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**Master Thesis Abstract**

**Cost Benefit Analysis of Selected Biofuels in the Czech  
Republic**

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## Summary

In the last several years biofuels became one of the main drivers of the energy sector. Czech Republic as well developed its biofuels sector and general consensus on the importance of advantages related to biofuels has been established. However, many researchers and associations such as Sorda et al., Ajanovic and others see several shortcomings of biofuels industry expansion. Therefore, the net costs of biofuels utilization in the Czech Republic are not clear yet. There is a gap in the estimation of economic costs and benefits of the industry. This thesis aims to narrow the gap with a research on economic welfare effects of the biodiesel and bioethanol industry expansion in the Czech Republic including the factor of biofuels policies. Cost benefit analysis was conducted with a consumer and producer surplus theory approach based on econometrically modeled functions of selected biofuels demand and supply. The results of the research are contradictory, however it is clear that biodiesel and bioethanol utilizations and subsidies presence on the market result in the net economic loss of 9.109 million CZK. The research outcomes prove the problem of too intense direct financial support of the biofuels sector in the Czech Republic and the need to increase indirect methods of support such as investments in R&D and infrastructure development.

**Keywords:** Biofuels, biodiesel, bioethanol, subsidies, Czech Republic, renewable energy policy, cost benefit analysis, regression analysis, food prices, environmental costs, economic costs, welfare effect, consumer surplus, producer surplus.

## Extended Abstract

In 20<sup>th</sup> century life was driven by fossil energy and even nowadays fossil fuels cover the most part of world's energy demand. However, in recent years, renewable energy and especially biofuels has become a topic of a high scientific and practical interest. Several researchers, such as Ajanovic (2008), Demirbas (2008) and others, analyze biofuels benefits and shortcomings. Czech biofuels market is characterized by significant subsidies and low productivity (Mikulasova, 2015). Biofuels industry development is important for the Czech Republic, especially in the frame of European Union Directives. However, there is insufficient amount of research connected to the industry.

## Main Aim

Existing researches have a gap in the estimation of economic costs and benefits of the biofuels industry in the Czech Republic. This thesis aims to narrow the gap with a research on economic welfare effects of the biodiesel and bioethanol industry expansion in the Czech Republic including the factor of biofuels policies.

The research questions of this thesis are:

- What are the economic costs and benefits of biodiesel and bioethanol utilization in the Czech Republic;
- How these costs and benefits ratio contributes to the welfare of the country.

## Methodology

The author made research on existing approaches to the cost benefit analysis of the industry. Some researches use scenarios and imitations to see what effect will have an activity of policy in future (Massiani, 2015; Santamaria et al., 2015). Others use ex-post evaluation to see the effect that activity has now or had in the past (Bell et al., 2011; Lu et al., 2012). Consumer and producer surplus analysis was mentioned several times as one of the key implementations of cost benefit analysis (Campbell and Brown, 2012). As a result the author uses the ex-post evaluation approach to the cost benefit analysis and uses the theory of consumer and producer surplus to estimate costs and benefits of bioethanol and biodiesel industry in the Czech Republic.

In general, the methodological framework of this thesis looks as follows:

1. Research and building of the theoretical framework on biofuels industry in the Czech Republic.
2. Comparative analysis of the biofuel policies in different countries.
3. Building economic and econometric models (Least square methods) to estimate the production and consumption functions of the biodiesel and bioethanol in the Czech Republic.
4. Plotting the curves of supply and demand for biodiesel and bioethanol in the Czech Republic using real data of December 2014 observations.
5. Estimating the consumer and producer surpluses of biodiesel and bioethanol industry and the subsidies influence on the total welfare of the country (December 2014).

## Results and Discussion

Figure 1 shows how subsidies change the situation on the market and correct the size of consumer and producer surpluses as well as introduce the government costs. Trapezoid BEEsG represents the increase in consumer surplus. The calculation of its square value gives the amount of 163.318 million CZK. Producer surplus increase is illustrated by the trapezoid BDFE and equals 159.194 million CZK. Total economic costs connected to the subsidy implementation are paid by the government and are presented by the rectangular DFEsG. The value of its square is 331.622 million CZK. It can be seen on the Figure 1 that rectangular DFEsG is bigger than the sum of trapezoids BEEsG and BDFE, as it also includes triangle EFEs. This triangle represents the deadweight economic loss of the society due to the subsidy implementation and it equals 9.109 million CZK

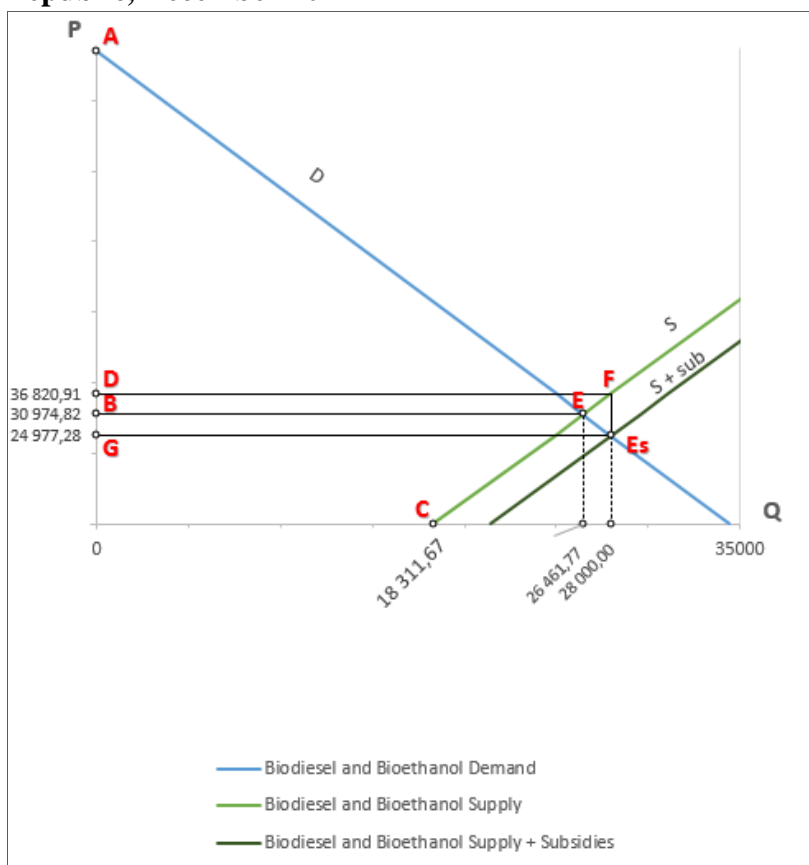
The research proved arguments stated in the theoretical framework. First of all, subsidies were proved to provoke economic loss, particularly in the Czech Republic market. Secondly, the biofuels market low transparency was confirmed by the difficulties with data mining during the research. As a result, the estimated model is preliminary and therefore considered not to be precise. Results are controversial. From one hand, all the verification tests proved that the model is unbiased and sufficient. Most part of the theoretical assumptions made before the estimation were fulfilled and go along with the economic theory. From the other hand, estimated values sometimes have significant differences with the real life observed values, for example in the case of total subsidies amount. Therefore, the author recommends to consider the results of the research, in particular the cost-benefit analysis, to be theoretical.

## Conclusion

This research meets the objectives of estimation the economic costs and benefits of biodiesel and bioethanol use in the Czech Republic and examination of how their utilization influences the economic welfare of the country. The research questions were answered with a help of theoretical model based on real life time-series observations.

The main value of this paper is the methodology presenting a set of methods and instruments that were implemented for the cost-benefit analysis of the biodiesel and bioethanol utilization in the Czech Republic. To the extent of the author's knowledge, there are no research papers published in English with the same methodology applied for the biofuels market of the Czech Republic.

**Figure 1 The Effect of the Subsidy on the bioethanol and biodiesel market in the Czech Republic, December 2014**



Source: own work

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