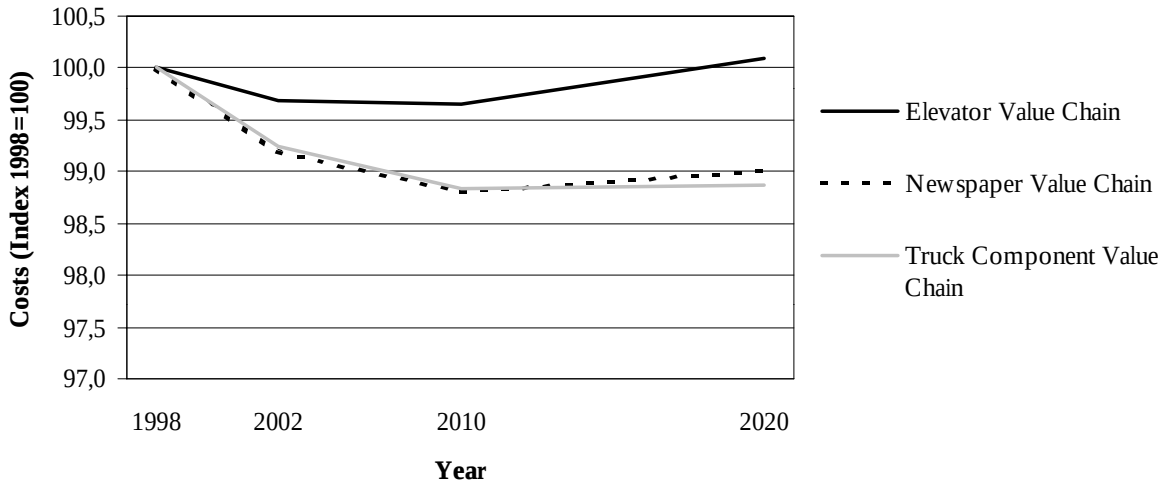
The tax model was based on the following assumptions:

1. Increase in the taxes on energy was directed to CO_2 part of the taxes on fuels and electricity
2. Taxes corresponded to 200 FIM/t CO_2 in 2002 (USD 30), 300 FIM/t CO_2 in 2010 (USD 45), and 400 FIM/t CO_2 in 2020 (USD 60)
3. Energy consumption was assumed to diminish 10 % by 2010 and 20 % by 2020
4. 60 % of the increase in the state revenue due to higher energy taxes was compensated to private sector including industry and services
5. Decrease in the taxes on labour was done by diminishing employers' national pension constributions

2.2 Main results

The effect of the tax reform is small on the total value chain costs in all cases over time. The changes in the total costs differ between – 1,1 % and + 0,1 %. There is a marginal increase (0,1 %) in the costs of the elevator value chain. The costs of newspaper and truck component value chains decrease slightly. In the case of newspaper value chain the decrease of costs from 1998 to 2020 is 1,0 %, in the case of truck component value chain 1,1 %. Figure 1 presents the development of the costs of the total value chains from 1998 to 2020.

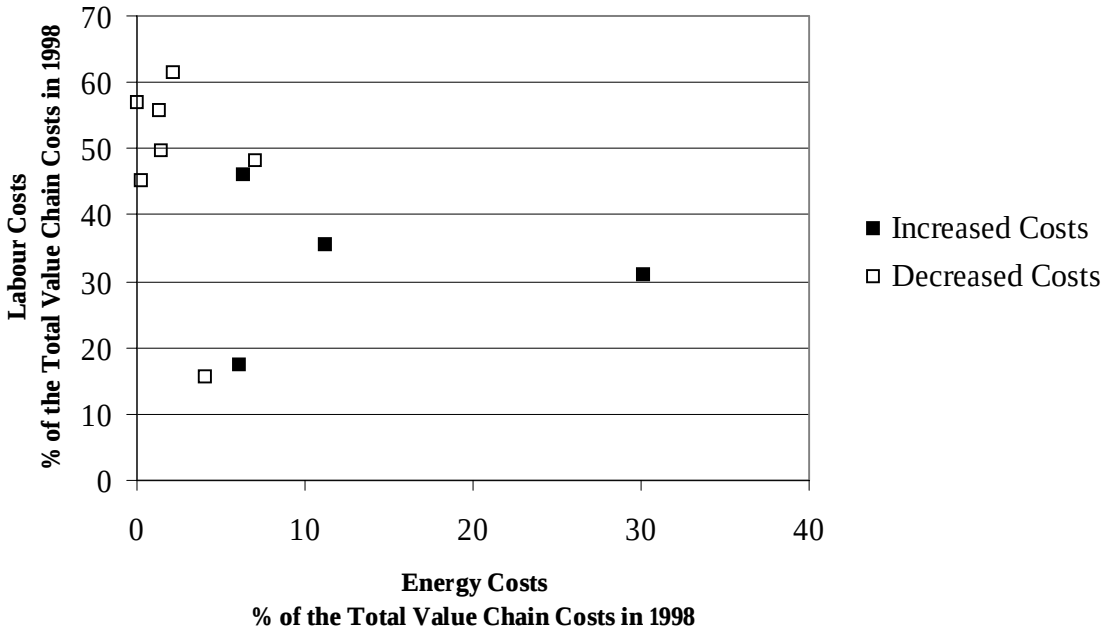
Figure 1. Development of the Value Chain Costs from 1998 to 2020 (Index 1998=100).



The share of energy costs of the total value chain costs increases due to the tax reform. The increases in the energy costs from 1998 to 2020 vary between +0,4 and +1,7 % units. The share of labour costs decreases. The decrease of the labour costs of the value chains is between 1,3 – 2,2 % units.

Figure 2 presents the effect of the ecological tax reform on different parts of the value chains of the case studies. The parts of the value chains are placed in figure according to labour and energy costs.

Figure 2. Effect of the Ecological Tax Reform on the Parts of the Value Chains.



The ecological tax model used in this study will reduce employers' labour costs. However, this does not automatically mean an increased use of labour on a company level in a short term. In the long run the reduced labour costs may have an influence on the strategic decisions of the companies.

2.3 Winners and losers of the tax reform

When discussing the competitiveness it is essential to make a difference between an individual company or an industry and the national economy as a total. Despite of marginal effects on the value chain level, the tax reform will change the competitive situation of single industries and companies. As the results of the study indicate, the effects of the ecological tax reform on the different parts of the value chains can be significant. This may mean notable cost relieves or pressures to certain companies.

Concerning the total value chain, the costs of the parts near customer end of the value chain in many cases form the most significant share of the total value chain costs. Especially in the case of long-life products the costs of use phase of the product may be unexpectedly high. If the usage costs are mainly due to energy consumption, the ecological tax reform will increase the life cycle costs significantly.

Losers of the tax reform are energy intensive parts of the value chains such as transport. For example, in the case of newspaper the tax reform may make recycled raw materials more attractive as raw materials than virgin ones. This is due to the intensive logistic

needed for the wood supply. Winners may be services as they are often labour-intensive and their energy use is marginal compared to production. More generally, those industries and companies that can flexibly reduce energy consumption or replace energy consumption by the use of labour gain economical benefits compared to those, which cannot adapt their strategies accordingly.

2.4 Potential of energy saving

Improving energy efficiency can compensate the rise in the price of energy. In order to compensate the increase of energy costs caused by the tax reform, energy should be saved in the elevator value chain 3 % by the year 2002, 8 % by the year 2010 and 16 % by the year 2020 compared to the total energy costs in 1998. In the truck component value chain the savings should be 3 %, 8 %, and 10,0 % accordingly. In order to compensate the increase of energy costs in the newspaper value chain, energy should be saved 2 % by the year 2002, 9 % by the year 2010 and 16 % by the year 2020 compared to the total energy costs in 1998. These calculations do not take into consideration the possible investments needed for energy saving. The energy savings needed to compensate the increase of energy costs represent a 0,5 - 1 % annual improvement in energy efficiency.

2.5 Shift to service economy

An ecological tax reform can be seen to shift the economy to a direction supported by several current development pressures. These include the need for higher material and energy efficiency and productivity as well as new business opportunities enabled by information technology. These changes are driving the society to a service economy, where performance is sold instead of goods (Stahel 1998). The ecological tax reform and service economy clearly have common features. They both favour immaterial instead of material, emphasize the importance of the final customer and the end part of the value chain, and create direct shifts in the competitive position of companies. Stagnant product demand together with an expanding installed product base have pushed economic value to the downstream end of the value chain, that is away from manufacturing toward providing service required to operate and maintain the products (Wise and Baumgartner 1999). In addition to economic efficiency, the service economy can contribute to increased environmental efficiency (Gabaglio 1999). A limiting factor may be that during the transition from the classical economy to current service economy, the cost of production in manufacturing and services is increasingly transferred to the consumer through the latter's participation in making products and services usable by self-service (Giarini 1999).

There already exist examples of companies, which create a remarkable part of their sales volume through services. Examples include companies such as Dow, General Electric, Xerox, and Kone. The stock market listing of these companies may be much higher than their ranking by sales volume, indicating the interest of investors in dematerialized companies (Stahel 1998).

2.6 Business strategy options

There are a couple of possible strategies for companies to fight against the increase in the energy costs. A company may not suffer because of the ecological tax reform, but because it fails to reform its strategy accordingly. Possible strategies in response to increased taxes on energy include:

- Energy saving and energy saving investments
- Substitution of energy and energy-intensive inputs with less energy demanding inputs
- Shifting to less energy demanding activities, products, and services
- Taking advantage of the energy saving potential in the end use
- Displacing operations to countries with lower energy taxation

These strategies may diminish the share of the energy costs in relation to total costs and profit. This is the case when production comes more energy independent than before.

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