



CHARLES UNIVERSITY
Faculty of mathematics
and physics

Anthony David Leamer, B.Sc. Thesis

**Profit Maximization of Car Manufacturers
Facing EU CO₂ Emission Penalties From 2021**

Supervisor Report

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This thesis studies the impact of the forthcoming CO₂ penalties imposed by the European Union on the car manufacturers. The car manufacturers will pay penalties for producing and selling the cars that do not meet the CO₂ emission limits. The penalty itself is paid by the manufacturers on their entire production across all segments and the exact penalty value is not computed in a straightforward fashion as it also depend on some technical specifications of the individual cars, such as their weights. Thus the thesis focuses on various car segments which differ in penalty computation, such as cars not meeting the emission standard, cars meeting the emission standard and cars with little or no emissions that earn extra emission credits.

The question itself is original and very timely and the literature on the topic is pretty much non-existent. Moreover, the analysis does not require new theory or new mathematics, it is solved by standard constrained optimization techniques. The results presented in the thesis are quite interesting, depending on the model of the demand function of the consumers. The demand functions considered are linear and exponential – these are ad hoc choices as the economic literature does not suggest reasons for using any specific form of the demand function. Very interestingly, the linear demand function means that the consumers and the manufacturer will split the imposed penalty, meaning that the cost of the car will increase by the half price of the penalty imposed. The exponential demand function means that the penalty is fully absorbed by the consumers.

While the conclusions of the thesis are novel and potentially exciting as it reveals optimal price behavior of the manufacturers, the exposition presented in the thesis

could have been better. Some sentences begin with an equation or with a conjunction. The notation itself is sometimes not well documented and a reader can get confused about the problem which is studied.

Summary: The thesis satisfies conditions of a bachelor thesis and I recommend that it is **accepted as such**.

A handwritten signature in blue ink, appearing to read 'Jan Vecer', with a stylized flourish at the end.

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