THESIS APPLICATION

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FACULTY OF INTERNATIONAL MANAGEMENT AND BUSINESS
International Economics course
Full-time
International Business Development

The impact of the deposit return system on Hungarian consumer behaviour

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Budapest, 2024

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1 INTRODUCTION

The environment and sustainability have become global challenges of paramount importance in the 21st century. Climate change, depletion of natural resources and pollution are problems that demand urgent solutions worldwide. Economic policy action is needed to reduce these problems, and environmental (green) taxes are one tool that a growing number of countries are using to encourage sustainable economic activities and reduce those that are harmful to the environment.

The introduction of these taxes is part of an international trend and many countries are successfully using them to encourage people and businesses to adopt greener practices. These types of taxes come in different forms, such as carbon taxes, energy taxes or soil pollution charges. They aim to tax activities that lead to an increase in environmental pressures. Among the first environmental taxes was the 'Gas Guzzler Tax', introduced in the United States in the 1970s, which was levied on cars whose consumption exceeded the legal limit (Chen 2022).

We can also look at our nature as a resource, because it is the resources that provide the framework for an economy. The creation and consumption of economic goods and e-goods often has an environmental cost. And depending on the size and scale of the environmental cost, it degrades the quality of life and well-being of the people living there. This phenomenon is referred to in economics as the so-called negative externality. If a factory's fumes pollute the air, it is a negative externality for the people living there because it reduces the quality of life of the people living there by causing poor air quality, but it does not cost the factory any extra money. One of the aims of the environmental tax is to mitigate or, better still, eliminate this phenomenon by making the polluter pay for the negative externality created.

It is important to underline those environmental pressures are not a problem confined to one country or continent, but are global in scale. The problem of public grazing illustrates the conflict between the individual economic interests of countries and the need to make environmentally sound choices. The public grazer problem is a situation where community resources, such as grazing land or fishing grounds, are overused or exploited by people because individual interests often conflict with community interests. As a result, resources can be depleted or degraded if effective regulation or cooperation among community members is not put in place. The introduction of green taxes at global level could be a solution to this problem.

In the case of Hungary, it is particularly interesting to look at environmental taxes, since as a member of the European Union it has committed to achieving carbon neutrality by 2050.This

research primary aim is to look at the Hungarian deposit fee system and to see if it changed which is introduced to the tax system in January of 2024 and it is effective since June 2024. The secondary aim of the research is to see what are the green taxes, how do they work in foreign countries, and compare it to Hungarian green taxes.

My research questions are the following:

1. **Has the deposit system changed the consumer behavior and if so, how?**
2. What are the green taxes in economics? What are they, how do they work and what are their purpose?
3. What European and international examples show the effectiveness of environmental taxes for economic development and environmental protection?"
4. What are other examples of environmental taxes in Hungary?
5. How do the foreign and Hungarian green taxes compare?

To answer my primary research question, I conducted primary research using a questionnaire to gather data. I distributed the questionnaire among friends, relatives, and online groups dedicated to this purpose. The questionnaire was anonymous. I established the following hypothesis.

Null hypothesis (H0): The introduction of a deposit-fee scheme has no impact on customer behavior.

Alternative hypothesis (H1):): The introduction of a deposit-fee scheme has an impact on customer behaviour.

To give context to my research and to answer the remaining research questions I used Hungarian and English language sources to prepare and answer my research questions. I used case studies from different countries, international organizations and government statistics. I also consulted various EU and Hungarian legal sources. In my application, I will first review the theoretical foundations of environmental taxes, and then I am going to investigate the different types of green taxes used in other EU and international countries to give some basis. I am also going to examine the green taxes in the Hungarian taxation besides the deposit fee system so I can make a comparison between the methodologies of Hungarian and foreign green taxes.

2 .What are the green taxes in economics? What are they, how do they work and what are their purpose?

The environmental tax, as formulated by Eurostat, is:

"Environmental taxes are taxes whose tax base is a physical unit that has a proven negative impact on the environment" (Eurostat n.d.)

This definition illustrates the essence of green taxes, but is also broad in scope. Obviously, each country sets the scope and conditions of green taxation according to the natural conditions and economy of its own country.

The majority of green taxes fall into the category of "special purpose taxes", which means that the revenue from the tax can be used for a predetermined purpose. In the case of green taxes, this is usually to finance a designated sustainability objective. Alternatively, the revenue from the tax can be used to reduce other types of taxes.

Taxes work efficiently if the tax base is easy to assess and administer, and the cost of administration does not exceed the tax revenue. This is also true for green taxes, except that in the case of green taxes the tax base is a specific negative externality (or resource). Their purpose is to promote the sustainability of the economy and to encourage energy efficiency. They also reduce, or better still eliminate, the negative externalities from production and consumption. Build the cost of the overall environmental burden into the price of a service or product in the form of a tax. The idea of taxing negative externalities was first put forward by the British economist Arthur Pigou in his 1920 book Welfare Economics, and is therefore often referred to as Pigou's taxes (Kagan 2023).

Another important feature of green taxes is the so-called double dividend effect. On the one hand, green taxes increase tax revenues, which can be used to change the ratio of tax elements within the tax system, and on the other hand, they have an activity-inducing effect, as they encourage companies to adopt more environmentally friendly technologies and practices. If businesses change their activities that are flexible and environmentally damaging, the negative externality will decrease and tax revenues will be lower (because the tax base is smaller). However, if they do not change their activities, the negative externality will not decrease and the tax base will not decrease. And if the tax base does not decrease, there will be more support for sustainable investment. Green taxes therefore have a positive impact on the economy and the environment in both cases. In addition, environmental taxes can be more effective in

incentivizing companies than a legal requirement. For example, if a company is legally required to emit carbon dioxide a year, then the factory will not do more to eliminate polluting activities than just not exceeding this limit. However, in the case where a tax is imposed on carbon emissions, the factory will have an interest in minimizing carbon emissions in order to minimise the tax paid (Williams 2016).

When determining the extent of green taxes, international organisations such as the OECD and Eurostat use two types of indicators to identify and rank countries in terms of green taxation: one indicator shows the share of green taxes in a country's GDP and the other shows the share of green taxes in its tax system compared to other taxes. Ideally, these two ratios should be as high as possible (OECD 2021)

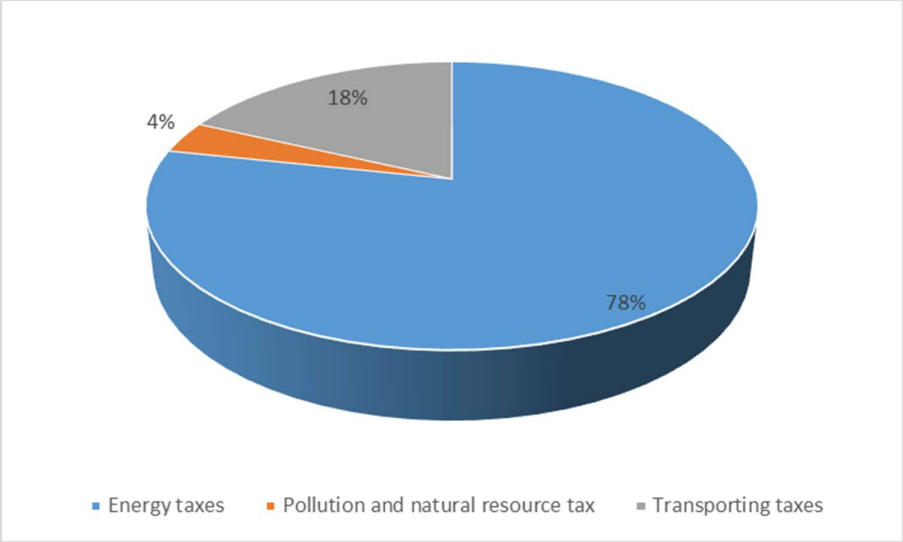

Figure 1 Green taxes by revenue breakdown

Source: Based on Eurostat 2023c data own editing

The OECD and Eurostat classify green taxes into four groups: energy taxes, resource taxes, transport/transport taxes and pollution taxes. Energy taxes cover so-called energy products, i.e. taxes on natural gas, coal and fuels. The tax is levied on energy trading companies and paid by the end user. Resource taxes are taxes on the use of various natural resources, such as raw materials and water resources. In our country, the land use tax is one of the taxes in this category. Transport/transport taxes include various taxes on motor vehicles. It is important to note that petrol and kerosene used for road and air transport are not included here, but in the category of energy taxes. Pollution taxes are levied on activities that are proven to pollute the environment. These taxes are based on soil, water and air pollution. They include taxes on

greenhouse gas emissions, landfill taxes, and even the so-called noise pollution tax. (KSH 2021b)

Figure 1 illustrates that energy taxes account for the majority of green taxes, almost 80% of total green tax revenues, followed by transport and transportation taxes with 18%, and finally pollution and resource taxes, which together account for a very small share of green tax revenues. Energy, in particular fossil fuels such as petrol and natural gas, is one of the most used energy sources in the EU, accounting for 69.9% of total energy consumption. However, the good news is that fossil fuels are on a downward trend, while renewables are accounting for a larger share of energy production every year (Eurostat 2023a).

The energy tax is not in vain. A Chinese study confirms that the application of green tax policies leads to non-linear effects on clean energy production, the share of clean energy production, fossil energy consumption and the share of fossil energy consumption. The introduction of green tax policy will help China's energy transition and demonstrate the feasibility of the current environmental tax policy in China. The study also provides benchmarks for different countries on how green tax policies should be considered based on national circumstances and energy structure by examining different aspects of green tax intensity (GTI) thresholds. The results show that green tax policies are effective in reducing the share of fossil fuels, but it is important to note that the marginal effect decreases as the green tax intensity increases (Fang et al. 2023)

2.1 International outlook

To understand green taxes more comprehensively, we first need to look at examples and trends in other countries around the world.

Green taxation has been on the rise since its first appearance in 1970 and is now found in all countries of the world in some form.

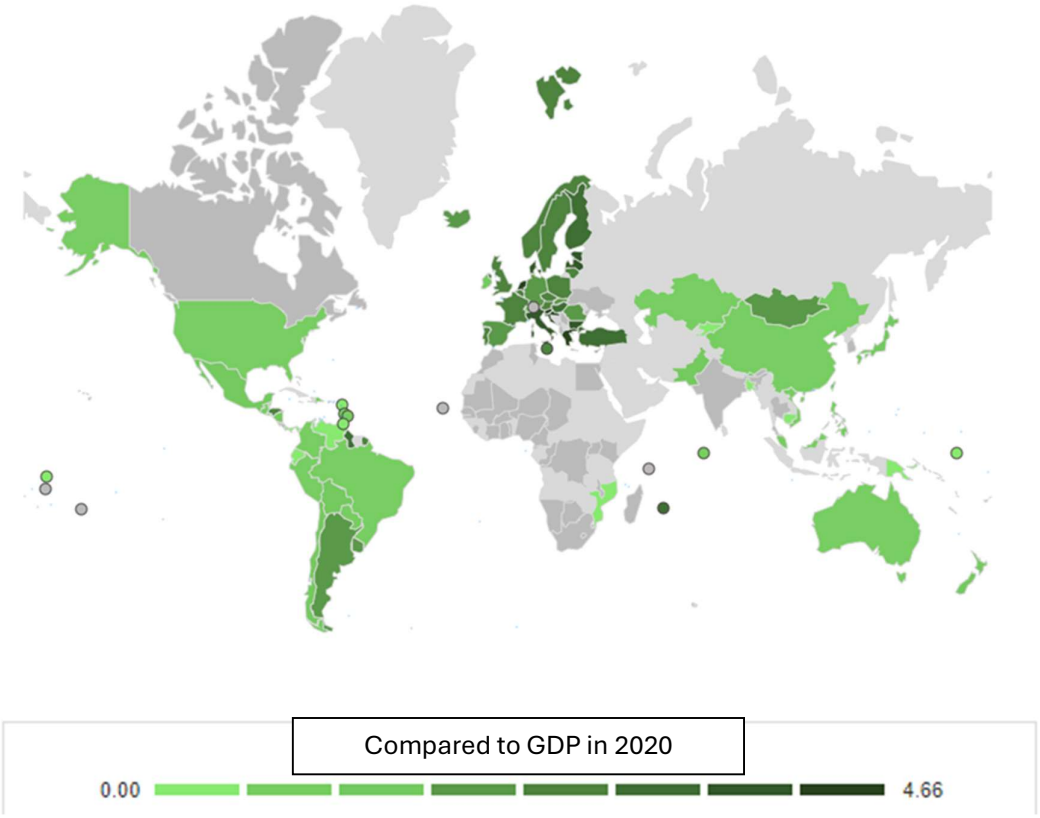

Figure 2 Green taxes as a percentage to GDP

Source: OECD

Figure 2 shows the green tax revenues of different countries as a share of annual GDP (countries in grey have no data and countries in dark grey have no 2020 data).

Although green taxation is widespread in the Americas and Europe, the revenue from it remains low. The global average for 2020 is around 2%, with the rate even lower in the major economic powers. For China, green taxes account for 0.84% of GDP, while for the United States they account for only 0.66% (OECD 2021).

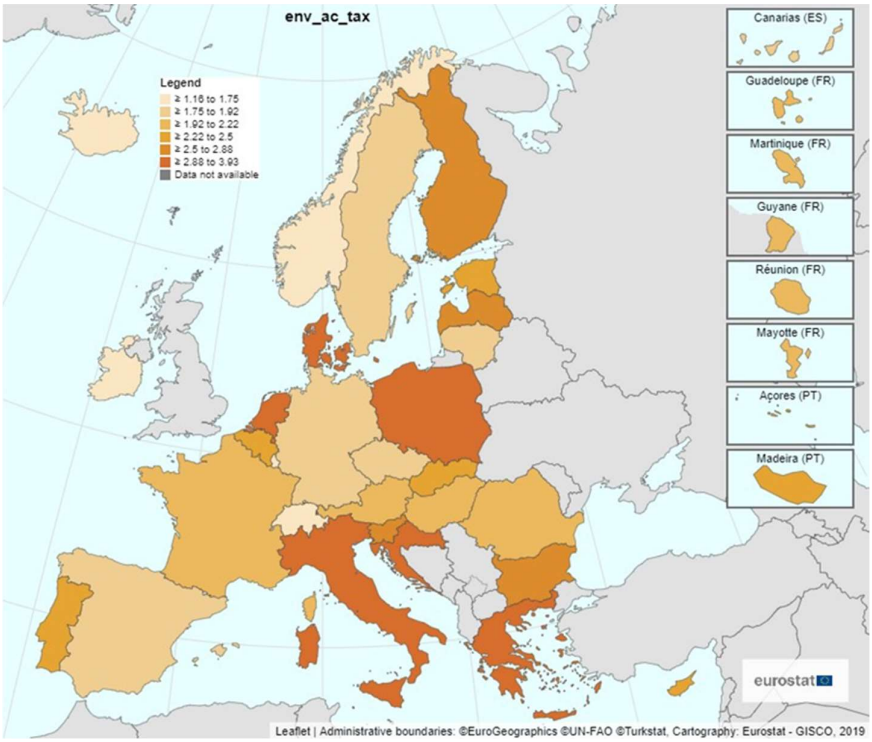

Figure 3 Green taxes compared to GDP in the EU
Source: Eurostat 2023b

The European continent is at the forefront of environmental taxation, and Figure 4 shows that all European Union countries have had environmental taxes in place since the 1990s. Figure 3 shows that developing countries have a higher share of environmental tax revenue than developed countries, but it does not necessarily follow that developing countries are more environmentally conscious. The EU average was 2.23% in 2020. Hungary is slightly below the EU average at 2.16%. In neighboring countries such as Slovakia, the rate was 2.46%, while in the EU's strongest economy, Germany, it was only 1.69%. However, if we look at environmental taxes as a share of total tax revenue, the EU average is 5.42%, while in Hungary green taxes are above the EU average, accounting for 6% of total tax revenue (Eurostat 2023b).

The European Union adopted the European Green Deal in 2020. As part of the agreement, the European Union has set a goal of climate neutrality by 2050. The European Union believes that green taxes can drive economic actors towards sustainability. It wants to create tax reforms in both an EU and a national context. It stresses that well-designed green tax reforms can significantly enhance a country's growth and economic sustainability. According to the European Union, increases in energy taxes (including on petrol and gas oil) would be borne most heavily by low-income households, and it is therefore important that energy tax revenues

are invested in ways that help low-income households to bear the burden (e.g.: improving public transport).

The European Union supports the so-called "Polluter Pays Principle", which requires households and businesses to pay a fee in proportion to the pollution they cause. The Polluter Pays Principle could be implemented mainly in the form of taxes within the European Union. However, the EU has pointed out that if the polluter pays principle is not properly applied, it is not the polluters who pay the extra costs, but the public: (European Commission 2023b) A well-designed tax system can rebalance the proportions within the tax system. A modelling exercise in 2020 suggests that if the United States were to pay a tax of $50 for every tonne of carbon dioxide emitted, this would mean an extra $1.87 trillion in revenue for the budget. If this revenue were used to reduce income taxes, it would have a positive impact on productivity and make production for export more competitive (Pomerleau and Asen 2019).

Furthermore, according to modelling by the European Environment Agency (EEA), an increase in green taxes and a parallel reduction in personal income tax would have an overall positive impact on all social and economic groups, but for some countries, it could hurt the poorest as they would spend a larger share of their salaries on energy. Green tax reform would have a positive impact on innovation and the creation of new technologies while reducing greenhouse gas emissions by 20%. The measures would also create more than one million new jobs and the revenue from green taxes could be used to develop green technologies, further stimulating innovation (EEA 2019).

3 International examples of green taxes

In the following chapter, I will show some examples of green taxes, which have been successfully implemented in the tax systems. First, it is important to look at other deposit fee systems in different countries, to have some basis for comparison. To do that I will look at two existing deposit-fee systems in Europe. I am going to examine, how do they operate, and what was their impact on consumer behaviour. Following this, I will present additional examples of green taxes from other countries, highlighting their diverse applications across various sectors of the economy.

3.1 Deposit-fee system in Finland

The deposit-fee system in Finland is a good example of a working deposit-fee system and it is regarded as one of the best ones in the world, and perhaps one of the oldest ones as well because it is existing since 1950. The largest deposit refund system operator (PALPA) is collecting refillable glass, pet bottles, one-way cans and glass bottles. The price on the deposits of the bottles is set by the government based on the type of container ranging from 0.10 EUR to EUR 0.40 per container. A key element for this system's success is the tight cooperation between the food industry, retail trade and the government. Since 1994, the packaging tax has been in effect, complementing the deposit fee system which is 0.51 EUR per liter, and the manufacturer can get a discount if it is taking part in the deposit-return scheme. Finland's return rate was already high from the outset, but with the introduction of the deposit-fee system, it surged from 59% to 79%, ultimately reaching 95% by 2015 (Ettlinger 2016).

Figure 4 PALPA system

Source: PALPA

3.2 Deposit-fee system in Germany

Germany wanted to reduce the environmental pollution caused by product packaging, so it introduced the German Deposit Return Scheme (DRS) back in 2003. The Deposit Return Scheme is a system set up to collect PET bottles, cans and metal drinks cans from consumers for recycling or reuse. The system is based on the use of a deposit (known in German as a

"pfand"), a monetary deposit that is added to the price of the product and refunded when the empty container is returned to the appropriate take-back locations. The effective operation of the system requires close cooperation between retailers, the food industry and government. Data from recent years show that while the take-back rate for glass is relatively low (as only a small proportion of glass bottles can be taken back for the time being), the take-back rate for PET bottles is very high (Bellis 2020). The take-back price for reusable packaging (glass or plastic bottles) is set by the producer and can range from €0.08 to €0.25. For single-use packaging, the return price is set by the German government and is fixed at €0.25. Before the measure was introduced, 3 billion product packages were released into the environment every year. Since then, the take-back rate of packaging has reached 98% (Ruiz et Cwienk 2021).

The deposit-fee system has also led to high return rates in other countries, for example in Finland the return rate for glass bottles was 98%, while the return rate for PET bottles was 90% in 2022 (PALPA 2023).

Seeing the high redemption rate achieved by a deposit scheme, the European Union has made it mandatory for member states to implement some form of deposit scheme, with 20% of hot and cold drinks by 2030 and 80% by 2040 to be filled in a container that is part of a reuse scheme or to allow consumers to refill their own containers (European Commission 2020).

In my view, the deposit scheme can work effectively because it combines a Pigou tax with a redemption option, which provides an incentive for consumers to dispose of the packaging of the product they buy in an appropriate way.

3.3 Carbon tax in Sweden

In 1991, Sweden restructured its energy tax structure, introducing a carbon tax as a new type of tax and reducing the general energy tax rate. The changes were guided by the Polluters Pay principle. When the carbon tax was introduced, the tax rate was 0.25 kroner/kg, which was gradually increased over the years by the Swedish government to 1.20 kroner/kg in 2015. One of the key successes of the Swedish carbon tax has been its ability to decouple economic growth from emission reductions, which has been observed since 1996. Between 1990 and 2013, GDP grew by 61% while CO2-equivalent emissions were reduced by 23%. The tax has also played a role in increasing the use of biofuels in the transport sector. Following the Swedish example, carbon taxes have already been introduced in Ireland, France and Portugal (Hammar and Åkerfeldt 2015).

3.4 Landfill tax in the UK

The UK has created a landfill tax to ensure that landfilling properly reflects its environmental costs and, secondly, to promote sustainable waste management, where less waste is generated and more value is recovered from existing waste. The tax was first introduced in 1996, with a charge of £7 per tonne for hazardous waste and £2 per tonne for non-organic waste (stone, sand, ceramics, concrete). The measure has been a success, with a 90% reduction in the amount of waste sent to landfill by local authorities since 2000. In 2021, the charge will be £96.70 per tonne for hazardous waste and £3.10 per tonne for non-hazardous waste. Landfill tax revenue will be used to support sustainable waste management technologies and recycling practices (HM Treasury 2021).

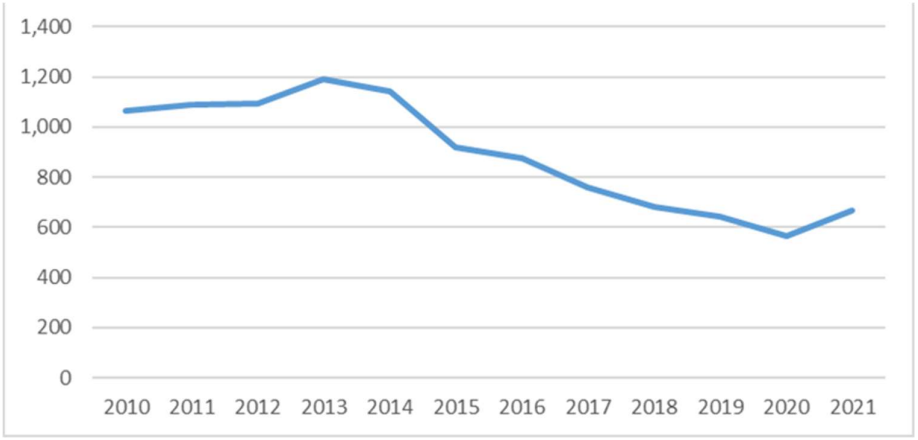

Figure 5 Revenue from the landfill tax (million pounds)

Source: Own editing based on Statista

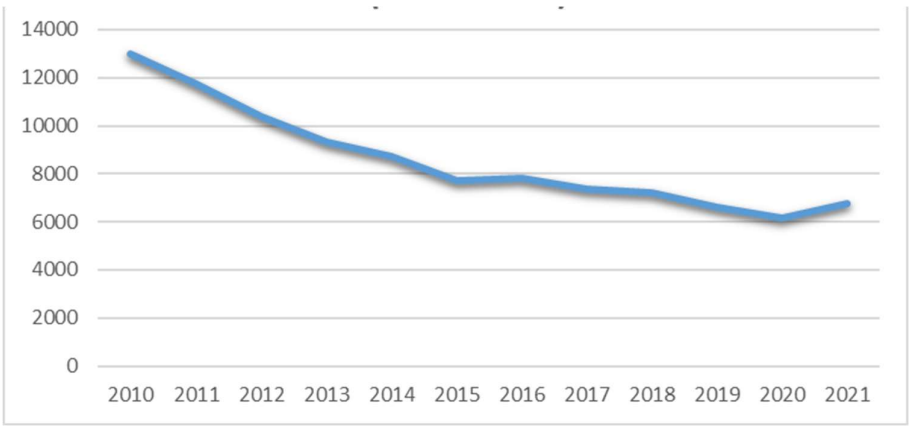

Figure 6 Quantity change in the waste depletion (million tonnes)

Source: Based on UK Statistics source own editing

Figure 5 shows the landfill tax revenue by year, while the sixth figure shows the amount of waste landfilled. The two figures illustrate the double dividend effect of green taxes in practice. As the negative externality that forms the tax base decreases, the revenue from the tax decreases proportionally.

3.5 Ireland's plastic bag tax

Plastic bags have become an increasing problem in Ireland. In 2002, plastic bags accounted for 5% of all litter thrown away, spoiling Ireland's landscape, particularly in rural areas and along the coastline. The Irish government therefore decided to impose a tax on plastic bags, initially set at €0.15 per bag, which was increased to €0.22 per bag in 2007. The tax has been used to reduce the proportion of plastic bags to total litter thrown away from 5% to 0.1% and to reduce the proportion of plastic bags to marine litter from 5% to 0.2%. The proceeds from the plastic bag will go to the Environmental Fund, which supports the development of environmentally friendly technologies. A consequence of the tax imposed has been a change in the purchasing habits of the population, with more people carrying bags to avoid paying the extra tax (Anastasio and Nix, 2016).

The example of Ireland shows that the benefits of green taxes can be doubled by spending the revenue on the development of sustainable technologies.

3.6 Singapore carbon tax

Singapore is the first Southeast Asian country to tax carbon dioxide, specifically to reduce emissions. The carbon tax was introduced in 2019 and costs S$5 per tonne emitted. The carbon tax has a relatively low-price tag, but since carbon accounts for 80% of the country's emissions, coverage is high. Furthermore, Singapore would increase the tax rate in stages over the years, with residential and business consumers having to pay S$25 per tonne in 2024 and S$45 per tonne in 2026. Further increases are expected by 2030, and it is projected that this would increase electricity prices by 8-12% if companies continue to consume fossil fuel-based energy. Singapore, like the European Union, has set a target of carbon neutrality by 2050, a measure that makes clear to businesses and the public its commitment to achieving this goal (Ernst & Young 2022).

3.7 Green tax in aviation

Under the Green Deal, the European Union has committed to achieving carbon neutrality by 2050. This also applies to aviation within the EU, as aviation is a significant contributor to emissions and is estimated to contribute an increasing share in the coming decades. With this in mind, the European Union has prepared a case study in 2021 on the options for taxing aviation fuel. The fuel tax would be levied on passenger flights within the European Economic Area. The tax would not apply to freight flights. The tax would range from €0.17 to €0.50 and could be made dependent on the distance travelled. The tax would be borne by the airline, but would be paid by the passenger and integrated into the ticket price. Ticket tax options would include a 'flat rate', a 'graduated rate' (higher rates for longer distances to better reflect higher environmental impacts) and a 'reverse graduated rate' (higher rates for shorter flights to encourage passengers to use alternative transport options).

The European Union estimates that the tax would on the one hand encourage airlines to use more fuel-efficient aircraft, but that the bulk of the emissions would come from a reduction in demand for air travel (due to higher ticket prices). The European Union estimates that this would not cause a significant change in demand in the short term, given that demand for air travel has fallen since Covid-19 anyway. Looking over decades, however, demand is more subject to elasticity of demand, which would be reduced by the tax (Neiva et al 2021).

The European Union has planned to introduce the aviation tax in 2023, but there is still no agreement among Member States on its methodology, so there is no experience of its practical benefits.

3.8 Summary of foreign green taxes

The following practical examples of environmental taxes may well be found in different economic systems and circumstances with different methodologies, but there are clear features that bring them together. As the examples have shown, in each case there was a specific negative externality on which the tax was imposed, and if the negative externality could not be precisely measured, then the person causing it was taxed. Furthermore, the green tax was not introduced with a high tax rate, but with a low rate, which has been gradually increased over the years. This allowed companies to gradually shift to more sustainable activities. In order for green taxes to achieve the desired activity-preventing effect, there was always an alternative to which companies could switch their harmful practices, and they did so in order to avoid paying extra tax on harmful activities. Another important feature was that the revenue from the green

tax was used for a specific purpose: to develop technologies, to promote sustainable alternatives or to take other measures that would increase overall social welfare. No other type of tax has been reduced in any of the examples, which can be explained by the fact that the tax revenue from green taxes is not yet sufficient to reduce other types of taxes. Another important common feature was that green taxes had a long term, decadal impact, which required that the various parameters directly affected by the tax were properly documented in order to monitor the changes that occurred. It can also be said that the state was transparent in sharing data on the green tax, which made it easy for companies and the public to work together.

Highlighting the key things that were important features for an effective green tax to work:

- a specific negative externality
- the possibility of an alternative
- long-term planning, thinking
- proper use of tax revenue
- cooperation between the state, traders and manufacturers

These were, therefore, the main features of the examples mentioned above, which will provide a basis for examining green taxes in Hungary.

I think it is important to note that the green taxes mentioned above correct for a specific negative externality that applies to each company within the economy. However, it is well known that depending on the activity/industry, some companies have a larger ecological footprint than others. There is not yet a universally accepted methodology for assessing the environmental impact of a company's operations in general. However, the good news is that most large companies already publish an annual sustainability report on their activities. This is supported by research by KPMG (2022), which shows that all of the 250 largest companies in the world by revenue publish some form of sustainability report. And in the European Union, since 2014, all companies with 500 or more employees are required to publish a sustainability report (POEU 2014). The most common methodology is ESG (Environmental, Social and Governance), but there are several other frameworks that measure the sustainability of a company (SASB, GRI). The most promising of the many methodologies is TCFD (Task Force for Climate-related Financial Disclosures), whose methodology provides a detailed account of sustainability risks, not least for small and medium-sized enterprises. The TCFD could form the basis for a statutory formal qualification, which would make it easier for companies to file environmental tax returns.

At the moment, companies that get their ESG (or any other methodology) certificate have no particular benefit from it other than that it is an attractive thing for investors.

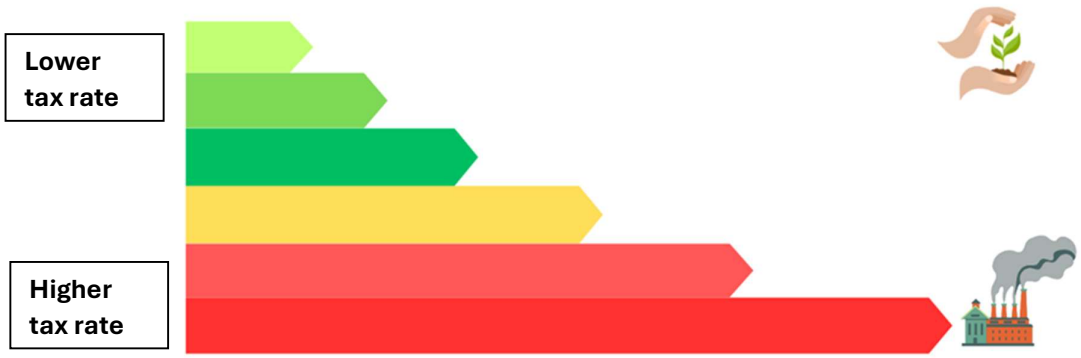

Figure 7 Categorasing the companies based on sustainability

Source: Own editing

In my view, if companies could be categorised according to their environmental impact using a standardised sustainability methodology, this could form the basis for a progressive banded tax system, with different tax rates for different categories. The lowest category would be those companies with the highest environmental impact and would therefore pay the highest tax rate, while companies in the higher categories would pay progressively lower taxes.

Categorising companies according to environmental burden would not only reform taxation, but also lending. We have already seen a similar example at home in the form of home loans. Green housing loans could only be claimed for the renovation or construction of a dwelling that would result in the dwelling reaching a certain energy rating level. The energy certificate was issued to homeowners by specialised engineers (24.hu 2023).

In 2023, the European Union published the European Standard for Sustainability Reporting (ESRS), which will require all companies with 500 or more employees to prepare a sustainability report in accordance with the ESRS rules from 2024 (European Commission 2023a). This measure will primarily benefit stakeholders by giving them a more comprehensive

view of the company, but it is also possible that in the future sustainability reporting will form the basis for a wider lending and tax reform.

4 Green taxes in the Hungarian tax system

4.1 Introduction

Before diving into the Hungarian deposit-fee system, I would like to go through the already existing taxes in the Hungarian tax system in order to see how green taxes have been implemented here so far.

According to the HCSO, environmental taxes accounted for 6.2% of total tax revenue in 2019. In the same year, the EU28 average was 5.9%, so Hungary is slightly above the middle of the pack.

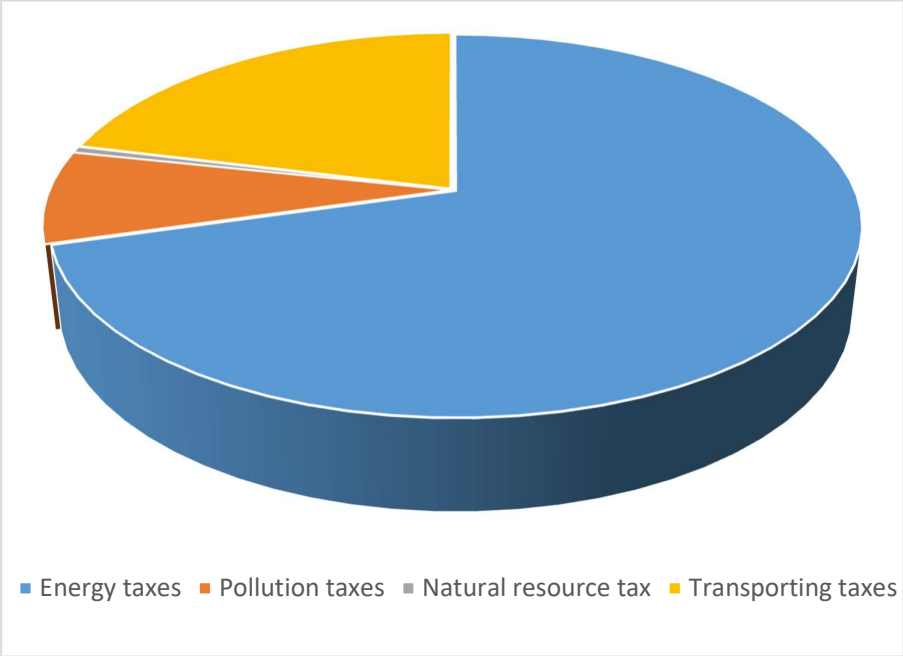

Figure 8 : Breakdown of green taxes in Hungary

Source: Own editing based on KSH 2021

Figure 8 shows the revenue from green taxes in Hungary broken down by group As in the EU, energy taxes accounted for the largest share of environmental taxes in Hungary, although unlike in the EU, Hungary has a higher share of pollution taxes. This is due to soil, air and water pollution charges (KSH 2021b).

In the next chapter, I will go through the green (and related) taxes in force in Hungary, in chronological order, starting with the earliest tax introduced. Then, at the end of the chapter, I

will evaluate and summarise the extent to which green taxes have succeeded in moving the Hungarian economy forward in a more sustainable direction.

4.2 Vehicle tax

The car tax is the first tax in the Hungarian tax system that can be considered a green tax. It is true that the tax was not introduced with environmental objectives in mind. However, its justification is partly based on environmental policy considerations. The tax is levied on the owner of the vehicle or, failing that, on the operator. The tax is a degressive tax, the rate of which decreases with the age of the vehicle. In my opinion, this does not reflect the need to reduce pollution, as older vehicles have a more polluting effect on the environment, which this tax favours. 40% of the revenue from the vehicle tax goes to the municipalities and the other 60% to the central budget.[1]

The motor vehicle tax law also covers motor vehicles not used for private purposes, referred to in the law as company car tax. The company car tax is payable by the owner of the vehicle. The company car tax is paid in full to the central budget. The rate of company car tax has been increased in the 2022 Extra Profits Tax Decree, as set out in the table below.

The company car tax sets the tax rate on the basis of performance and environmental class labelling. Car tax already paid can be deducted from the company car tax rate.

4.3 Mining waste

The tax is payable on all mineral resources (rocks, energy carriers, other mineral resources) extracted in Hungary Although the tax does not tax environmental damage, but rather the taxpayer pays the state monopoly royalty, the justification for the law already includes environmental reasons. The revenue from this tax is paid to the central budget.[2]

4.4 Environmental product charge

The environmental product charge was introduced into the Hungarian tax system in 1996. The tax, which was payable by the person placing the product on the market, was levied on fuel, tyres, refrigeration equipment, packaging and batteries. The primary objective of the tax was to create financial resources for the prevention and reduction of environmental hazards and damage caused by the production, distribution and use of products. The proceeds of the tax

[1] Act LXXXII of 1991 on vehicle taxes
[2] Act XLVIII of 1993 on mining

were allocated to the Central Environmental Fund (CEF), whose primary objective was to promote environmentally friendly products, practices and technologies.[3]

The environmental product charge has been amended several times over the years to include products such as glass and wood-based materials, office paper, screens and monitors. Currently, the 2023 amendment is the relevant one. Most of the tax is levied on plastic-based products (plastic bags, plastic flowers), which are set by law at 1900 Ft/Kg. I could not find data on the annual sales of plastic products that are subject to the tax, so the impact of the environmental tax on consumption cannot be determined.

As of 2011, the revenue from the product charge is earmarked to finance the public waste management intermediary.[4]

From 1 July 2023, the environmental product charge will be complemented by the so-called circular product charge. The circular product charge is based on the EU's requirement for producers to take responsibility for the waste management of their products and to contribute to the costs of waste treatment. The tax is a multi-stage tax, as it is paid by the manufacturer of the product and the first domestic distributor. The tax is payable on subsequent products:

- tyre
- office paper
- advertising support paper
- cooking oil
- textile products
- wooden furniture

However, the tax rate varies by product, with a tax credit for products made from recyclable materials, encouraging the promotion of sustainable packaging. (Key-Soft 2023)

4.5 Energy tax

The most common type of environmental tax worldwide is the energy tax, which is levied on energy carriers. This type of tax was introduced in Hungary from 1 January 2004. Its primary objective is to internalise external environmental damage in energy prices, while its secondary

[3] Act LVI of 1995
on environmental product charges and on environmental product charges for certain products

[4] Act LXXXV of 2011
on the environmental product charge

objective is to encourage economic operators to save energy. The tax is levied on the utility service provider and on the producer in the case of energy production for own use. The energy tax is a single-phase tax, effectively paid by the consumer. The revenue from the tax is paid to the central budget.[5]

The tax is paid on the amount of electricity and natural gas. The energy tax rate currently in force:

- for the sale or use of natural gas HUF 0,3038/kWh
- electricity 310,50 Ft/megawatt-hour

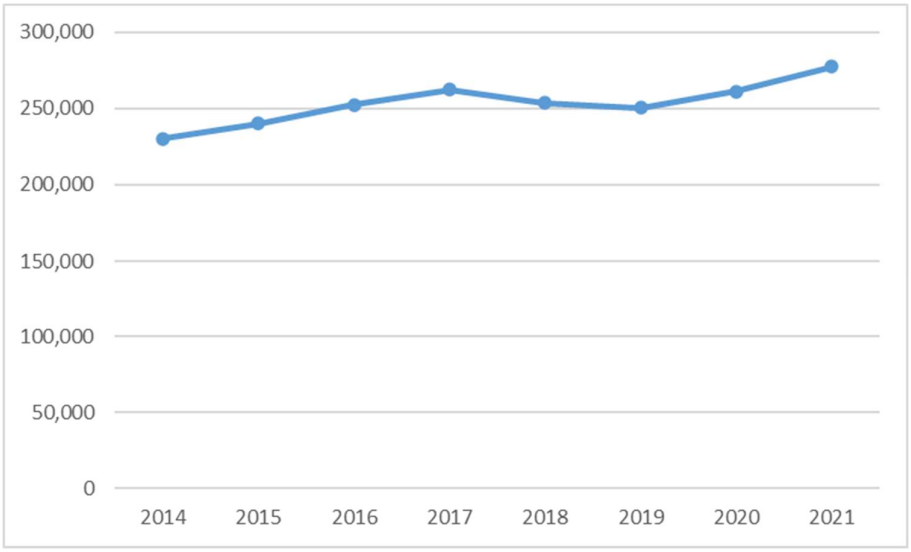

Figure 9 Hungarian natural gas consumption (terajoule)

Source: Based on Hungarian Energy and Public Utility Regulatory Office, own editing

[5] Act LXXXVIII of 2003
on energy taxation

Figure 9 shows the consumption of natural gas in Hungary over the years. All economic agents are included in the consumption. Figure 9 shows that, despite the tax, natural gas consumption shows an increasing trend.

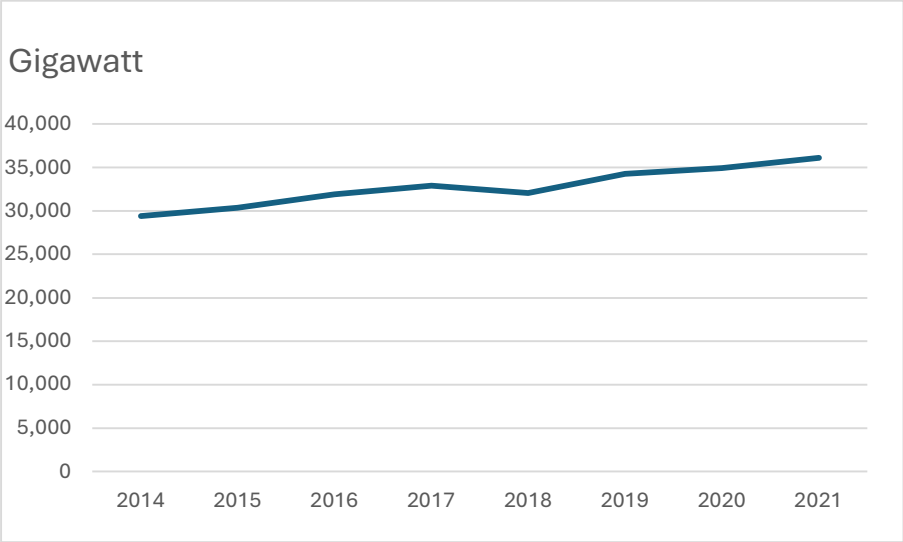

Figure 10 Hungarian electricity consumption

Source: Based on Hungarian Energy and Public Utility Regulatory Office, own editing

The same can be said for electricity consumption, which is visualized in Figure 10. It is worth noting that the tax does not distinguish between the way electricity is generated. Electricity can be generated from non-sustainable energy sources (coal and oil based power plants) and from sustainable energy sources (solar and wind power plants) and the tax rate does not differ. The tax therefore does not encourage energy trading companies to source electricity from renewable energy sources. Although the energy tax was not originally intended to steer companies towards renewable energy sources, but to encourage consumers to save energy. No modelling has yet been done of what the estimated consumption of natural gas and electricity would have been without the tax, so it is not possible to say with certainty what quality of reduction in consumption this tax has had.

4.6 Pollution charges

The pollution charge was introduced in connection with the renewal of environmental legislation. It is paid for the amount of pollutant emitted. It was introduced in the Hungarian tax system in 2004, alongside the energy tax. The tax is part of the group of green taxes known as pollution taxes. The aim of the legislation is to protect nature, reduce pollution and encourage environmentally conscious activity by users. It is levied on any natural or legal person who releases harmful substances into the environment through the (authorised) use of the

environment. The law provides for the possibility of an exemption and a refund of the fee paid, provided that an appropriate investment is made to reduce pollution.

The law basically distinguishes between three types of pollution. A charge is payable for pollutants released into the air, soil and surface water.

The tax base for the air pollution charge is the total amount of pollutants emitted in the year in question. The pollutant can be sulphur dioxide (50 Ft/kg), nitrogen oxides (120 Ft/kg) and non-toxic solids (30 Ft/kg).

The water charge is based on the amount of pollutant discharged in the year in question. The water pollutant can be organic solvent extract, mercury, chromium, nickel, lead and inorganic nitrogen. The unit charge rates may vary more widely than the water charge. While nitrogen discharged into surface water is charged at only HUF 120 per kilogram, mercury is charged at HUF 220,000 per kilogram. The unit rates for the different substances are set according to how much they pollute the surface water source and its biota.

The soil charge is payable for the amount of water used and polluted water discharged into the soil. The unit rate for the soil charge is HUF 1200/m^3 , but the concentration of substances in the waste water and the sensitivity of the area may affect the charge payable.[6]

Next year will mark exactly 20 years since the introduction of the pollution tax in the Hungarian tax system, however, there has been no study or official evaluation of how much the tax has reduced pollution and to what extent it has encouraged companies to reduce the amount of harmful substances they emit.

No relevant data on the annual levels of pollutants in soil and surface water were found.

Based on the data from the Hungarian Central Statistical Office (KSH), however, we can see in percentage terms how much emissions of air pollutants have decreased in Hungary in recent years.

[6] Act LXXXIX of 2003
on the environmental charge

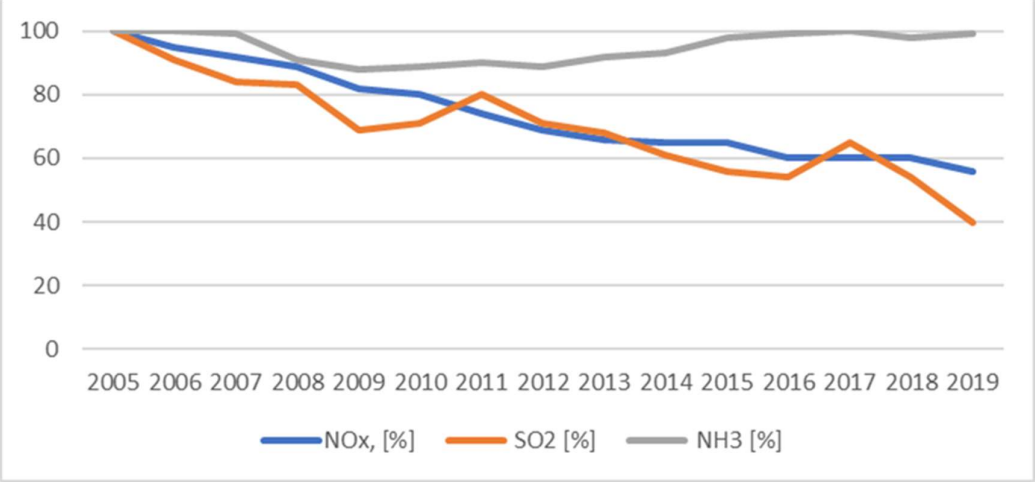

Figure 11 Polluting substances

Source: Based on KSH 2021a, own editing

Figure 11 shows that sulphur dioxide emissions have shrunk to 40% compared to 2005 emissions, while nitrous oxide emissions have shrunk to 56%. Apart from a small outlier, ammonia emissions have remained essentially unchanged. The main source of ammonia emissions is fertiliser crops used by agriculture. The decrease in sulphur dioxide emissions is due to widespread technological changes in the energy industry (use of desulphurisation equipment), according to the CSO. The decrease in nitrogen oxide is mainly due to EU legislation regulating the combustion of fuels and the production of power plants (CSO 2021a).

Furthermore, according to the 2019 declaration of the National Tax and Customs Administration, the majority of companies are not even aware of the existence of the tax.

"The NAV's audit experience shows that the environmental pollution charge is a tax liability that most taxpayers do not think they are covered by. The results of the inspections show that some taxpayers sometimes fail to declare the environmental charge even if, for example, they have a working chimney several metres high in the yard of their head office or if they operate boilers for heating and hot water supply on several sites" (NAV 2019)

However, there is no relevant data available to determine whether there is any link (and if so, how strong) between the pollution charge and pollution. It can be argued with a high degree of probability that the environmental charge is not a significant incentive for companies to make sustainable investments that would reduce the tax base and harmful emissions.

4.7 Land protection levy

The land protection levy was introduced in the tax system in 2008. The land tax is payable by the user on the use of the land for other purposes. In the case of permanent withdrawal of the land, the charge is paid once, while in the case of temporary use, it is paid until the land is restored to its original state. The rate of the land charge is determined in one of two ways:

In case of final use for other purposes:

The value of the land in gold should be multiplied by the fees for the quality grades defined in the law. The multiplier for the highest grade is 184000, while the multiplier for the lowest grade is 4000.

For temporary other uses:

The amount of the levy is equal to 1,000 times the value of the gold standard of the land for the first year, irrespective of the quality class. The multiplier shall be increased by a thousand per year until the land is restored to its original condition.

The revenue from the land protection levy is paid to the central budget. It is used on a general basis and is not earmarked for specific investments to promote environmental protection.[7]

4.8 Road toll

As of 1 June 2013, a road toll has come into force, which all lorries over 3.5 tonnes must pay. The aim of the charge is to ensure that lorries over 3.5 tonnes contribute to the maintenance and improvement of Hungarian roads. It also aims to include the environmental costs of road use in the toll. In setting the charge, the environmental classification of the vehicle's engine is taken into account, giving preference to environmentally friendly vehicles by applying a lower charge. The government can use the revenue from this to reduce the environmental costs of roads and to maintain and expand the road network.[8] I could not find an adequate source of information on what environmental investments have been made with the toll.

[7] Act CXXIX of 2007
on the protection of soil
[8] Act LXVII of 2013
on the tolls to be paid for the use of motorways, motorways and trunk roads in proportion to the distance travelled

4.9 Contributions from airlines

The Hungarian government introduced the so-called extra-profit tax with immediate effect by Government Decree 197/2022 (4.VI.), and several existing taxes were amended.

The extra profit tax includes, among other things, the airlines' contribution to reducing pollution and balancing public finances. The revenue from this contribution is revenue for the central sub-system of the general government. The airline is subject to the tax. The levy was payable on all passengers, depending on whether they travelled within the EU or outside the EU. For the former, airlines have to pay HUF 3900 and for the latter HUF 9750 per passenger.

This has been amended with effect from 1 January 2023, which now takes into account the level of emissions. The new specific tax rate is determined by the per capita emission rate and the country of destination. For example, if an aircraft has a per capita dispensation of less than 10.50 kg and the destination country is in Europe, the charge is 2 700 HUF per passenger. If the destination country is not in Europe and the aircraft has an emission of more than 17.50 kg, airlines will have to pay 12700 HUF per passenger. The revenue from the tax will go to the central budget.

4.10 Carbon dioxide quota

Hungary's July 2023 decree introduces a new green tax on companies that emit carbon dioxide. It will be set at €40 per tonne, to be determined in Hungarian forints at the mid-market exchange rate of the Hungarian National Bank. The carbon dioxide quota is payable on emissions of more than 10,000 tonnes of carbon dioxide. Companies will be allowed to trade unused quotas. It is possible to reduce the fee if the carbon dioxide emitted is reduced by the same amount as the EU linear reduction factor. The CO2 quota will be charged to the taxpayer from 31 December 2022 (Zsiborás 2023).

The carbon dioxide quota is part of the European Union's Emissions Trading Scheme (ETS), which has reduced emissions from energy and industrial plants by 37% since its introduction. The ETS is one of the most successful measures the European Union has put in place to reduce emissions. It is hoped that the introduction of the scheme in Hungary will bring similar positive changes.

4.11 What are the recent green taxes in Hungary?

The Ministry of Finance has already announced the changes to the tax system, which will take effect from 1 January 2024. Two of the new changes concern green taxes and I thought it important to mention them in this paper.

Increase excise duty on fuel:

The finance ministry justified the increase in excise duty on fuel by saying that it has been at a lower level than the European Union has been demanding for years. The increase in 2024 will be a correction in this direction.(Index 2023) In all cases, the tax rate is set in relation to the world market price of fuel. The changes are as follows:

Excise duty on petrol:

- If the world oil price is more than 50 dollars per barrel, the excise duty on petrol will rise from 120 forints to 152.55 forints per litre.
- If world oil prices remain below $50 per barrel, the excise duty on petrol will rise from HUF 125 to HUF 157.55 per litre.

Gas oil tax:

- If the world oil price is above $50, the tax on diesel will rise from 110.35 to 142.9 forints per litre.
- If the world oil price is below 50 dollars, the tax on diesel will rise from 120.35 to 152.9 forints per litre.

Excise duty on petroleum:

- If the world oil price is above $50, the excise duty on petroleum will rise from HUF 124.2 to HUF 152.55 per barrel.
- If the world oil price is below 50 dollars, the excise duty on petroleum will rise from 129.2 forints per barrel to 157.55 forints per barrel. (HVG 2023)

4.12 Green investments in Hungary

The revenues of several green taxes mentioned earlier are earmarked specifically for green investments in the Hungarian budget. As part of my research, I am investigating exactly which investments the extra levy collected under the heading of green tax is used for.

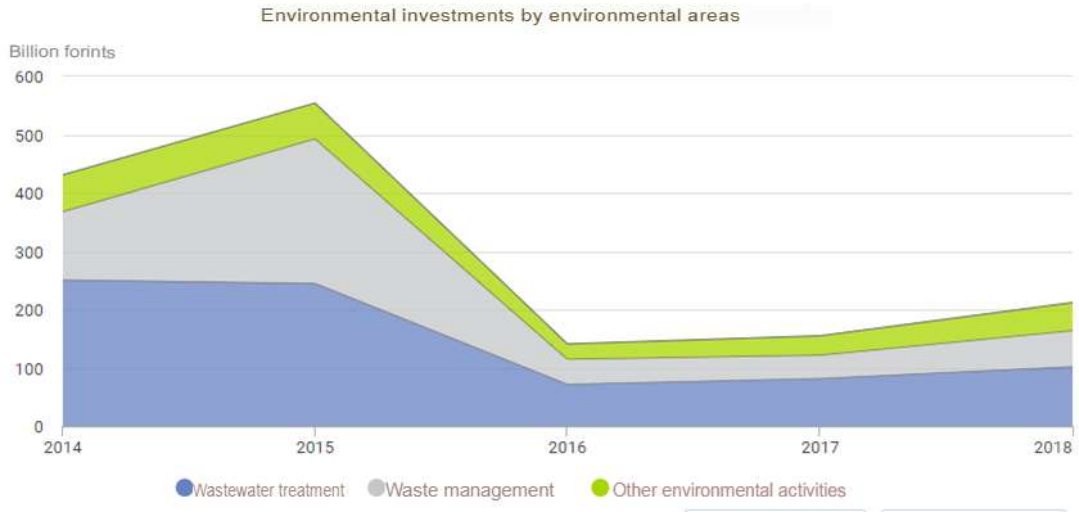

Figure 12 Green Investments in Hungary

Forrás: KSH 2023

Figure 12 shows the breakdown of environmental investments by area, showing that wastewater treatment receives about half of all environmental investments, while waste management and other environmental activities account for the other half of environmental investments in Hungary. The KSH concluded that "The orientation of environmental expenditure and investment suggests primarily the financing of emission management and the improvement of existing technologies. Also in the case of expenditure and investment, the highly skewed ratio between prevention and treatment implies that greening and systemic transformation of economic processes from the outset is not a priority." (CSO 2023)

This shows that the vast majority of environmental expenditure is used to maintain wastewater and waste treatment, but no new, more sustainable, environmentally friendly practices and methods are being developed.

4.13 Summary of Hungarian green taxes

Hungary's tax system has included a number of green taxes since the 1990s, which aim to reduce or mitigate activities that are harmful to the environment. Based on my research, I found that the green tax system applies to most economic operators in some form, so its coverage is broad. However, the Hungarian tax system in general is complex and difficult to understand. In the

case of the green taxes I examined, it was often only possible to find information in the description of the legislation. Companies often do not even know which taxes apply to them and often fail to pay them through no fault of their own. This was also confirmed by the NAV in the case of the environmental pollution tax. Furthermore, it is a shortcoming that the impact of green taxes is difficult to quantify, as there is no (publicly available) data on the change in the negative externality. This makes it difficult to monitor the double dividend effects of green taxes (e.g. to what extent the product charge on plastic bags has reduced the demand for plastic bags). The revenue from green taxes is paid to the central budget and is not earmarked in a separate environmental fund. Although it is not possible to say where the green taxes are spent within the central budget, it is possible to say which environmental investments are subsidised by the State. The majority of environmental investments are spent on maintaining existing waste water and waste treatment methods and, within these, on improving existing technologies. No investment is made in more sustainable methods and new technologies, as the KSH Communication states that the aim is not to transform economic processes at system level.

So in Hungary, it is not possible to determine exactly to what extent green taxes have contributed to advancing sustainability, because often taxpayers do not know when they have to pay which tax, and it is not possible to determine exactly whether there is a correlation between the change in a given green tax and the change in a negative externality, because I could not find any data showing the amount of a given negative externality in a given year.

5 Comparison of Hungarian and international green taxes

The aim of my research was to examine the impact of green taxes in the Hungarian economy in the light of international green taxes, which formed the basis for this comparison. In my research, I looked at green taxes already in place in different countries, or to be introduced in the near future, in order to find common features. I subsequently did the same for green taxes in the Hungarian tax system in order to compare them in my research.

On the positive side, it can be said that Hungary has a higher share of environmental taxes as a proportion of total tax revenue. While the EU average is 5.42%, in Hungary green taxes account for 6% of total tax revenue.

The purpose of green taxation is similar: both international and Hungarian green taxes were (and are) introduced into the tax system with the aim of reflecting the environmental cost in the price of a given product or service. Furthermore, in both the international and the Hungarian examples, the tax base was always a negative externality. Another positive aspect is that many green taxes in Hungary have been in place for decades, which is a good thing, as green taxes have a positive long-term impact. However, the difference was that while in the international examples the tax was levied on a specific negative externality, such as the plastic bag levy in Ireland, in Hungary a green tax applies to several products, in the case of the environmental product tax, the same tax applies to plastic bags, artificial flowers and tyres, among others. Or, for example, in the case of the air pollution tax, there is a wide range of chemicals that are subject to the tax, whereas in the case of the Singapore or Swedish carbon tax, the levy is on coal. In my view, the narrower the scope of the tax, the easier it is to monitor the extent to which the green tax is changing the negative externality.

Furthermore, practices also differ in that, while in the international examples, once the tax is imposed, not only the revenue from the tax but also the size and change in the negative externality are monitored, thus allowing the effectiveness of the tax imposed to be determined. In the case of Hungarian green taxes, no correlation can be established between the tax and the negative externality. For example, due to the introduction of the environmental product charge, a tax on plastic bags (1200 ft/kg) is also payable, but there is no data on the demand for plastic bags (and its change). In the Irish example, the same tax was levied on plastic bags, and since data on earnings were collected there, it was easy to show a decrease in demand and a change in consumer behaviour. The lack of data is not only the case for the environmental product

charge, but for most green taxes currently in force in Hungary. However, for those for which data are available, such as the annual amount of pollutants emitted into the air, it cannot be said that the green tax (in this case the air pollution charge) was the main incentive, but rather the EU legal requirement.

Another difference is that while in international examples the revenue from green taxes is often allocated to a special environmental fund to support the development of sustainable technologies, in Hungary the revenue from green taxes is allocated to the central budget and is presumably used to cover general government expenditure. Current investments in environmental protection are exhausted by maintaining current waste and waste water treatment methods.

The comparison shows that although there are similarities, differences are more pronounced between domestic and international green taxes. In Hungary, the primary objective of green taxes is to increase government revenues, with sustainability objectives playing only a secondary role. In the more developed countries of the world (mostly in Europe), the polluter pays principle would be implemented, where current green taxes form the basis of a broader tax reform, where the tax burden would be shifted from labour to environmentally harmful activities. As the KSH wrote in its analysis of the green economy, greening and systemic transformation of economic processes from the outset is not currently a priority in Hungary.

6 Hungarian deposit fee system

6.1 Introduction

As of 1 January 2024, almost all ready-to-drink or concentrated beverage products with plastic, metal and glass packaging with a capacity of 0.1 to 3 litres will be subject to a mandatory redemption fee. The majority of bottles, are single-use, so-called single-use bottles, which become waste after consumption and can be recycled as recyclable material into raw material for future bottles after proper collection and pre-treatment. The minority of the bottles are however reusable, so by returning it to the manufacturer, it can be refilled if it is in the proper condition. It is compulsory for every grocery store which is at least 400 square meters to have a bottle deposit machine. If you have returned the bottles you can have it deducted from the purchase by the returned amount, or if you have the repont application downloaded, then you can transfer the money directly to your bank account, alternatively you can offer the returned amount to charity organizations. As of 11 November 2024, 79 million forints were offered for charity (REpont 2024).

The fee on the non refillable bottles is set by a government decree, currently it is 50 HUF, the re-usable bottles fee (an example is the bottle of a syrup) is set by the manufacturer and it can only be refunded in a special Repont machine designed for this.

The redemption system operates in such a way that the manufacturer initially pays the deposit fee for the bottle to Mohu. When a distributor purchases the product, they reclaim the deposit. After that, the retailer buys the product from the manufacturer or wholesaler, along with the deposit fee, and sells it to the consumer, again including the deposit fee. As a result, the deposit remains in Mohu's account until the bottle completes its journey through the supply chain. Therefore, any deposit on bottles that are not returned ultimately stays with Mohu, the system operator. For each unreturned bottle, Mohu will retain HUF 50, which will be allocated to covering the operational costs of the system (Krász 2023).

6.2 Primer research introduction and results

At the time of writing this thesis, the deposit return system in Hungary has been operating for more than five months so people are more or less used to it. There has not been any official data published by Repont or the central statistical agency of Hungary, so I took the initiative to gather my own data using a questionnaire (for the list of full questions of the questionnaire please see appendix 1). I distributed the questionnaire among friends, relatives, and online

groups dedicated to this purpose. The data collection took place between the first of October and November 5th in Hungary. The questionnaire was completely anonymous and was only available in Hungarian. After the data collection period, the questionnaire got 84 submissions altogether.

6.3 Demographics

The first few questions on the questionnaire included the base demographic question (age, gender, living place, yearly revenue, level of education and status of employment). Over all of the respondents, 84.5% were women, and the majority of the respondents were living in a city. The age and level of education showed a bit more distribution.

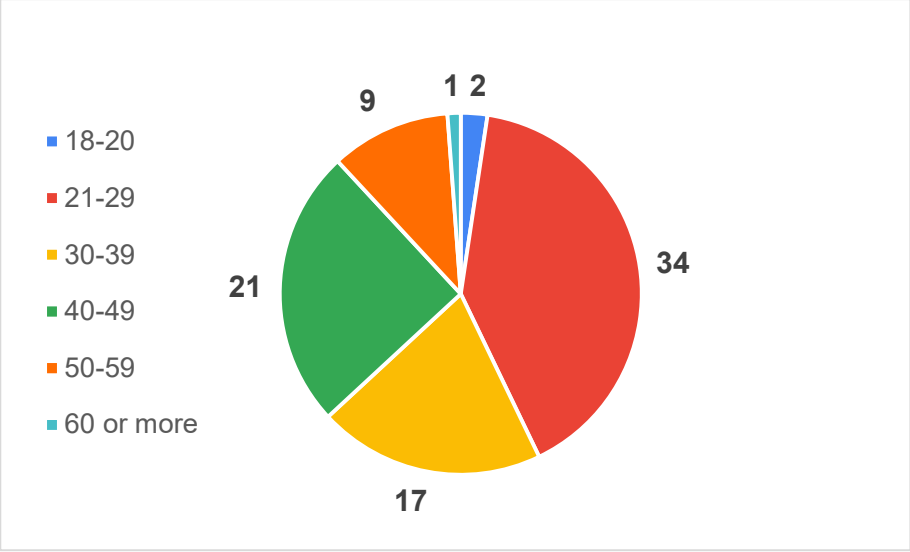

Figure 13 Age distribution

As we can see in Graph 13, the majority of the responders were between the ages of 21 to 29, and the second most represented group were the people between 40 to 49. The least reached group were the people over the age of 60, but combined with the age bracket of 50 to 59 they still make a noticeable present of 11.9%. The dominant young respondents can be attributed to

the fact the questionnaire was distributed among my friends, university peers, and Facebook groups dedicated to this purpose and these people fall into this age category.

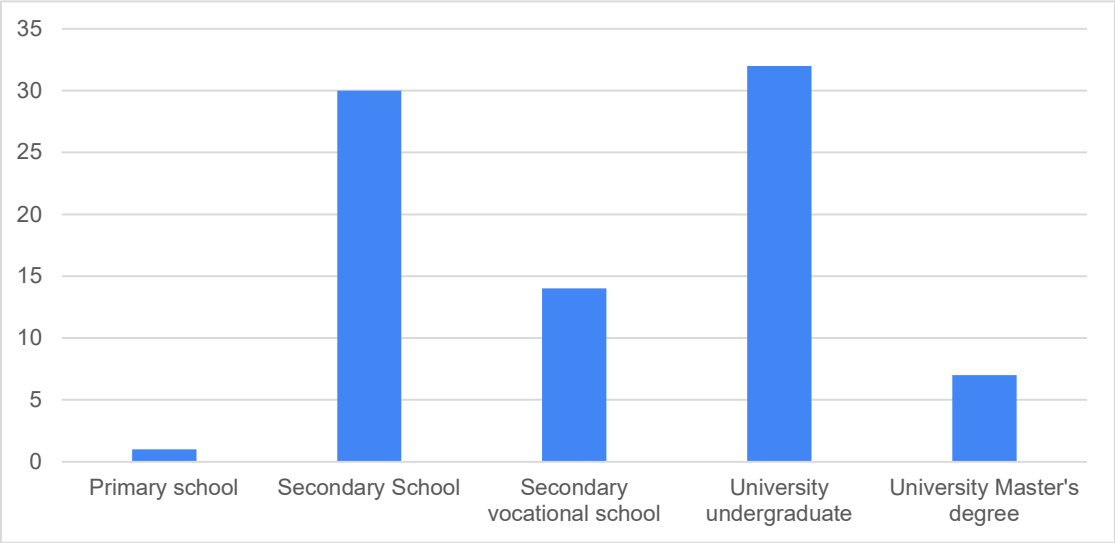

Figure 14 Level of education

If we look at the graph 14 it shows that the majority of respondents completed at least secondary school, with a significant portion holding university degrees. There is a notable drop in the number of respondents with only a secondary vocational school education.

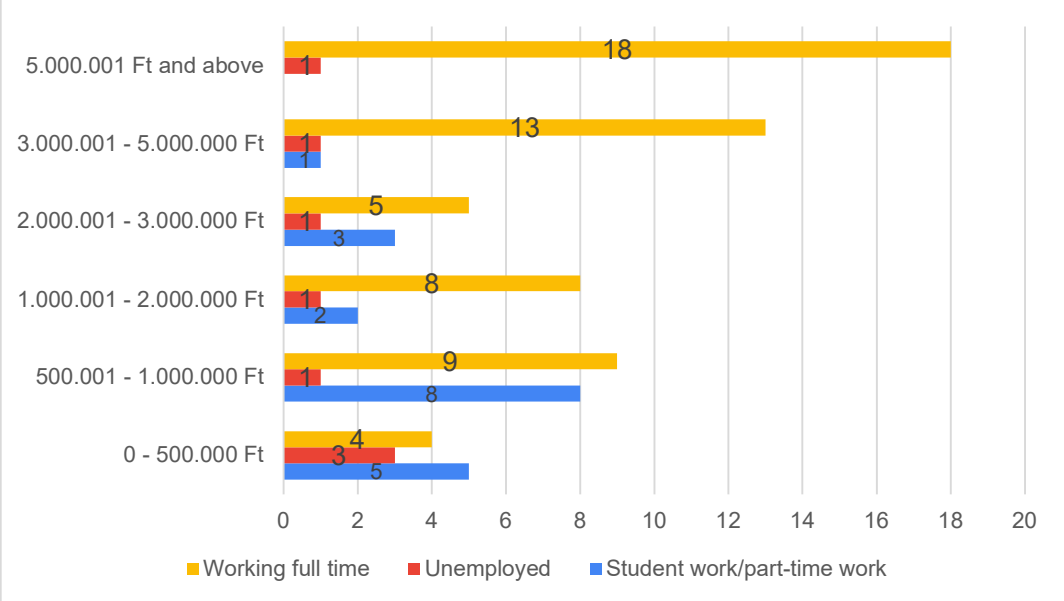

Figure 15 . Status of employment and gross revenue

The graph provides a snapshot of the respondents' income distribution and employment status. The majority of respondents fall within the 500,001-1,000,000 Ft income bracket, suggesting this is a common income range in the asked population. A significant number of respondents

are working full-time, while a notable portion is engaged in student work or part-time employment, reflecting a younger demography. The relatively low number of unemployed respondents reflect a specific target audience for the survey.

6.4 Behavioural questions

The following questions target customer behavioural questions such as the number of times one buys bottled liquid during a week or whether one buys fewer bottles of liquid since the introduction of the deposit-fee system. I prepared charts from the survey results and will go through them one by one with different demographical breakdown and write a few sentences of commentary. I am going to follow the same order as was in the questionnaire.

To gain deeper insights into consumer preferences and behaviors,I asked in a survey to assess the consumption of various beverage categories. By analyzing the questionnaire data, I wanted to identify the most popular beverage types, to understand, what are the most populare bottled products which consumers buy.

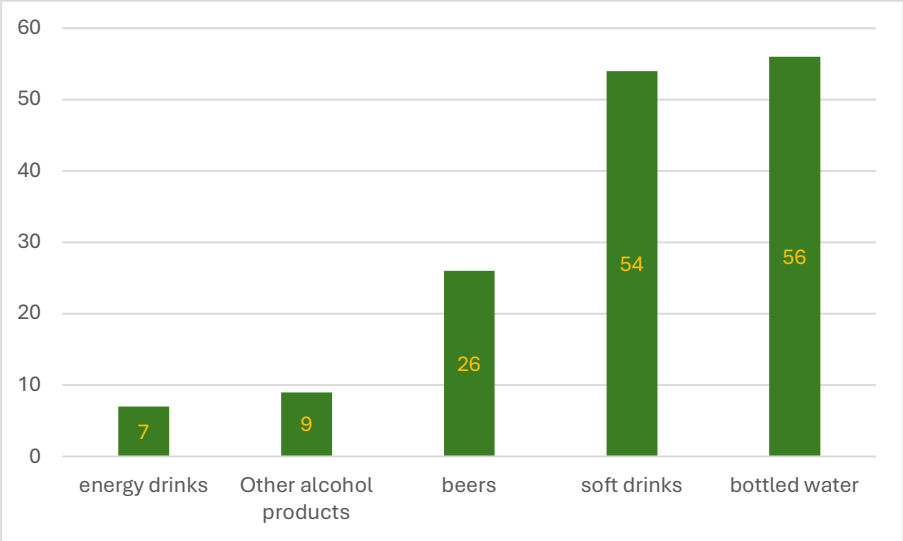

Figure 16 Distribution of beverage types

Figure 16 illustrates the consumption frequency of five different beverage categories: energy drinks, other alcoholic products, beers, soft drinks, and bottled water. The most popular beverages are bottled water and soft drinks, with consumption frequencies exceeding 50. In contrast, energy drinks are the least consumed, with a frequency of only 7. Beers and other alcoholic products fall in the middle range of consumption. The survey results suggest that even with the introduction of the depoist fee, bottled water is still the most sought after packaged liquid.

My next question was aiming to determine how many bottles of liquid an average hungarian buys over a week period. The choices ranged from 0 bottles to 21 and more.

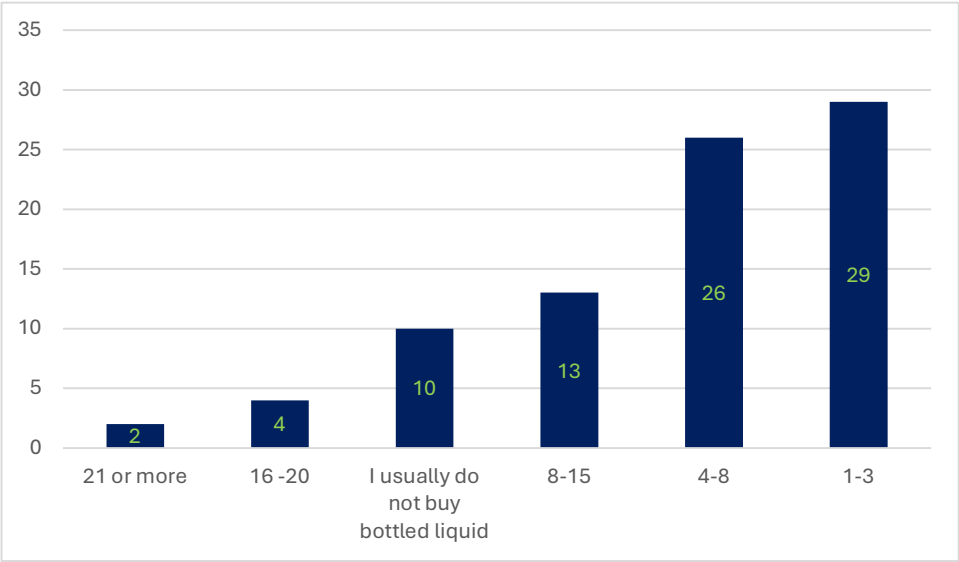

Figure 17 Bottles per week

The data reveals a clear trend: the higher the number of bottles purchased, the fewer respondents fall into that category. Only 2% of respondents buy 21 or more bottles per week, while 29% purchase between 1 and 3. This suggests that the majority of Hungarians are more moderate when it comes to consuming bottled liquid, with the sweet spot appearing to be around 4-8 bottles per week. The category "I usually do not buy bottled liquid" accounts for 10% of respondents, indicating that a portion of the population avoids bottled water altogether.

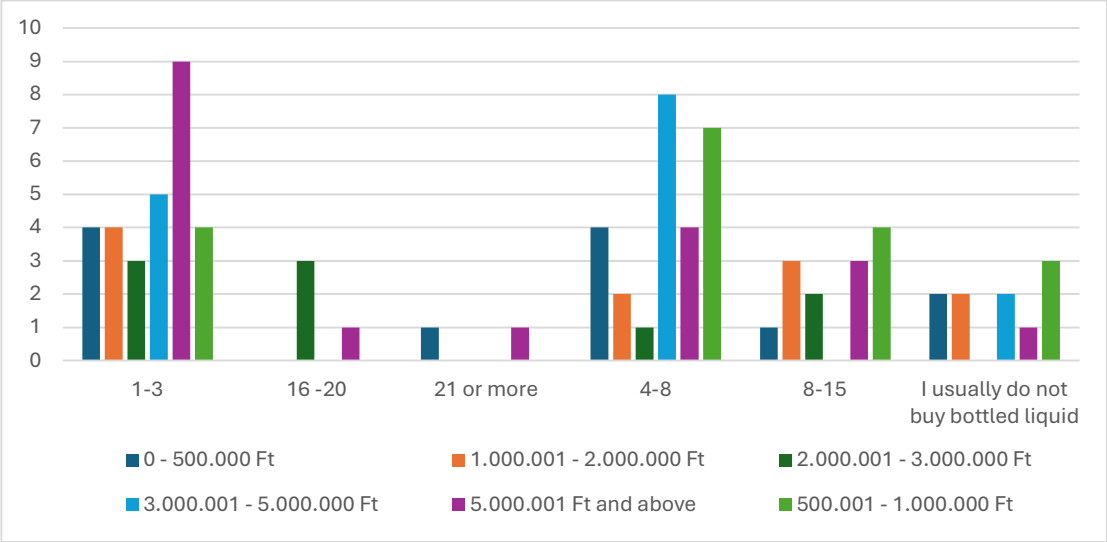

Figure 18 Bottles per week with revenue breakdown

An intriguing relationship between income and water use is shown by the statistics. Higher-income households are more likely to buy bottled liquid. For example, households with incomes

over 5,000,001 Ft are most likely to purchase the most bottles (21 or more). On the other hand, households with lower earnings are more likely to buy fewer bottles; those making less than 500,000 Ft are most likely to fall into the "I usually do not buy bottled liquid" category. This implies that the use bottled liquid in Hungary may be influenced by affordability.

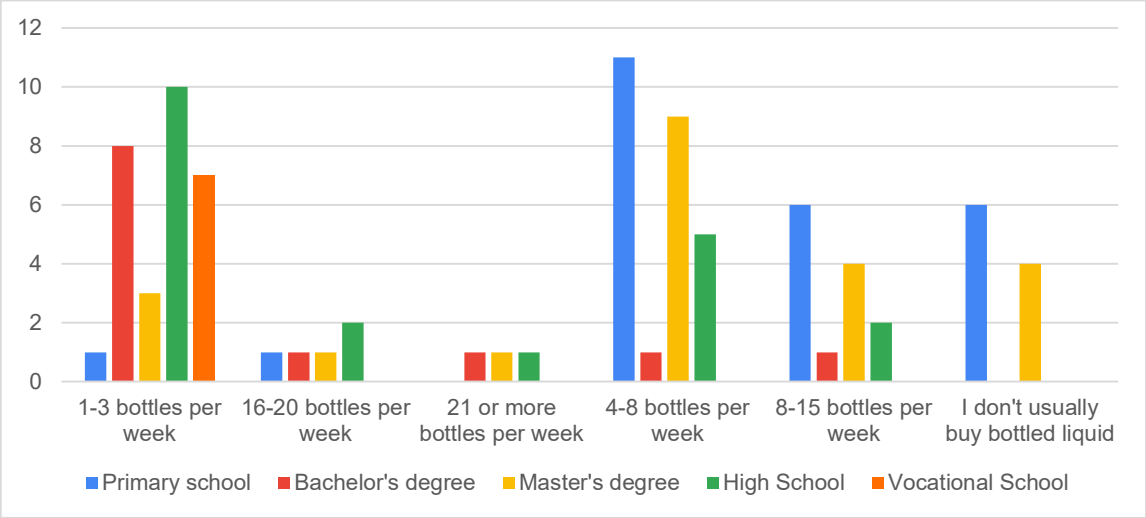

Figure 19 Bottles per week, education level breakdown

I also created an educational level breakdown just to see if there is any relationship between the data. If we take a look at graph 19 then we can see that individuals with higher levels of education tend to purchase more bottled water. For instance, those with Master's degrees are the most likely to buy 21 or more bottles per week. In my opinion, this can be attributed to the fact that responders who have a master's degree tend to earn more than people with lower educational level.

Third question of the survey was aimed to determine whether the respondents are buying less bottled liquid which capacity is less than 0.5 liter after the introduction of the deposit fee. The reason I wanted to separate the containers based on liter capacity is because the fee is fixed on all types of bottle volume, meaning the tax ratio is greater on smaller bottles (by which I mean bottles with less than 0.5 liter compared to larger ones.The question was the following „ Has the frequency of purchase of small bottled drinks (half litre or less) changed since the introduction of the deposit fee?" Responders could choose between three options. Yes it changed (increased or decreased), and no, it remained the same. Again I did a breakdown based on yearly revenue and subsequently I assembled yet another graph.

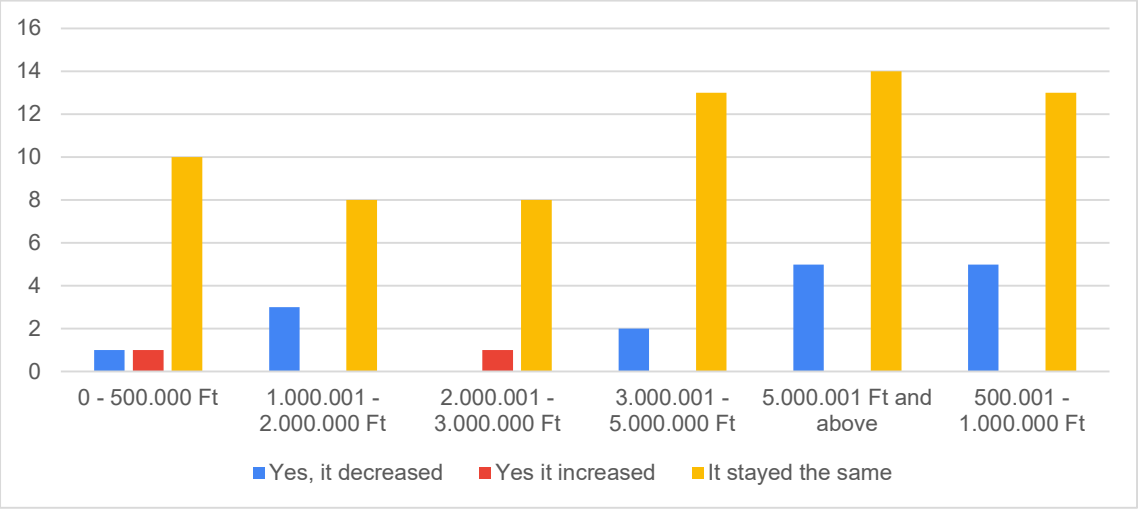

Figure 20 Has the frequency of small bottle liquid purchase changed?

If we take an observation on graph nineteen, the data reveals that across all income levels, the majority of respondents reported that their purchase frequency of small bottled drinks remained the same after the introduction of the deposit-fee. However, there is a slight increase in the number of respondents who reported a decrease in their purchase frequency, particularly among those with higher incomes. This suggests that the deposit-fee may have had a minimal impact on the overall consumption of small bottled drinks in Hungary, with the majority of consumers continuing their previous purchasing habits.

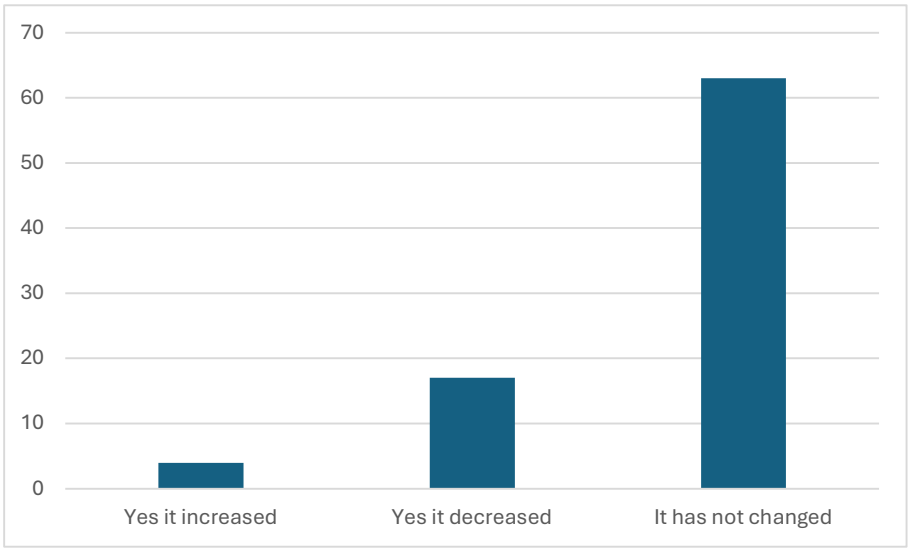

Figure 21 Has the frequency of large bottles of liquid purchase changed?

Majority of the responders stated they did not change their purchasing habits of buying larger bottles of liquid (large bottles in this context means containers with at least half liter capacity). Just by looking at this data and charts we can determine that in this survey population,

respondents did not change their purchasing habits with the introduction of the deposit-fee system.

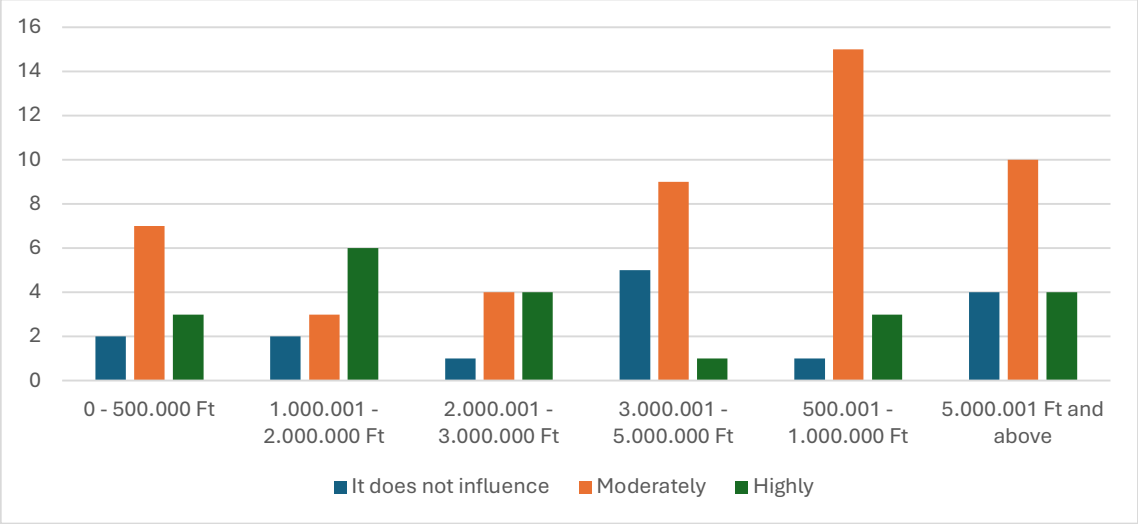

Figure 22 Does the price influence your purchasing decision? - Revenue breakdown

According to the previous charts, the introduction of the deposit-fee did not really change their purchasing habits of small and large liquid containers. On the other hand if we take a look at graph 22 then we can see that across all the income levels, responders take the price of the product into consideration. We can also see that in the lower income brackets responders are more sensitive to product price, which is expected to some degree Even though that the deposit fee did not change the consumer behaviour acoss all of the respondents, respondents do take the prices into consideration. A higher fee on the bottles might decrease the consumption of packaged liquid.

The last two questions' goal was to determine whether the participants of the survey return the bottles to a Repont machine. Participants of the survey were presented with the following question: „ Do you usually return and redeem the bottles at the designated Repont macines?". Respondents could choose between, the answers of „ No it doesn't concern me"-„Yes but it is not that important for me" and „Yes I always return them whenever I have the chance". A majority,more than 83% of the respondents stated that they always return the bottles, and 13% stated, that they sometimes return it but it is not important for them. Only three people from the eighty-four respondents stated they did not return the bottles and had no intention of doing so.

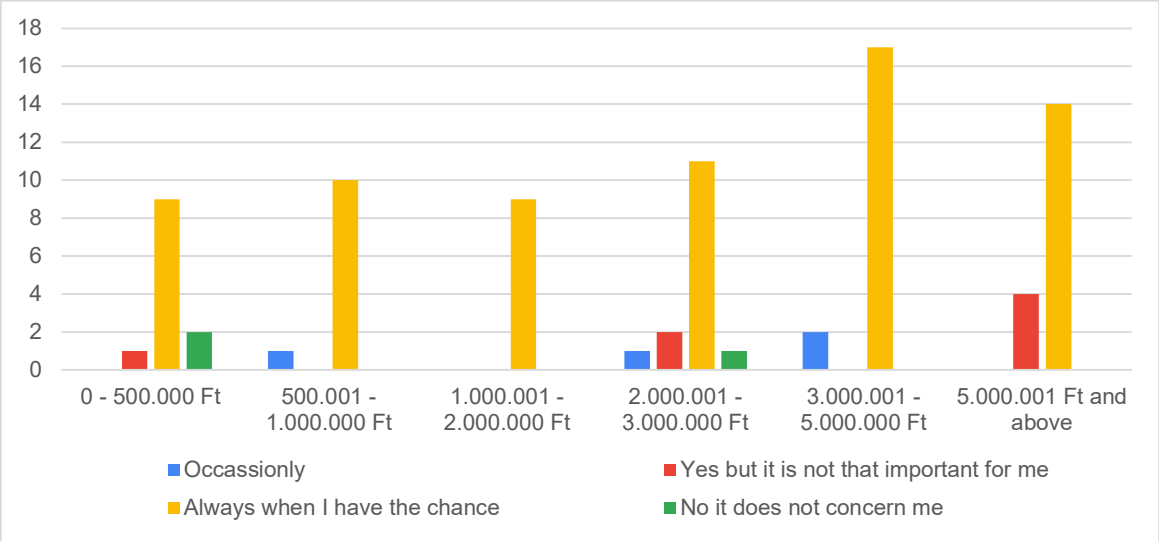

Figure 23 Willingness to return the bottles – income breakdown

If we look at Graph 23, we can see the dominant choice for returning the bottles across all income brackets. In the higher revenue brackets, we can see an increase in people who occasionally return the bottles so it might be less important for them. Another interesting observation we can make is the people who stated that the return of the bottles is not important to them can be found mainly in the lowest income category. A possible explanation for this phenomenon is the high number of active students in this category who do not work and likely get his/her financial support from his/her family and they might be less financially responsible compared to responders who have their own income.

The next and final question in the questionnaire's objective was to determine the reason for returning the bottles. Responders could choose between the following three options: environmental sustainability, to get back the deposit fee and the third option was other reasons. The majority of the responders (54) bring back the bottles because of the deposit fee and 29 responders bring them back because of environmental concerns. No one selected the ”others” option. Based on this survey, we can say that the majority of responders' motivation to bring back bottles was to get back the extra fee they paid at the time of their purchase. Although the majority of responders stated they brought back the bottles because of the fee, a significant slice of the responders chose the environmental awareness option which suggests that 34.5% of the responders returned the bottles because for them the environmental concern of the bottles is greater than the fee on the bottles.

In summary, the survey's findings offer new information about the attitudes and purchase patterns of Hungarian consumers toward bottled beverages, after the implementation of the

deposit-fee system. Price sensitivity, education, and income all had some level of an impact on consumer decisions, even though most respondents did not dramatically change their purchasing patterns once the tax was implemented. While people in lower income brackets tended to buy fewer bottles of bottled liquids, higher-income households and those with higher levels of education were more likely to buy larger quantities. Notably, although the deposit fee had little effect on the frequency of purchases for both small and large bottles, consumers still return bottles to Repont machines primarily for financial incentives, such as the ability to get back the deposit fee, and on a small degree environmental concerns. All things considered, these results show some complex relationship between environmental and financial factors in consumer behaviour, with price continuing to play a major role in determining purchasing decisions.

6.5 Hypothesis test

To scientifically prove or disprove my initial hypothesis I conducted the Chi-Square Goodness of Fit Test because this is the appropriate statistical test for my questionnaire. I chose a 0.05 (5%) significance level which represents a 5% chance of rejecting the hypothesis when it is true. Because I was sampling for two different groups of changes (one for smaller bottles and the other for larger bottles), I conducted the hypothesis test for both of them. I applied the original hypothesis for both cases:

Null hypothesis (H0): The introduction of a deposit-fee scheme has no impact on customer behaviour.

Alternative hypothesis (H1):): The introduction of a deposit-fee scheme has an impact on customer behaviour.

6.5.1 Testing for smaller bottles

My sample size is 84 and the number of respondents who selected each option is the following:

No change: 66

Increased: 2

Decreased:16

I chose a 10% significance because of the relatively small sample size. Under the null hypothesis, I assumed that the deposit fee had no impact on purchasing behaviour. If this were

true we would expect about the same number in each category. The expected frequency of each category would be: 84/3=28.

After calculating the Chi-square statistic which result was 80.85 and the critical value was 4.605 (with degrees of freedom equaling to 2). I rejected the null hypothesis since the calculated Chi-square is much larger than the critical value.

Based on the Chi-square test I can reject the null hypothesis on a 10% significance level meaning that the introduction of the deposit-fee has had a significant impact on purchasing behaviour of smaller, because the distribution of responses (increased, decreased, no change) is significantly different from what we would expect if there was no impact.

6.5.2 Testing for larger bottles

Many of the original attributes of the previous hypothesis test remained the same. The only thing which I changed was the input number of the categories.

No change: 63

Increased: 4

Decreased: 17

After conducting the necessary calculations, I got 68.84 for the chi-squared value and the critical value remained the same as before.

Same as in the previous statistical test, I reject the hypothesis on a 10% significance level meaning that the introduction of the deposit-fee has had a significant impact on the purchasing behaviour of larger bottles because the distribution of responses (increased, decreased, no change) is significantly different from what we would expect if there was no impact.

6.5.3 Interpretation of Results

I can conclude that even though I have to reject the null-hypothesis because there is a statistically significant difference between the observed and expected frequencies of responses. On the other hand, if I take the research into context it shows a different picture, as the majority of the respondents stated that they did not change their bottled drink behaviour suggesting that the majority of the population's purchasing decision was not impacted by the extra tax. The other side of the coin is that a statistically significant portion stated that they buy fewer bottled drinks and only a very minority of the population said that they increased their purchasing

behaviour, this result is not surprising as it's unlikely that a deposit-fee system would increase purchasing behaviour.

If I compare the results with the secondary research, I can tell that based on this primary research, Hungary has not achieved bottle return ratios above 90% such as in Finland or Germany. However, it is important to mention that it is a little early to tell because Germany and Finland have been operating their bottle return schemes for a few decades now, while in Hungary it has not even been a year, and the bottle returns are definitely on a surging trend.

6.5.4Limitations

It is important to note that this research is very limited to certain demographical groups. The majority of responders (85%) were females between the ages of 21-29, who live in a city, so they are over-represented in this research while the men and older generations in general are under-represented. It is important to mention that active students in universities are also over-represented, and since they have no real income it can cause discrepancies in the lower income brackets. We also do not have a clear picture of the income breakdown because the questionnaire does not make a distinction after more than 5 million HUF yearly revenue.

Overall, the research is not representative of the whole Hungarian population, because certain demographical groups are overrepresented, while others are under-represented such as people of retirement age or people with high income just to mention a few.

To get a more accurate answer to this research question, more extensive research is needed with a greater sample size representative of the population to exactly determine the effects of the deposit-fee system on the Hungarian people's purchasing decisions.

7 Conclusions

Environmental protection, the depletion of natural resources and the unsustainability of the global economy have become major issues of the 21st century. Solving these problems is becoming increasingly urgent for countries around the world, and the green tax is an economic policy instrument that can contribute to solving the problem. Over the past decades, more and more countries have introduced green taxes to internalise environmental costs into the price of a product or service.

The aim of my research was to find answers on whether the Hungarian deposit-fee system which was introduced in 2024 January changed the customer behaviour towards bottled drinks, and to answer that I first had to find out what green taxes are, and what are their usage in Hungary or in other countries. In order to answer the research question, I first did secondary research on the economics of green taxes and then examined international examples in order to compare them with the green taxes in the Hungarian tax system. I used Hungarian and English language sources to prepare my research and answer my research questions. I used case studies from different countries, international organisations, government statistics and various EU and Hungarian legal sources.

In my research, I traced the economics of green taxes to the European Green Deal's position on environmental taxes. Through studies, I presented green taxes already found in a number of different countries and found that they share the following common features: cooperation between the state, traders, and producers; a specific negative externality on which the tax is levied; the possibility of an alternative; long-term planning, thinking and appropriate use of the tax revenue. In addition, there is a growing emphasis within the EU on the implementation of the polluter pays principle, which would shift the burden of the tax from labour to the environmental burden. We have seen that revenue from green taxes can be used to reduce the tax burden on labour and invest in sustainable technologies.

I then examined the green taxes in the Hungarian tax system in chronological order, starting with the earliest green tax, and concluded that the complexity and lack of transparency of the Hungarian tax system makes it difficult for companies and taxpayers to pay and interact with taxes. Although green taxes are widely applied to economic operators, it is often unclear which taxes apply to them. Lack of data and information makes it difficult to assess the impact of green taxes and to monitor changes in negative externalities. Revenues from green taxes are paid into the central budget and the monitoring of their use is incomplete. In addition, the focus

of environmental investment is on financing existing practices in waste and waste water management, while little attention is paid to the development of new and more sustainable technologies. In Hungary, there is currently no goal of greening the economy from the ground up, nor of a comprehensive reform of the tax system.

On the positive side, environmental tax revenues in Hungary are higher than total tax revenues, which is good news in terms of coverage. Furthermore, Hungarian and international green taxes are similar in that both international and Hungarian green taxes aim to reflect the environmental cost in the price of a product or service. Moreover, in both cases the tax base is a negative externality.

However, differences are more numerous. While in international examples taxes often apply to a specific negative externality, in Hungary a green tax applies to several products. In international practices, the effects of taxes and the change in negative externalities are monitored, while in Hungary data on the demand for the services and products that are the subject of the tax are not collected, and in the absence of data it is difficult to establish a link between the tax and the change in the negative externality. The treatment of revenue from green taxes is also different, as in Hungary the money is paid to the central budget. In contrast, in the international examples, it is paid to environmental funds. Although there are similarities, differences are more present between Hungarian and international green taxes. In Hungary, the primary objective of green taxes is to keep up with the ever-tightening European Union regulations and/or increase government revenues in more developed countries, however green taxes aim to promote sustainability, reduce pollution and environmental burdens, and create a fairer tax system where taxes are paid not for work but for consumption that is harmful to the environment.

After concluding that Hungary lacks publicly available data on behavioural changes caused by environmental taxes, I took the initiative to do my own research on the subject. To do this I assembled a questionnaire which I distributed among friends, relatives, and Facebook groups dedicated to this purpose between October and November of 2024. The questionnaire included demographical and behavioural questions related to the subject (for the full list of questions please see the appendices. The demographic data was not representative to the Hungarian population overall and it is important to mention that a significant majority of respondents (84.5%) were women, and most lived in urban areas. The age distribution showed a generally young respondent base, with the majority falling between 21-29 years, while older age groups (50+) were heavily underrepresented. Most participants had completed at least secondary

education. Many of the survey's population hold some sort of university degree. Revenue-wise, the respondents' earnings were predominantly in the 500,001-1,000,000 HUF range, and I found out that higher-income respondents were more likely to purchase larger quantities of bottled liquids. I also explored the typical bottled liquid preferences, where bottled water and soft drinks were the most commonly consumed beverages (which was expected). On the other hand energy drinks were the least popular. Most respondents stated they buy 4-8 bottles of liquid per week, and a significant portion of the population (10%) avoided purchasing bottled liquids altogether. When examining the impact of the deposit-fee system on consumer behaviour, I found that the introduction of the fee had minimal effect on the frequency of purchasing small (under 0.5 litres) or large (0.5<= litres) bottles of liquid. The majority of respondents reported no change in their purchasing habits. Although there was a slight decrease in the purchase of small bottles, especially among higher-income individuals. Price sensitivity was a significant factor across all income levels. Respondents from lower income brackets were particularly sensitive to the cost of bottled liquids. In terms of bottle returns, **83% of respondents indicated they always returned their bottles** to Repont machines, primarily motivated by getting back the deposit fee. Environmental concerns were the second most chosen option, chosen by 29% of respondents. Interestingly, respondents in the lowest income group were less likely to view bottle returns as important. This might be due to the financial support they receive from their families.

As a part of my primary research, I also conducted a hypothesis test to prove or disprove my hypothesis statistically. My null-hypothesis was the introduction of a deposit-fee scheme has no impact on customer behaviour. While the statistical analysis indicates a significant difference between observed and expected response frequencies, the practical implications are more straightforward. The majority of respondents reported no change in their bottled drink purchasing habits, suggesting a limited impact of the extra tax. A significant slice of the population did reduce their purchases, as expected, the overall picture indicates that the tax's influence on consumer behaviour may be less strong than the statistical significance might indicate. The study provides valuable insights, but it's important to acknowledge its limitations. The sample over-represents young, females aged 21-29 who live in urban areas. Especially active university students. This overrepresentation causes discrepancies in the results, underestimating the impact of multiple demographics groups. The lack of detailed income data beyond 5 million HUF yearly revenue limits our understanding of the financial implications

across different socioeconomic groups. The **research is not representative** to the Hungarian population.

To obtain a more comprehensive picture of the deposit-fee system's impact on Hungarian consumers, future research should involve a larger, more diverse sample that reflects the population's demographics. This would enable a more precise picture of the system's effects on various age groups, genders, and income levels. If I compare the results with the secondary research, I can tell that based on this primary research, Hungary has not achieved bottle return ratios above 90% such as in Finland or Germany. However, it is important to mention that it is a little early to tell because Germany and Finland have been operating their bottle return schemes for a few decades now, while in Hungary it has not even been a year, and the bottle returns are definitely on a surging trend.

Overall, while the deposit-fee system did not drastically change purchasing habits, it did influence bottle return behaviour, with financial reasons being the primary motivation. While Hungary has not reached levels of bottle returns like in Germany or Finland, it is on a surging trend and a good incentive to make people return the bottles and not dispose of regular waste. Based on this primary research, though not representative, according to the data and the statistical test, the introduction of the bottle return scheme had an impact on Hungarian consumer behaviour. Price, income, and education were key factors driving purchasing decisions, with environmental concerns playing a smaller, though notable, role in Hungarian consumer behaviour.

8 Suggestions

Based on the findings, I would like to make a few recommendations. Hungary should improve government transparency regarding the green taxes or on the taxation overall. By implementing more comprehensive data tracking on revenues, tax impacts and environmental effects then policymakers would be better equipped to make decisions or adjust existing policies. Public awareness campaigns should be expanded to draw more people emphasizing how they can contribute to environmentally friendly behaviour. Additional research should be conducted involving a more diverse representative sample to get a clearer picture across different demographic groups. The government should consider increasing the fee on the bottles because it would likely lead to a drop in the consumption of bottled liquid and a surge in bottle returns which would bring a sustainable future closer. Last but not least the government should encourage consumers who are less likely to engage in the process with discounts or rewards. I

think these suggestions would lead to a long and successful deposit return scheme and would contribute to bringing closer the environmental and sustainability goals.

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10 Appendices

Questionnaire questions and choices

1. Az Ön neme *

- Férfi
- Nő

2.Melyik korkategóriába tartozik? *

- 17 vagy kevesebb
- 18-20
- 21-29
- 30-39
- 40-49
- 50-59
- 60 vagy több

3. Mi az Ön legmagasabb iskolai végzettsége? *

- ◯ Oktatás nélküli
- ◯ Általános iskolai
- ◯ Középiskolai
- ◯ Szakközépiskola
- ◯ Egyetemi alapképzés
- ◯ Egyetemi mesterképzés
- ◯ Magasabb egyetemi képzés

4.Milyen településen él, életvitelszerűen? *

- ◯ Város
- ◯ Falu
- ◯ Község

4.Milyen településen él, életvitelszerűen? *

- ◯ Város
- ◯ Falu
- ◯ Község

5. Az alábbi kategóriákból melyik írja le legpontosabban a foglalkozását? *

- ◯ Munkanélküli
- ◯ Diákmunka/Részmunkaidő
- ◯ Teljes állásban dolgozom
- ◯ Nyugdíjas

6. Milyen magas volt a teljes háztartása jövedelme 2023-ban, az adók levonása nélkül? *

- 0 - 500.000 Ft
- 500.001 - 1.000.000 Ft
- 1.000.001 - 2.000.000 Ft
- 2.000.001 - 3.000.000 Ft
- 3.000.001 - 5.000.000 Ft
- 5.000.001 Ft és felette

7. Ön hetente hány palack folyadékot vásárol? *

- Nem szoktam palackozott folyadékot venni
- 1-3
- 4-8
- 8-15
- 16 -20
- 21 vagy annál több

8. Változott-e a kisméretű (fél liter vagy annál kevesebb) palackozott italok vásárlásának gyakorisága a betétdíj bevezetése óta? *

- ◯ Igen, nőtt
- ◯ Igen, csökkent
- ◯ Nem változott

9. Változott-e a nagyméretű (fél liternél több) palackozott italok vásárlásának gyakorisága a betétdíj bevezetése óta? *

- ◯ Igen, nőtt
- ◯ Igen, csökkent
- ◯ Nem változott

10.Mely betétdíjas termékeket vásárolja leggyakrabban? *

- ☐ üdítők
- ☐ sörök
- ☐ egyéb alkohol tartalmú termékek
- ☐ ásványvizek
- ☐ Energiaital

11. Mennyire befolyásolja az ár a vásárlási döntését? *

- ◯ Nagyon
- ◯ Közepesen
- ◯ Nem befolyásolja

12.Szokott visszavinni betétdíjas termékeket visszaváltó helyre? *

- ◯ Igen, ha van lehetőségem akkor mindig
- ◯ Igen, de annyira nem fontos számomra
- ◯ Általában nem,de ha úgy adódik akkor néha visszaviszem
- ◯ Nem, nem is foglalkoztat

13.Ha vissza viszi beváltani, a betétdíjas termékeket, ezt leginkább milyen indokból teszi? *

- ◯ A betétdíj visszatérítése miatt
- ◯ Környezettudatosság
- ◯ Nem szoktam visszavinni
- ◯ Egyéb

NYILATKOZAT

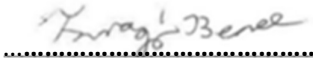
Alulírott Faragó Bence büntetőjogi felelősségem tudatában nyilatkozom, hogy a szakdolgozatomban foglalt tények és adatok a valóságnak megfelelnek, és az abban leírtak a saját, önálló munkám eredményei.

A szakdolgozatban felhasznált adatokat a szerzői jogvédelem figyelembevételével alkalmaztam.

Ezen szakdolgozat semmilyen része nem került felhasználásra korábban oktatási intézmény más képzésén diplomaszerzés során.

Tudomásul veszem, hogy a szakdolgozatomat az intézmény plágiumellenőrzésnek veti alá.

Budapest, 2024 év 11 hónap 30 nap



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hallgató aláírása