

DEVELOPMENT OF ENVIRONMENTAL REGULATIONS AND BENEFITS ON ENTERPRISES

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Abstract. The Porter Hypothesis is one of the most controversial views and has received a lot of attention since it was written by M.Porter in 1991. His ideas were strikingly similar to some of the environmental policies developed in Latvia since 1990's. There have been advanced market based environmental regulations implemented in Latvia, and as current data shows, it was quite beneficial to the private enterprises as well as state and municipal entities. As monitoring data for Climate Change Financial Instrument implementation have become more available there were opportunities for analysis of them and also in relation to Porter Hypothesis statements.

This research article provides analysis of the benefits to the enterprises participating in the specific environmental programme as well as public sector entities during the programme. Total impact of the programme based on the European Commission guidelines on Cost Benefit Analysis and European Investment Bank value estimates were calculated, and further research was analyzed. In addition to intangible benefits, the results show clear financial benefits to the enterprises and public sector.

Key words: Porter hypothesis, environmental regulations, entrepreneurship.

JEL code: Q50, Q51, Q58, M1

Introduction

The economy of Latvia has been in rapid development since beginning of 1990s. The same can be said about the environmental regulations. During these years there has been the continuous discussion whether the environmental regulations are having an impact on enterprises. This item has been used in wide range of conferences, discussion forums or when something is delaying construction project. But there is no clear understanding whether that is true and what quantifiable impact on enterprises is.

As the latest research regarding to this shows there are difficulties in estimating costs or benefits from environmental policy measures as there are not a sufficient data available or the data are not available at all. In the same time Latvia has reached quite high results in overall environmental performance, for example 22 place in the world in 2016 in Environmental Performance Index (Hsu *et al.* 2016).

Interestingly M.Porter in almost the same time (1991) formulated his view regarding the environmental policy and its impacts on enterprises which has since that time become known as "Porter Hypothesis". It is still controversial as a statement and has been analysed from different theoretical and empirical

viewpoints, but the analysis of his view is showing striking similarities with the opinions in Latvia regarding impact on enterprises financial results and benefits. In the same time substantial number of European level environmental regulations currently are following the ideas stated in the Porter Hypothesis.

In the latest empirical studies there was not enough information delivered on how this impact is evaluated for specific region of Central and Eastern Europe or so called "Countries in transition Economies". It is important as most of available data up to now does not include these economies. As stated by Sylvia Albrizio, Enrico Botta, Tomasz Koźluk and Vera Zipperer (2014), wider country coverage is required as currently almost all of the existing evidence uses data from developed countries.

In this article, the authors will provide an analysis of the most recent data available of a market based instruments of the environmental regulations implemented in Latvia and provide the suggestions for further research.

The authors research hypothesis states that the market based financial instruments, when looking from the Porter Hypothesis narrow approach are beneficial not only to economy as whole but also to enterprises and public sector entities.

The research will focus on the analysing of quantitative data and beneficiaries of market based environmental regulatory policy, specifically Climate Change Financial Instrument (KPFI) as monitoring information for this programme is currently providing most up to date information, year 2015 being with the most of activities providing full monitoring reports.

The monitoring data will be evaluated based on the methodology applied by the European Commission in the Guidelines to Cost Benefit Analysis and European Investment Bank value estimates.

The quantitative data analysis in this article is limited to the current data collected by Ministry of Environmental Protection and Regional Development of Latvia from the beneficiaries and enterprises implementing Climate change policy measures.

Research results and discussion

1. Theories in the background

There has been a long period of time since Michael Porter articulated his view that "Reducing pollution is often coincident with improving productivity with which resources are used". From this reasoning, Porter argued that "properly designed environmental regulation can trigger innovation that may partially or more than fully offset the costs of complying with them" (Porter, van der Linde, 1995). This has come to be known as the Porter Hypothesis. But there still are controversial views regarding Porter's idea.

Initially, the Porter Hypothesis was backed by anecdotal examples collected by the authors, without a rigorous theoretical explanation of the factors at work or any comprehensive empirical evidence – many of these were developed only subsequently (Ambec *et al.* 2013; Desrochers 2008).

As argued by Oates, first, the evidence initially provided in its support was based on small number of enterprise case studies, in which the enterprises were able to reduce both their pollution emissions and their production costs. As

such, it can hardly be generalized to the entire population of enterprises.

Second, economists would suggest that, in a perfectly competitive economy, if there are opportunities to reduce costs and inefficiencies, enterprises could identify them by themselves without the help of the government (Oates *et al.* 1995).

Porter's original concept focused on enterprise-level activity, emphasizing the potential "optimistic" aspects of gains in productivity, profitability and competitiveness gains induced by environmental regulations. Examples cited in the original work concerned mainly improvements in production processes through the development and adoption of new technologies and cost-savings. However, particularly at a more aggregate level, productivity improvements may actually come from the cut-back or outsourcing of less efficient activities and the exit of less efficient enterprises – with more general economic outcomes hinging on issues such as a swift reallocation of resources (Albrizio *et al.* 2014). Following Porter and van der Linde (1995), enterprises do not detect the potential of environmental innovations because they are "... still inexperienced in dealing creatively with environmental issues. Environmentally and economically benign innovations are not realised because of incomplete information, organizational and coordination problems. Enterprises are not able to recognize the cost saving potentials (e.g. energy or material savings) of environmental innovation so that for example Environmental Management Systems may serve as a tool to detect the lacking information."

The arguments backing Porter's Hypothesis are often behavioral - based on the idea that managers may be risk averse, myopic or rationally bounded and hence may not be able to realize all profitable investment opportunities. Other arguments include the presence of market failures, such as imperfect competition (due to

first-mover advantage or barriers to entry), asymmetric information (where "green" products are not correctly valued by consumers), R&D spill-over effects (as innovation has a public good character and leads to underinvestment), and organizational failure (where managers are able to lie about the true abatement costs in order to secure extra personal profits). Hence, in each such case, environmental regulation may potentially induce investments which turn out to be profitable ex post (Constantos, Hermann 2011; Hovardos, 2016).

In an attempt to better categorize empirical testing approaches, the Porter Hypothesis has been differentiated into weak, strong and narrow versions (Jaffe and Palmer, 1997):

- In the weak version of the Porter Hypothesis environmental regulation will lead to an increase in "environmental innovation", that is more innovation directed at minimizing the costs of the environmental input/output subject to regulation (as implied by Hicks 1932). An increase in "environmental" innovation may come from a pure redirection of innovation efforts, without any net increase in the latter.
- In the strong version, the costs saved from innovation and the improved production processes will outweigh compliance costs, leading to increased productivity, profitability and competitiveness.
- In the narrow version, more flexible environmental policy instruments - designed to target the outcome rather than the design of the production processes - are more likely to increase innovation and improve enterprise performance.

However, during the last 20 years, a vast literature has proposed many theoretical justifications for the Porter hypothesis. These include behavioral arguments (the interests of enterprises and managers might not align, and regulation forces managers to adopt innovations

that are profitable for the enterprise but do not increase the manager's utility) or the existence of additional market failures such as market power or knowledge spillovers (Lanoi *et al.* 2011; Ambec *et al.* 2013). Along with these theoretical developments, there has been a large amount of the empirical researches works investigating the validity of the Porter hypothesis in practice.

According to Dechezlepretre and Sato (2014) and Visser (2015) the result of current state of research on environmental regulations and impact on enterprises can be finalized into following:

- environmental regulations make a small difference to productivity and employment;
- environmental regulations only marginally affect international competitiveness;
- the benefits of environmental regulations often vastly outweigh the costs;
- environmental regulations induce innovation in green technologies;
- switching to green technologies can have economy-wide benefits.

As they and Rexhauser and Rammer (2014) as well as von Weizsacker *et al.* (2009) argue, a key area for the future research is to identify where environmental regulations can be strengthened to deliver clear social benefits, in terms of health or new technologies, with little risk for reducing competitiveness. Because policies can affect sectors differently, this should be assessed on a sector-by-sector basis, depending on the abatement opportunities available and the level of competition the sector is exposed to. For each sector, policies will need to be tuned to balance the policy goals with the multiple impacts of environmental regulations on pollution, employment, trade, productivity and innovation.

2. Porter hypothesis. A case for Latvia

There has been important development of environmental legislation in Latvia during the last 15-20 years. As it was mentioned earlier there is

a coincidence that basis for the Porter Hypothesis was developed as Latvia started to develop market economy and all regulations in the same time. Substantial efforts were made to develop environmental regulations according to the best available examples from Western European countries. Alongside with development of environmental regulations some interesting market based instruments were created according to the European Union and the Kyoto Protocol guidelines.

As stated by the United Nations (UNFCCC:2, 1998): "Policy makers can use insights from empirical analysis to evaluate environmental regulations against their objectives". This information is particularly useful with often intense political and lobbying pressures governments face when formulating environmental regulation (Albrizio *et al.* 2014). For example, the Kyoto Protocol states that "the Parties strive to implement policies and measures in such a way as to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, especially developing country Parties..." (UNFCCC:3, 1998).

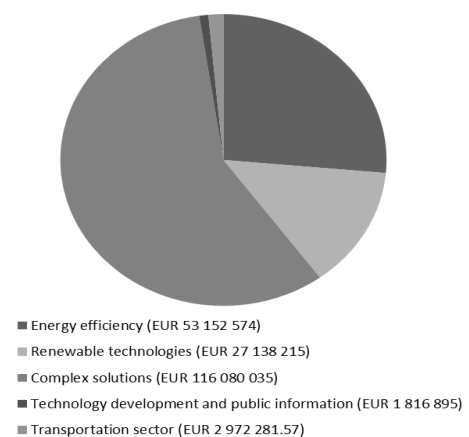
For the most of time this new set of regulations for Latvia was taken as given. There were no specific analysis as data for impact on enterprises and industries were missing. Estimates for impact were analysed based on available examples from Western European countries provided by the EU experts. So, the different EU wide environmental policies were applied but evaluation of the data was not done sufficiently. Only now after long period of time we are seeing sufficient ex post data from enterprises and industries (Atstaja *et al.* 2012).

To implement Kyoto Protocol in national legislation, Latvian Law on Participation of the Republic of Latvia in the Flexible Mechanisms of the Kyoto Protocol was adopted in 08.12.2007. It relates to a narrow version of empirical

approaches according to Jaffe and Palmer (1997), as there are set targets but not set limits. The purpose of this Law was to promote the prevention of climate change, adaptation to the consequences caused by climate change and to facilitate the fulfilment of the commitments for the reduction of greenhouse gas emissions assigned to the Republic of Latvia in the Kyoto Protocol (Cabinet of Ministers of Latvia, 2007).

As it is shown in the Table 1, initial estimate for total amount of financial gain to the Latvian state budget would be at 153.8 million EUR for total programme period, but according with the information provided by Ministry of Environmental Protection and Regional Development (MEPRD) in 2016, the exact amount of revenue to the Latvian state budget for subsequent implementation was 208 million EUR. (MEPRD, 2016).

There were in total 9 contracts signed from 2009 till 2015 for sale of total of approximately 40 million of assigned amount units (as named and described in the law) and the received almost 202 million EUR were invested in projects according with the goals of the programme.



Source: MEPRD report, 2016

Fig. 1. Sectors of KPFI programme implementation activities 2007-2015

In 2016, there were 3 full periods of monitoring of project results and as the data were provided by MEPRD on each and specific project, an evaluation of impact to enterprises and economy level was made.

Table 1

Latvian State budget income and expenditure initial estimate from implementation of KPFI (2007-2012), thous.EUR

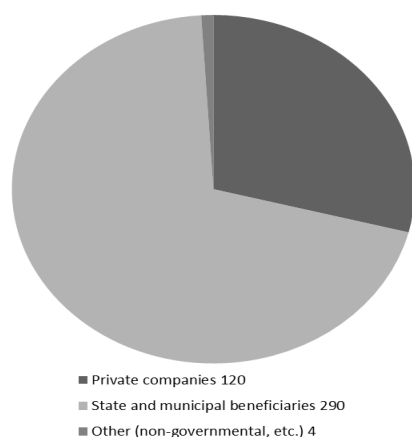
Budget position	Current year 2007	2008	2009	2010	Average for next 5 years after current year
1	2	3	4	5	6
Change in state budget income	0	39840	49801	49801	39481
Change in state budget expenditure	0	171	24189	49801	39481

Source: authors recalculation based on Annotation to the Law on Participation of the Republic of Latvia in the Flexible Mechanisms of the Kyoto Protocol (as adopted on 08.12.2007)

According to the latest Information report for 2015 provided by MEPRD in April 2016, there were in total 414 implemented projects in 16 different KPFI activities from 2009 till 2015. These do not include special activity to support small scale renewable technology to private housing sector with 2266 separate project implementation contracts signed, as they have different reporting requirements.

Basic information collected is estimated tonnes CO₂ emissions equivalent avoided (t CO₂e) during the year in each beneficiary of the programme (in this case 2015).

Overall structure of KPFI programme beneficiaries by number of participants is shown below in Fig. 2.



Source: Authors calculation based on MEPRD 2016 report

Fig. 2. Beneficiaries of KPFI programme activities 2007-2015

As data shows there were in total 120 private enterprises participating in this programme and the represented all range of businesses in Latvia starting from small sized enterprises till some of largest as for example electricity giant

Latvenergo. Full monitoring information is provided for 90 enterprises out of 120. This provides us with representation of data related to the Porter hypothesis views.

Major share of participants is representing public sector. That includes mostly state level and municipal level educational, social and healthcare institutions. The data provided in the monitoring report shows that not all beneficiaries have provided data on emission reductions, so out of 414 the amount of reduction of CO₂e is not provided for 73 beneficiaries, partly related to low emission transportation activity and its different reporting requirements. There should be some further attention to all beneficiaries of the programme to provide all monitoring data in next reports. In addition cross evaluation of data consistency should be developed.

3. Estimated impacts from the KPFI programme

The KPFI programme provided a number of benefits to participants; most of them can be named but not financially estimated. As mentioned earlier the environmental regulations induce investments in green technologies but switch to them provides economy with wide benefits. The specific benefits identified during KPFI programme are availability of financial support, possibility to substitute old inefficient technology, improve energy efficiency in buildings for public sector and many more. The enterprises gained access to resources, knowledge, know-how, improved human resource in relation to efficiency and effectiveness, most

importantly from authors view – improved their business model and gained some marginal advantage over the other market participants. There is an opportunity for further research how and in what amount they have gained advantage over the other enterprises.

There were also some really practical benefits to small and medium size enterprises, as one of the private beneficiaries mentioned opportunity to invest in new technology instead of buying used one without support from the programme.

To evaluate financial impact of KPFI programme author takes into account the value of CO₂ emission reduction what can be estimated according to methodology provided by European Commission in "Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020 (Guide)". As stated by Corina Cretu, the European Commissioner for Regional Policy: "Evidence-based and successful policy requires making investment decisions based on objective and verifiable methods. This is why the Commission has been continuously promoting the use of Cost-Benefit Analyses for major infrastructure projects above 50 million EUR. For the first time, in the 2014-2020 period, the basic rules of conducting CBAs are included in the secondary legislation and are binding for all beneficiaries (European Commission:11, 2014)."

According to the methodology provided in Guide (European Commission:62, 2014) t CO₂e emissions should be multiplied by a unit cost expressed in EUR/tonne. It was suggested to use the values illustrated in Table 2, for the central scenario, going from EUR 25 per tonne of CO₂e in 2010 and then assuming a gradual increase to EUR 45 per tonne of CO₂e until 2030. As stated in the Guide - due to the global effect of global warming, there is no difference between how and where in Europe greenhouse gases (GHG) emissions take place, and this applies to all countries. However, the cost factor is important as it was estimated that emissions in future years

will have greater impacts than emissions today (European Commission: 63, 2014).

Guide has provided data on value of GHG (in tonnes of CO₂e) reduction estimate. It was based on European Investment Bank (EIB) special analysis report (EIB, 2013) where data and methodology from major EIB supported projects were analysed.

Table, 2

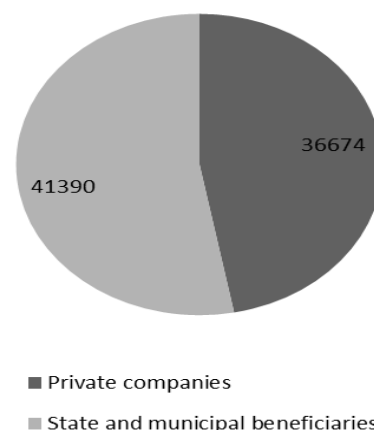
Unit cost estimates of different scenarios for calculation of GHG emissions for Cost Benefit Analysis needs, EUR

Scenarios	Value 2010 (Euro/t CO ₂ e)	Annual adders 2011 to 2030
High	40	2
Central	25	1
Low	10	0.5

Source: Guide 2014, EIB 2013

As data show, unit cost estimate for GHG emission reduction (in tCO₂e) was calculated at 50/30/12.5 EUR for 2015.

Authors then calculated total amount of emission reduction by private enterprises and state and municipal beneficiaries in year 2015 as seen in Fig. 3



Source: Authors calculation based on MEPRD 2016 report

Fig. 3. GHG Emission reductions per sectors of beneficiaries in 2015, tCO₂e

Data shows that the private enterprises implemented 90 out of 414 projects (21.7 %). When looking at the reduction of tCO₂e, their share is increasing to 47.0 % out of total.

As the amount of emission reduction for year 2015 has been established, the value of benefits can be calculated.

Table 3

Value of benefits to private enterprises and public sector from CO₂ reduction in 2015, EUR

Scenarios	Value 2015 (Euro/t-CO ₂ e estimate)	Value of benefits by private companies	Value of benefits by public sector
High	50	1 83 37 14	2 06 94 99
Central	30	1 10 02 28	1 24 16 99
Low	12,5	45 84 29	51 73 75

Source: authors calculation based on Guide, 2014, EIB, 2013 and MEPRD, 2016

As the Table 3 results show, the implementation of CO₂ emission reduction is providing a substantial amount of benefits, if looking at Central estimate – 1.1 million EUR to private enterprises and 1.2 million EUR to public sector in a single year.

As monitoring reports for 2016 and following year will be available, new data will provide additional insight into the long-term benefits of the KPFI programme.

Authors' research suggests that there are clear benefits from implementation of market based environmental regulations and further research on the topic will provide additional benefit quantification to enterprises based on more detailed analysis of results provided by KPFI programme.

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Conclusions, proposals, recommendations

- 1) Up till now there have been difficulties estimating costs or benefits from different environmental regulations in Latvia as there were not sufficient data available or data were not available at all.
- 2) Alongside with development of environmental regulations several market based instruments were created according to the European Commission guidelines. KPFI programme was one of them.
- 3) From 2009 till 2015 aprox. 40 million assigned amount units were sold and state budget received 202 million EUR what were invested in KPFI projects, including 414 large and medium size projects
- 4) In addition to intangible benefits, the estimate for benefit from emission reductions was developed based on the EC Guidelines and EIB estimates.
- 5) The research shows the benefit of CO₂ reduction for private enterprises and public sector based on monitoring data for 2015. Further research would provide estimates of other benefits to enterprises.
- 6) Further research needs to address all market based instruments and comparison to the other countries, what have implemented similar programmes.

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