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# **A review of the German mandatory deposit for one-way drinks packaging and drinks packaging taxes in Europe**

Markus Groth<sup>1</sup>

## **Abstract**

The mandatory deposit for one-way drinks packaging, embodied in the German Packaging Ordinance of 1991, entered into force in January 2003, after the condition for its implementation was given by the fall of the market share of reusable drinks packaging under 72% in 1997. In this context the author doubts that the German mandatory deposit is an effective instrument to stabilise the market share of ecologically advantageous drinks packaging. Rather it is to be expected that the environmental policy objectives can be accomplished more effectively by a reorientation of the specific environmental policy. Hence it needs to be considered that – even eleven years after the first time decrease of the relevant market share of reusable drinks packaging – an urgent need for action exists in Germany. This practise based analysis therefore deals with packaging-taxes as an alternative environmental policy instrument and points out recommendations against the background of a further amending of the German Packaging Ordinance as well as experiences from the use of packaging taxes in Europe.

**Keywords:** packaging tax, waste management, mandatory deposit, non-ecologically advantageous one-way drinks packaging, environmental policy

**JEL-Classification:** H23, Q50, Q53, Q58

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## **1 Introduction**

The German mandatory deposit for non-ecologically advantageous one-way drinks packaging turned into force in January 2003. The mandatory deposit is based on regulations within the German Packaging Ordinance (*Verordnung über die Verwertung und Vermeidung von Verpackungabfällen*) of 1991, as amended in 1998 and 2005. It stipulates that if the national market share of refillable drinks packaging fell below 72%, a mandatory deposit would be imposed on non-refillable drinks packaging of any material in the drinks categories that fell below the 1991 level.

In 1997 the market share of refillable drinks packaging fell below the 1991 benchmark for the first time. After prolonged political discussions and legal proceedings a confusing and not well established mandatory deposit was imposed in January 2003. The original mandatory deposit comprised several critical exceptions and included exclusively non-refillable drinks packaging for packed mineral water, beer, mixed drinks containing beer and carbonated soft drinks. Non-carbonated drinks and juices were not affected. Milk and milk-based drinks, spirits, drinks for specific dietary purposes, wine and sparkling wine were also exempt from the deposit. Drinks sold in one-way carton packaging (brick packs and gable-top cartons) were exempt, since these packaging are evaluated as ecologically advantageous and therefore equal to refillable packaging.

Taken into account some of the former problems, an amendment of the German Packaging Ordinance entered into force in May 2005 and took effect from May 2006. Hence currently a flat-rate deposit of €0.25 is charged on all one-way drinks packaging subject to the mandatory deposit and containing between 0.1 and 3 litres.

Even if some problems have been solved by the present amendment of the German Packaging Ordinance and the mandatory deposit is accepted by the population, it still is inappropriate. Firstly, the current mandatory deposit contains critical exceptions, especially since wine, spirits, fruit juices, fruit nectars, milk and drinks containing more than 50% milk remain exempt – even if these drinks are sold in non-ecologically advantageous one-way drinks packaging. Secondly, it is doubtful that the mandatory deposit will stabilise the reusable share in the drink sector at all, mainly because of missing incentives on the demand side.

Hence this paper deals with an up-to-date evaluation of the German mandatory deposit as well as additional policy recommendations to enhance the specific environmental policy. The discussion of an alternative environmental policy instrument is urgent since first available data on the performance of the German one-way drinks packaging mandatory deposit supports the appraisal that the objective of stabilising the share of reusable and ecologically advantageous drinks packaging will not be accomplished by the current environmental policy design. Furthermore, lessons to be learned by the German way will be included to avoid costly mistakes within the future implementation of nationwide policy instruments to support ecologically advantageous drinks packaging in other countries. Therefore the example of packaging taxes will be discussed against the background of possibilities for short-term adjustments within the German environmental policy as well as experiences from other European countries.<sup>2</sup>

The remainder of the paper is structured as follows. Main aspects of the one-way drinks packaging mandatory deposit in Germany will be introduced in the second section, concerning its implementation and its performance based on currently available data. As an alternative policy instrument to support ecologically advantageous drinks packaging, a specific design of an environmental tax will be discussed and applied to the case of drinks packaging in section three. The fourth section includes a brief survey of drinks packaging taxes in other European countries. The paper concludes by the introduction of a promising environmental policy design to support ecologically advantageous drinks packaging in section five.

## **2 The German mandatory deposit for one-way drinks packaging**

### **2.1 Legal requirements and implementation**

The main waste management objective within the German Packaging Ordinance is to avoid or reduce the environmental impacts of waste arising from packaging. In the case of drinks packaging the aim is to support reusable drinks packaging. If the national market share of refillable drinks packaging fell below 72%, a mandatory deposit should be imposed on non-refillable drinks packaging of any material in the beverage ranges with a market share below the 1991 level.

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<sup>2</sup> The environmental policy instrument of packaging licences will not be considered in this paper since there is no possibility for an implementation in the foreseeable future within the German environmental policy (Groth, 2007).

Exempt from the mandatory deposit are the following ecologically advantageous one-way drinks packaging:

- i. carton packaging (brick packs, gable-top cartons),
- ii. packaging in the form of polyethylene bags and
- iii. stand-up bags.

This classification is based on a study by the German Federal Environmental Agency (*Umweltbundesamt*) on the life cycle analysis of drinks packaging. The life cycle analysis shows that these packagings have less detrimental impact on the environment than other one-way drinks packaging.<sup>3</sup>

The difficulty within this classification is that ecologically advantageous one-way drinks packaging are explicitly mentioned, but no general definition is given how to define an ecologically advantageous one-way drinks packaging. Thus the inclusion of a new beverage packaging necessitates a renewed amending of the ordinance (Groth and Serger, 2004).

When the market share of refillable drinks packaging did fall, a mandatory deposit was imposed from January 2003 on non-refillable drinks packaging for water, beer, drinks containing beer and carbonated soft drinks. Hence distributors (including fillers) placing beverages on the market in non-refillable packaging – except for those types of non-refillable packaging classified as ecologically favourable – were required to charge their customers a deposit of €0.25 per pack. The deposit is to be charged by every other distributor at all stages – including the sale to the final consumer – and is to be refunded on return of the packaging. When selling from vending machines, the distributor has to ensure the return and refund of the deposit by suitable means within a reasonable distance from the vending machine. The returned packaging has to be sent for recycling. The ordinance did not require the operational rules for the deposit system to be established by regulation and the government gave manufacturers as well as retailers the possibility to introduce a nation-wide clearing system until October 2003. As a result of political disagreements and legal uncertainty this deadline was not met and a series of independent arrangements resulted. So-called individual or island solutions

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<sup>3</sup> The life cycle analysis looks at the entire cycle of drinks packaging, from production to transport and disposal, and its environmental performance. Further information on this specific study is available at <http://www.umweltbundesamt.de>.

*(Insellösungen)* operated mainly by discount chains accounted for the majority of the market. Using individual solutions, the retailers only needed to take back the special containers they sold. This was possible since the German Packaging Ordinance limited the take-back obligation of retailers to empty drinks packaging of the same type, shape and size and for the same products as those sold by the retailer (Groth and Serger, 2004). By specifying bottles of a particular shape, retailers operating individual solutions were able to avoid taking back competitors' products and thus did not need to participate in expensive clearing systems. This was not possible with cans having a generic shape, and in consequence these retailers often stopped selling cans (Perchard and Bevington, 2007). Thus individual solutions placed cans at a strong competitive disadvantage against PET.

An amendment to the ordinance – entered into force in May 2005 – finally removed the legal basis for individual solutions. Since the amendment took effect from May 2006, retailers have been required to take back empty drinks packaging of the same packaging material type as sold by the retailer. Thus retailers now have to take back all packages they supply, regardless of brand or size.<sup>4</sup> Only small stores (less than 200 m<sup>2</sup> sales area) are still permitted to accept no more than packages of the brands they sell.

The amending also extended the scope of the mandatory deposit obligations. In addition to drinks packaging that are already subject to the mandatory deposit from May 2006 it also applies to other one-way drinks packaging, not ecologically advantageous. Therefore the mandatory deposit incorporates the following beverages:

- i. beer (including alcohol-free beer) and mixed drinks containing beer,
- ii. mineral waters, spring waters, table waters and remedial waters,
- iii. carbonated and non-carbonated soft drinks (specifically lemonades, cola drinks, fizzy drinks, bitter drinks and ice-tea),
- iv. fruit juices, fruit nectars, vegetable juices, vegetable nectars,
- v. drinks with a minimum of 50% milk or other milk-derived products,
- vi. dietetic drinks with the exception of those used for intensive muscle-building (primarily for athletes),

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<sup>4</sup> For that purpose a clearing arrangement between retailers and fillers was established to handle imbalances between the deposits received and paid.

- vii. mixed alcoholic drinks with an alcohol content less than 15% or wine-based drinks with a wine content less than 50%.

Wine, spirits, drinks containing more than 50% milk or milk-based products, energy drinks and sport drinks remain exempted from the mandatory deposit. Hence it needs to be criticised that still not only the material of the packaging is relevant but also the kind of filled beverage. This leads to the situation that, for example, water filled in a non-ecologically advantageous one-way bottle is charged with a deposit and wine or spirits filled in a non-ecologically advantageous one-way bottle are exempt from the mandatory deposit.

After its amending the German Packaging Ordinance now aims to increase the share of beverages filled in reusable drinks packaging and ecologically advantageous one-way drinks packaging up to at least 80% until January 2010. However, it remains critically that the ordinance does not contain a regulation how to react if this objective will not be achieved by the current mandatory deposit.<sup>5</sup>

## **2.2 Evaluation**

Regarding the German mandatory deposit for non-ecologically advantageous one-way drinks packaging, two main objectives are to be mentioned. Firstly, the promotion of ecologically advantageous drinks packaging. In this case the use of non-ecologically advantageous drinks packaging should become unattractive by incentives to carry out the substitution on the demand side. Secondly, the objectives of a high rate of return, an ingrade waste collection and the avoidance of littering (the environmental pollution by thrown away drinks packaging) by refunding the deposit to the former buyer or other enabled consumers.

To evaluate the so far performance of the mandatory deposit, two main aspects need to be taken into account. On the one hand, the implementation was characterised by consumer unfriendly individual solutions which most probably resulted in distortions in the steering effect compared to the current nationwide return system. On the other hand, the specific data base does suffer from an over two year time lag between the

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<sup>5</sup> The Federal Government is currently planning to amend the German Packaging Ordinance again. The main objective of the amendment is to adjust requirements for dual systems and packaging waste in private households and similar private end-users. It contains no relevant proposals to amend the deposit provisions and will therefore not be considered.

investigation period and its publication by the Federal Government. Thus a final evaluation of the practical steering effects will not be able until the end of 2009 or the beginning of 2010. Nonetheless, the available data on the market share of reusable drinks packaging – shown in table 1 – as well as additional considerations leave little doubt to the fact that an isolated deposit like in Germany will not lead to a sustainable stabilisation of ecologically advantageous reusable drinks packaging.

Table 1 about here.

The data shows a continuous decrease in the market share of reusable drinks packaging from 1993 to 2002. The specific market share fell below the benchmark of 72% in 1997 for the first time. In 2003 a recovery of the proportion of reusable drinks packaging up to 63.60% could be recognised in the course of the introduction of the mandatory deposit for non-ecologically advantageous drinks packaging, whereby in particular the beverage ranges mineral water, carbonated soft drinks and beer are to be emphasised. Towards these first positive effects, a renewed decrease of the market share of reusable drinks packaging took place within all beverage ranges and for the whole proportion from 63.60% to 60.26% in 2004 as well as even down to 56.00% in 2005.

Beyond the decrease of reusable drinks packaging in 2004 and 2005 – despite the still customer unfriendly one-way drinks packaging mandatory deposit by the implementation of individual solutions at that time – further aspects will be considered, regarding future steering effects.

By the implementation of the well accepted nationwide return system in May 2006 in particular the following additional arguments are to be stated against a sustainable stabilisation or even increase of the market share of beverages filled in reusable drinks packaging by adjustments on the demand side:

- i. the handling of non-ecologically advantageous one-way drinks packaging – from its purchase to its return and refunding – is no longer less convenient for the final consumer compared to the handling of reusable drinks packaging,
- ii. one-way drinks packaging are usually a lot easier and more simple to transport than reusable drinks packaging as well as

- iii. the consumer every time receives a new one-way drinks packaging without the unavoidable signs of use of a reusable drinks packaging.

The handling of one-way drinks packaging is also more convenient on the supply side, since the used drinks packaging do not need to be costly stored, returned, cleaned and refilled.

Unlike the above argumentation we can expect positive effects arising from the mandatory deposit, regarding the second ecological objective of a high rate of return of one-way drinks packaging and therefore an ingrade waste collection as well as the avoidance of littering. An evaluation of the return rate is currently not possible due to missing published data.

### **3 Drinks packaging tax – an alternative environmental policy instrument**

#### **3.1 Basic considerations**

Environmental taxes are payments by economic agents referring to the polluter-pays-principle (OECD, 1975) and they are part of free market instruments of environmental policy (Pearce and Turner, 1992; Turner et al., 1998). To act as a theoretical first-best solution, the tax needs to be related directly to the environmental damage done by the production and consumption or to the costs of restoration of the environment (Pigou, 1912; Pigou, 1929).

Taxes and charges are different instruments, though differentiating between them is still somewhat blurred by the fact that different countries use the two terms to describe otherwise similar instruments as well as inter-changeably. The term ‘taxes’ usually means that the revenues go to the general budget and ‘charges’ means that the revenues are earmarked for a particular use, like for a specific service provision or for other activities when the revenue is not intended to reach the general budget. In this paper only the term taxes will be used and a specific tax for products will be examined, whereby the aim of the tax is to reduce the use of non-ecologically advantageous one-way drinks packaging. Since the tax refers to drinks packaging the term of packaging taxes will be used.

While implementing a specific tax on non-ecologically advantageous drinks packaging two main aspects need to be considered, as follows: the base for the tax as well as the tax amount must be decided on.

Therefore it needs to be differentiated between the options of a value tax and a quantity tax. A value-tax can be arranged similarly to the value added tax and the amount of the tax is directly connected to the price per pack. A quantity tax, however, refers to the filling volume and can be specified according to volume classes. Thereby it is to be expected that a declining rise of the tax rate leads to a desirable tendency for large packaging.

Furthermore, it is in principle conceivable to differentiate the tax amount by rates of duty, according to the ecological side effect of the used packaging material, whereby particularly harmful material could be rated accordingly highly. This is a very interesting idea from a theoretically point of view. But in practise we are in most cases confronted with packaging which consists of several materials and therefore it becomes clear that this kind of tax differentiation will most probably lead to demarcation difficulties and an unclear tax arrangement. Moreover, the ecological side effects of different packaging materials are in the specific German case to some extent taken into account by the differentiation of non-ecologically advantageous and ecologically advantageous drinks packaging, based on an environmental performance evaluation.

### **3.2 Intended effectiveness and steering effects**

The effect hypothesis of the specific packaging tax consists in the relative increase in prices for non-ecologically advantageous drinks packaging, which leads to incentives for costumers to buy drinks filled in ecologically advantageous drinks packaging. Consequently, a tax comprises an individual freedom of action and generally could be rated to be of a high economic efficiency.

The tax collection therefore is possible on different stages within the distribution chain, but it needs to be considered that an early tax collection could lead to a low or missing steering effect due to the fact that the tax will not be included in the market price and thereby could not evolve its incentives on the demand site.

The remainder of this paper will focus on a close to reality and most promising tax collection on the final stage of the distribution chain: the stage of the retailer or rather the stage of the wholesaler. Thus one effect hypothesis consists in the retailers' or

wholesalers' decision to take ecologically unfavourable drinks packaging completely or partly out of their range of products. The desired steering effect adjusts in the long run by an appropriate consumers' demand reaction.

Besides the consumer reaction described by Sprenger et al. (1997) for the beverage segment beer, we can also take into account the immediate practical consumer reaction after the implementation of the mandatory deposit in 2003 as a proof of steering effects of a packaging tax in Germany. The greatly consumer unfriendly implementation at that time – especially due to the so-called individual solution and the voucher- and dealer-bound refunding of the deposit – can therefore be interpreted as a successful 'quasi-tax' or 'felt price increase' for non-ecologically advantageous one-way drinks packaging.

In contrast, a packaging tax does not enfold additional incentives for consumers to return one-way drinks packaging after consumption. Hence the objectives of a high recycling ratio and low littering will not be supported.

A fundamental problem of environmental taxes is their low political enforceability, since they are often felt as unfair especially by the direct increase of the final consumer prices. Particularly in times of a high tax load and/or a strained overall economic situation the necessity for the implementation of a new tax is hard to communicate to the public. However, a higher political enforceability and public acceptance is to be expected by a tax design comprising the use of the arising tax amount tied to ecological concerns.

## **4 Drinks packaging taxes in Europe**

### **4.1 The packaging tax in Belgium**

In Belgium, drinks packaging were originally exempt from environmental taxes as long as strict recycling targets were met by the industry through its Green Dot scheme. This ended in 2002 and the non-refillable drinks packaging tax was implemented in April 2004 to promote the use of refillable drinks packaging. The packaging tax is levied on drinks packaging and needs to be paid at the time drinks packed in individual containers are released for consumption in the matter of excise duty or at the time the drinks are brought on the market in Belgium (Federal Public Service Finance, 2005).

The packaging tax is applicable to aluminium and steel drinks packaging as well as other one-way drinks packaging material such as beverage cartons or PET and glass bottles. The following beverage ranges are considered as drinks: water, lemonade, beer,

wine, vermouth and similar beverages, other fermented beverages, ethyl alcohol, distilled beverages, unfermented fruit juices and vegetable juices. Taxes on one-way drinks packaging range from €0.25 (beer) to €0.12 (soft drinks) and to €0.09 (mineral waters) per litre. At the same time, the value-added tax and excise duties decreased for the same drinks sold in refillable containers. The government claims that the scheme is designed to be revenue-neutral in terms of overall tax income (SPF Economie, 2006).

Refillable bottles are still exempt from the tax as long as they are re-used more than seven times. This collection and re-use is governed by a deposit scheme that places a minimum of €0.16 deposit on containers larger than 0.5 litres and €0.08 for those under 0.5 litres. Milk is entirely exempt from the tax.

European beverage and can manufacturers argue that the scheme has been poorly designed and would indirectly discriminate foreign producers. They also maintain that environmental arguments supporting preference for refillable containers have not been scientifically proven. Furthermore, there are ongoing legislative problems with the tax. In December 2005, the Belgian Court of Arbitration annulled part of the tax on disposable drinks containers and demanded amendments by June 2006. In its judgement, the court annulled for legal reasons the possibility to exempt one-way drinks packaging with a minimum recycled content from the tax. It also questioned the ineligibility of other one-way drinks packaging for exemption even where high recycling rates are achieved (ENDS, 2005). In December 2005, the Belgian Court of Arbitration confirmed that under European law, member states can favour refillable over one-way drinks packaging and that the European Commission has not objected to a fiscal differentiation (European Bulletin, 2006). An evaluation of the tax performance is currently not possible due to missing data.

#### **4.2 The packaging tax in Denmark**

Packaging taxes are levied on a number of products in Denmark. Since 1978 a volume-based tax on packaging for most drinks packaging has been in effect (Danish Environmental Protection Agency, 2004). In 1998, the Danish Parliament agreed to extend and revise the existing volume-based tax, which only applied to bottles and jars. This volume-based tax now covers containers of liquid substances, such as alcoholic liquors, wine, beers, soft drinks, water and mineral waters, juice, vinegar oil, sweet oil,

and methylated spirits (Danish Environmental Protection Agency, 1999a; European Environmental Agency, 2005).

The tax is levied on new packaging and the aim of the tax is to encourage the use of refillable packaging and more importantly to reduce the amounts of packaging material used. The tax also aims to reduce the use of resources for production of packaging material (Danish Environmental Protection Agency, 1999a; Danish Environmental Protection Agency, 2001).

Altogether there are two systems. The volume-based tax applies to retail containers for beer, carbonated soft drinks as well as wine, and the weight-based tax applies for others, not considered in this paper (Danish Environmental Protection Agency, 1999a).

To take into account the character of the packaging material an index of environmental impact was used that reflects CO<sub>2</sub> emissions, primary energy use, fossil resource use, and waste. It was put in force with glass set as the benchmark. The tax rates are adjusted according to the index, with the objective of achieving fiscal equality of materials. Different rates are applied to one-way and reusable packaging, with the tax base being the weight for the former and the volume for the latter (European Environmental Agency, 2005).

The tax is paid by businesses that bottle, fill up or pack goods within the commodity groups that are covered by the tax (the applications). Enterprises that import goods that were packed abroad and enterprises that act as intermediaries and/or trade in unused packaging materials are also subject to the tax.

18 commodity groups are covered by the tax and tax rates are not differentiated according to applications, but with regard to the materials (Danish Environmental Protection Agency, 1999b). Non-carbonated soft drinks, vinegar and edible oils also began to be covered under the weight-based tax as of January 1999 (Danish Environmental Protection Agency, 2004). The tax was adjusted in April 2001 to reflect the environmental impact from packaging materials used (Danish Environmental Protection Agency, 2004). Weight based tax rates remained stable from 2001 to 2005 (Speck et al., 2006). The volume-based tax on beer and carbonated beverage containers is lowered since February 2004 and has been differentiated to distinguish between containers for wine and spirits and those for beer and carbonated drinks, with lower

rates applying to the latter than previously. For wine and spirits, the volume-based tax has remained the same since 1999.

The per pack drinks packaging tax ranges – according to size – between DEK 0.05 to DEK 3.20 (European Environmental Agency, 2005; Speck et al., 2006). This corresponds to a range of €0.01 to €0.43 per pack.

In 2003, 99% of refillable and 80% of one-way drinks packaging were returned. Targets were 98% and 95%, respectively. From 1998 onwards the general tax revenue decreased and the tax was therefore successful in reducing the amount of packaging used (Speck et al., 2006).

### **4.3 The packaging tax in Finland**

The Finnish packaging tax was introduced in 1994 and applies to drinks packaging for soft and alcoholic drinks. The tax aims at preventing packaging waste through encouraging deposit based re-use and recycling systems. The drinks packaging tax is levied on the volume of the packaged product, with tax rates applied per litre. There are lower bands of tax if the taxpayer can show that the container is part of a Ministry of Environment approved reuse or recycling system.

In 1996, the European Aluminium Association and Beverage Can Makers Europe complained to the European Commission that the tax discriminates in favour of refillable and against recyclable drinks packaging because it still applies even if high return rates are achieved. The European Commission's view was that the tax was at a low level (€0.17 per litre) and therefore would not be prepared to challenge it if the aim was environmental protection (ECOTEC, 2001). The tax has meanwhile been replaced by a new tax on certain drinks packaging, which came into force in 2005 (Speck et al., 2006). If the producer or importer of alcoholic beverages and soft drinks organise a return system of the packaging – for a small deposit fee – such that the packaging can be refilled, the tax need not to be paid. If the packaging can be returned against a deposit and is then used as a raw material, the tax is €0.16 per litre. The industry is responsible for operating the deposit bottle and can system. In 1998, about 90% of the 1.2 billion glass bottles used in Finland were refillable (Hiltunen, 2004).

From January 2005, a tax of €0.51 per litre is raised for beverage packaging that is not part of a functional government approved return system. For beverage packaging that is

recycled and enters a functional return system, approved by the government, the tax is €0.08 per litre until 2007 (Speck et al., 2006).

Refillable drinks packaging, which is part of a deposit refund scheme, continues not to be subject to the tax (Speck et al., 2006). This system involves a €0.17 deposit being paid by consumers. All deposit cans in Finland have a special barcode that denotes when a deposit has to be paid and when one can be refunded. This helps to ensure that non-participating cans and those personally imported do not receive the deposit fee back. However, the system is also obliged to collect non-deposit cans for recycling.

According to Hiltunen (2004) Finland's packaging tax has resulted in a nearly complete recycling rate of packaging for soft drinks. Data shows that in the market as a whole, there are a number of factors at work in addition to the tax. The data demonstrates that there was almost a doubling in the number of refillable PET bottles used, and a decline in refillable glass bottles. An increase in the popularity of cans occurred, with the number of cans used increasing by 25% over the period 1995 to 1999. The majority of the drinks are filled in reusable packaging, refillable PET and glass; from this follows a market share of 73% by volume and 83% by the number of packaging filled. There was a trend towards larger packaging size as the volume of drinks produced increased by 14% and the number of drinks packages used declined by 2% (ECOTEC, 2001).

Since the tax is volume-based there is no incentive to minimise the amount of material used (e.g. thick walled containers pay the same tax as thin walled containers). The tax does also not distinguish between different materials and therefore it does not provide an incentive to use packaging material with lower environmental impacts.

#### **4.4 The packaging tax in Sweden**

The Swedish drinks packaging tax<sup>6</sup> was introduced in 1973. Milk containers were excluded from the tax, but most soft and alcoholic drinks were covered. The tax was set at a flat-rate, irrespective of the size of the container. Following its abolition in 1984, a revised drinks packaging tax was introduced a few months later to make up for the loss of tax revenue.

The packaging tax covered all drinks packaging in the range of 0.2 to 3 litres alongside existing deposit schemes covering glass bottles used for beer, soft drinks and bottled

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<sup>6</sup> This introduction and brief evaluation of the packaging tax in Sweden is solely based on ECOTEC (2001, section 12.2).

waters. Drinks packaging made mainly from paper and card were exempt from the tax. Differential rates were introduced for deposit and non-deposit drinks packaging. These rates were SEK 0.08 for those in a deposit system and SEK 0.1 to SEK 0.25 for non-deposit containers depending on volume. The tax on packaging was abolished in 1993. This coincided with the introduction of a new policy of producer responsibility for a wider range of packaging and accompanied by high targets for recycling.

The tax was primarily a revenue raising instrument, though it had secondary aims of reducing litter and waste volumes. The tax was also intended to help support the use of reusable containers. As the tax was levied only once on new containers, the actual charge per reusable container depended on the number of times that a container was refilled. In this case the average life of a 0.33 litres deposit beer bottle is 40 trips, so the tax rate per fill was a lot lower than for a one-way container.

In Sweden, there is a long-standing deposit system for glass bottles (e.g. beer, soft drinks and wine), using a number of standardised bottles. The reuse scheme for glass bottles is based on a voluntary agreement between various brewers and drinks companies; dating back to 1985 in case of 0.33 litres beer bottles. Therefore it is not a requirement of Government. In 1984 the deposit system was extended by mandate to cover aluminium cans. PET bottles were included in a mandatory deposit scheme in 1991. Reusable packaging has been steadily losing market share, with one-way drinks packaging increasing in popularity. In 1979, 46% of beer was sold in refillable glass bottles. This subsequently dropped to 31% in 1997. The development of refillable PET increased the total share of reuse bottles to 60% of the market for soft drinks and 80% of the market for mineral water.

The deposit system in place for refillable wine and spirit bottles was abandoned in 1998. Market share of the refill system had fallen from 80% in 1992 to 35% in 1996. Several factors have been attributed to this decline:

- i. the abolition of the monopoly of the state alcohol company on importing alcohol in 1995,
- ii. the change in the taxation of wine from being based on the price of the wine to the volume of alcohol in the wine, which reduced the price differential between imported wine and domestically packaged wine,
- iii. consumers were seen to prefer new and scratch-free bottles and

- iv. the abolition of the tax coincided with the introduction of new producer responsibility packaging regulations.

The mandatory deposit systems for one way PET and metal drinks packaging have been successful at achieving high return rates up to over 80% for PET bottles and over 90% for cans.

Data relating to the effect of the drinks packaging tax after its introduction in 1973 has not been found. Since its abolition, the tax was replaced by another set of regulations, which makes identification of cause and effect difficult. It is therefore impossible to reach any significant conclusion concerning the impact of the tax. Furthermore, the relationship to the various deposit refund systems makes assessing the impact of the tax difficult as both schemes work together.

## **5 Conclusion and environmental policy recommendation**

Taking into account the above argumentation as well as current data, it remains indisputable that – now already eleven years after the market share of refillable drinks packaging fell below the benchmark of 72% for the first time – the German mandatory deposit will not meet its most important objective and the promotion of ecologically advantageous drinks packaging will not be achieved mainly because of missing incentives on the demand side. On the other hand, the deposit will most probably fulfil the objective of a high rate of return of one-way drinks packaging. Therefore an in-grade waste collection as well as the avoidance of littering will be accomplished. To sum up, the German mandatory deposit proved not to be the most promising practical solution to support ecological advantageous drinks packaging and the specific environmental policy therefore still needs to be adjusted.

As an alternative or additional environmental policy design, the use of packaging taxes for non-ecologically advantageous drinks packaging seems to be a promising instrument; especially due to strong incentives on the demand side as well as its additional role of raising awareness and offering a ‘moral signal’.

Of the four examined European drinks packaging taxes briefly considered in this paper as possible role models and sources of information, three are still in place.

In Belgium, drinks packaging were initially exempt from environmental taxes as long as strict recycling targets were met. In 2004 a non-refillable drinks packaging tax was implemented to promote the use of refillable drinks packaging. An evaluation of the tax performance is currently not possible due to a lack of data.

In Denmark, a widely defined tax came into force in 1999. The tax rates are based on weight and, in the case of drinking containers, on volume. From 1998 onwards the general tax revenue decreased and the tax was therefore successful in reducing the amount of packaging used.

In the Finnish case, the tax was introduced in 1994 to prevent the production of packaging waste. It is a volume-based tax, with tax rates per litre. Tax rates are lower for containers that are part of specific recycling systems. Since the introduction of the tax, its revenues fell due to the link of the tax rates with a deposit system. The majority of drinks produced are filled in reusable packaging.

The Swedish tax was abolished in 1993. It was mainly used as a revenue raising instrument with the secondary aim of reducing waste volumes. The impact of the tax is difficult to estimate because after its abolition various deposit refund systems were introduced. This change in course was due to concerns about the compatibility of the tax with the law in the European Union. During its existence, the tax was also linked to a deposit system, with high recycling rates for deposit as well as non-deposit drinks packaging.

Thus the complementary instruments are important elements of the overall environmental strategy concerning packaging waste. Before the tax was abolished in the Swedish case, it was complemented by a deposit system which has been extended. In Finland, the tax is complemented by several recycling systems and in Denmark deposit systems for drinking containers have been in place since 1981.

The question of establishing an appropriate tax in Germany can be answered only with difficulty in the detail, particularly since the available data provides little information. Generally the tax should contain strong incentives to lead to the intended steering effects but must not be prohibitive.

Based on experiences within other European countries and a German study by Sprenger et al. (1997) a flat-rate tax of approximately €0.20 per pack of non-ecologically advantageous one-way drinks packaging seems to be appropriate.

Against the background of achieving a market share of 80% of ecologically advantageous drinks packaging in Germany until January 2010, the following policy recommendations for action emerge.

A binding procedure needs to be implemented within the German Packaging Ordinance if the main ecological objective will not be fulfilled until the evaluation in 2010. A promising solution will be a combination of the existing mandatory deposit and an additional packaging tax of €0.20 per package. Therefore the – in the meantime well accepted and still legally covered – mandatory deposit will persist and enfold its incentives to reduce littering and keep up a high return rate of used drinks packaging. On the other hand, the packaging tax will enfold its incentives for a substitution of non-ecologically advantageous drinks packaging with ecologically advantageous drinks packaging.

If the substitution will only partly be made by the consumers, the question arises how the tax amount should be used. Since an amendment of the packaging ordinance will not be able until 2010, data by the ‘German Company for Packaging Market Research’ (*Gesellschaft für Verpackungsmarktforschung*) will be taken into account, concerning the development of the number of non-ecologically advantageous drinks packaging to be expected in Germany in 2009 (*Gesellschaft für Verpackungsmarktforschung*, 2007). The study expects around 15.5 billion drinks packs. By the use of a drinks packaging tax of €0.20 per pack and an assumed immediate steering effect of, for example, 50%, this would result in a tax revenue of around 1.55 billion euros. Due to the fact that the actual steering effects need to be rated as insecure, this tax amount should merely act as an exemplary conceivable benchmark.

From an environmental economics point of view, the specific tax revenue should be used closely tied to ecological objectives like the accomplishment of necessary life cycle analyses or the optimisation of drinks packaging collecting systems. In this case also a higher political enforceability and public acceptance of packaging taxes are to be expected, since the tax design comprises a use of the arising tax amount tied to ecological concerns and it is only implemented if the mandatory deposit proved not to be effective.

It is also at this point to take into account the precarious situation that the beverage range of wine remains exempt from the mandatory deposit, despite the strong decrease of the specific market share of reusable drinks packaging down to 19% in 2005.

Therefore wine should at least become subject to the deposit. If this is not feasible to realise due to logistical reasons or other structural peculiarities of the wine market, a packaging tax should be implemented as soon as possible.

For a final view on future environmental policy action within other countries we can learn several aspects based on this study. From an ecological perspective, undoubtedly a combination of a mandatory deposit and a tax for non-ecologically advantageous drinks packaging will be the most promising policy design, since the two main objectives of the specific environmental policy will most probably be accomplished. If this combination of policy instruments will not be realised due to political or economical reasons, an isolated packaging tax should be implemented instead of an isolated mandatory deposit; unlike it was done in Germany.

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## Tables

Table 1. Market share of reusable drinks packaging within different beverage ranges in Germany

Beverage range	1991	1993	1995	1997	1999	2001	2002	2003	2004	2005
Mineral water	91.33	90.89	89.03	88.31	84.94	74.03	68.33	72.98	67.60	60.50
Non-carbonated soft drinks (including juice)	34.56	39.57	38.24	36.81	34.75	33.16	29.46	23.96	23.63	17.40
Carbonated soft drinks	73.72	76.67	75.31	77.76	74.90	60.21	53.97	65.42	55.91	54.50
Beer	82.16	82.25	79.07	77.88	74.83	70.84	67.99	89.23	87.52	88.50
Wine	28.63	28.90	30.42	28.10	26.75	25.41	25.29	24.62	20.02	19.00
All beverages (without milk)	71.69	73.55	72.27	71.33	68.68	61.13	56.24	63.60	60.26	56.00

Source: Own, based on BMU 2008.

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