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The impact of eco-driving on the Motor Own
Damage insurance risk of the light vehicle fleet in
Poland

Wpływ eco-drivingu na ryzyko ubezpieczeniowe
autocasco floty pojazdów lekkich w Polsce

Doctoral dissertation summary

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Doctoral dissertation summary

1. Research topic relevance

Nowadays the environment in which we live is one of the strategic objectives of European Union (EU). At the end of last century, it was recognized that the transport sector causes 26% of the total carbon dioxide emissions into the atmosphere. This is largely due to the universal function of a car as a means of land transport powered by an efficient internal combustion engine, its increasing availability and the expansion of the road network and consequently, the rapid development of the car transport industry. In Europe, the first exhaust emission standard for motor vehicles was introduced in 1970. Over the years, more and more restrictive emission standards were introduced to force the automotive industry to construct more ecological engines. Eco-driving has become a part of the ecological trend. It was created in the 1970s as one of the ways reducing fuel consumption by motor vehicles during the period of rising fuel prices. The growing importance of ecology meant that in a short time the economic function of eco-driving was associated with ecology which contributed to its dissemination.

Reducing fuel consumption brings not only economic benefits to the owner or user of the vehicle but also brings ecological benefits to the general public through lower emissions of harmful substances contained in exhaust gases into the atmosphere.

There is no uniform definition of eco-driving in a foreign and domestic literature. It is expressed the best in the form of rules that a driver should follow in order to use a car economically, energy-efficiently and ecologically. In practice, eco-driving means a technique for using a car that causes it consumes less fuel and in the case of ecological engines less energy, increasing the limited range of a vehicle. Currently, it is used in car fleets to reduce fleet operating costs and increase the range of vehicles. Economic and ecological issues of eco-driving are a mandatory element of the course and practical exam for people applying for a driving license. In modern passenger cars, a lot of on-board systems support a driver in economical, energy-efficient and ecological use of the vehicle.

Motor insurance in the Polish non-life insurance sector is the most important area of activity of non-life insurers. This is related to the legal provisions that impose an obligation on vehicle owners to have third party liability insurance. Despite the moderate rate of economic growth, the motor insurance sector is systematically developing which is largely related to the

increase in the number of registered motor vehicles. Passenger cars currently account for over 76% of all registered vehicles. In the years 1990–2020, their number increased almost fivefold. In the conditions of a competitive insurance market, it is very important for insurers offering motor vehicle insurance to identify various factors that affect to insurance risk. Motor insurance of business entities with at least several vehicles is called a fleet insurance. The fleet insurance constitutes a different insurance risk than an insurance of private vehicles of individual customers. For this reason, not all insurance companies offering motor insurance have an offer for car fleets.

In the process of assessing the risk of car fleets, insurers take into account a lot of risk factors including: the number of vehicles in the fleet, the loss ratio of the fleet in the last three to five years, the scope of cover of motor own damage insurance (MOD), the value and type of vehicles they use. However, the basic factor influencing risk assessing and fleet insurance premium calculation is the loss history of the fleet. Insurance risk increases with the increase in the frequency and severity (the value) of claims. As a consequence, the insurance premium may be higher. The recognition of risk factors by the insurer allows for a better adjustment of the insurance price and as a result, may have a positive impact on the profitability and competitiveness of the offered fleet insurance. Currently, there is no information on the insurance market if underwriters assessing risk in insurance companies treat eco-driving as one of the risk factors in the car fleet risk assessment process.

Within motor insurance there are several insurance products related to the insurance of the vehicle and its owner. The most well-known and basic products include compulsory motor third party liability insurance (MTPL) which protects the owner and driver of the vehicle in the scope of claims against third parties resulting from damage caused by the use of the vehicle and voluntary motor own damage insurance which covers damage caused to the insured vehicle.

In MOD insurance – unlike MTPL insurance – there is no significant time gap between the occurrence of a claim and its reporting to the insurer. The damage to the insured vehicle, the circumstances of its occurrence, the cause and extent as well as the insurer who covered the vehicle with insurance are known to the driver. It allows to report damage in a short time after its occurrence. Market practice shows that in fleet cars which are a working tool for a fleet driver, damages are reported to the insurer without undue delay. The fleet car must be repaired as soon as possible so that the fleet driver can carry out his business tasks without

any obstacles. In MOD insurance for fleet cars – unlike in MTPL insurance – after the end of the insurance period, the insurer receives practically the full loss history of this insurance. This allows for more complete and accurate analysis of the claims history and causes of claims in fleet vehicles.

Fleet passenger cars are used by lots of companies in various industries. Light fleets, consisting mainly of passenger vehicles are used by commercial departments of production, service and distribution companies, as well as local government units and state administration. Fleet passenger vehicles do not require specialist driver's licenses and can be driven by any drivers with a license to drive a category "B" vehicle. The same permissions are necessary to drive a private passenger car. Fleet cars are characterized by high annual mileage which results from the specificity of business tasks of fleet drivers. Fuel costs account for a significant share of vehicle operating costs. Reducing the average fuel consumption by up to several percent through the implementation of eco-driving in the fleet brings visible annual savings to the company using the fleet. The eco-driving support systems existing in modern cars do not always ensure that fleet drivers adhere to economical driving techniques. The implementation of eco-driving principles in large fleets with a lot of drivers often requires support through the use of telematics systems that allow the measurement and observation of results.

Eco-driving and its impact on fuel economy, reduction of exhaust emissions, safety and energy consumption have been the subject of research and publications by both Polish and foreign researchers. Especially in the last two decades, the general ecological trend which forces changes in the automotive market and a gradual departure from conventional car drives in favor of ecological drives, has contributed to many studies and publications on the impact of individual elements of eco-driving on reducing fuel consumption, emissions of harmful substances into the atmosphere and in the case of zero-emission ecological cars, the impact of eco-driving on energy consumption, travel planning and extending the range of electric vehicles. The literature on the subject lacks studies that would address the issue of eco-driving in the context of insurance risk.

Summarizing the reasons for choosing the topic of the dissertation, there are a number of areas that were crucial in this process of choosing the topic of the dissertation are distinguished namely:

- widespread use of passenger cars by enterprises operating in various industries,

- the ecological, economic and energy-efficient dimension of eco-driving and its relevance against the background of ecological challenges of the automotive market,
- significant position of motor insurance on the non-life insurance market and its impact on the size and profitability of the non-life insurance sector,
- the use of eco-driving by companies using car fleets as a way to save fuel, increase the range of cars and reduce vehicle operating costs,
- good recognition of losses from MOD insurance in fleet cars due to their quick disclosure and knowledge about their number, value, causes and circumstances,
- lack of knowledge if insurers take into account eco-driving as one of the risk factors in the process of assessing the risk of fleet motor insurance,
- lack of scientific studies that would address the issue of eco-driving in the context of risk factors in the risk assessment process of fleet motor insurance,
- supplementing the state of knowledge in the field of issues related to the impact of eco-driving on the number and value of losses under motor own damage insurance for passenger car fleets.

2. Research problem

The research problem was formulated as the following question:

How does the economic driving style of fleet passenger car drivers affect the MOD insurance risk?

3. Research objective and hypotheses

The main objective of the dissertation is:

To identify the impact of eco-driving on the motor own damage (MOD) insurance risk for fleet passenger cars.

Achieving the main research objective requires the following research tasks:

1. Characterization of MOD insurance for car fleets.
2. Recognition of how the MOD insurance risk is assessed in fleets of light vehicles by insurance companies.

3. Recognition what characterizes eco-driving understood as an ecological, economical and energy-saving style of driving a passenger car.
4. Recognition whether eco-driving used by drivers of fleet passenger cars is taken into account by underwriters in insurance companies as one of the risk factor in the risk assessment process.

The following research hypothesis was adopted in the dissertation:

The usage of eco-driving by drivers of light vehicle fleets reduces the insurance risk of MOD insurance, in particular, it reduces the number and value of claims.

4. Sources and methods

The following research methods were used in the implementation of this dissertation:

- analysis of statistical data,
- empirical research including experimental research using telemetry and a survey,
- comparative analysis.

The sources of data were the results obtained during the research, observations, interviews, statistical data, press articles and scientific publications, conference materials as well as reports, studies and databases made available by various institutions. While writing the dissertation, a number of Polish and foreign publications were used including insurance and automotive market, motor insurance, including in particular MOD insurance, car fleets, safety and driver support systems in motor vehicles, the impact of using motor vehicles on the natural environment, insurance risk, underwriting, eco-driving. The author's own empirical material collected as a result of experimental research and survey research was also used.

5. Dissertation structure

The main part of the dissertation consists of four chapters preceded by an introduction and followed by a conclusion.

The introduction presents the topic, an explanation of why it is important and what are the reasons for its selection. It also describes the subject of the work, the research problem, the main objective of the dissertation with research questions and a hypothesis was

formulated. In addition, the data sources used in the work and the research methods were presented.

The first chapter introduces the issues of motor insurance in Poland. Its first part discusses the genesis of motor insurance and then explains what the most important motor insurance is characterized by: compulsory third party liability insurance for motor vehicle owners (MTPL) and voluntary motor own damage insurance (MOD). The chapter ends with an analysis of the Polish motor insurance market in 2010–2021.

The second chapter discusses insurance risk, its management and its assessment, emphasizing the role of insurance as one of the most common methods of dealing with risk in the light of motor fleet insurance. The concept of a car fleet from the perspective of insurance companies was explained and as a result of the literature analysis, a comprehensive description of car fleets was made. The issue of identifying and indicating the differences that exist in insurance companies in terms of the structure of the offer and the method of organizing car fleet insurance and mass insurance of single vehicles belong to individuals was undertaken, resulting from the different needs of institutional customers using fleets and individual customers using single, own vehicles. The role of the fleet manager in the process of fleet management and its claims history was indicated, including the identification and review of modern possibilities and tools supporting the fleet manager in the risk management process. It was explained how the motor insurance risk of car fleets is assessed by underwriters in insurance companies. The risk assessment steps are defined. It was explained how underwriters identify risk factors and make their selection and assessment in the process of assessing the risk of car fleet motor insurance. The issue of explaining the differences that occur in the process of assessing and pricing the risk of car fleet insurance and mass insurance of single cars of individual customers was undertaken.

The third chapter considers the concept of eco-driving. As a result of the undertaken analysis of the literature, the characteristics of eco-driving were described, how it affects fuel economy, energy consumption and the emission of harmful substances contained in the exhaust gases of conventional engines into the atmosphere. The principles of eco-driving were identified which the driver should follow if he wants to use the car in an ecological, economical and energy-saving manner in the areas of driving technique, driver comfort in the vehicle cabin, trip planning, load management, purchase of an energy-efficient car as well as the technical condition and operation of the vehicle. The contemporary possibilities offered by

modern cars in the field of supporting the driver in implementing the rules of eco-driving in practice, training and technical solutions supporting the implementation of the rules of eco-driving in light fleets were identified and reviewed, considerations were made on the role of eco-driving in the future.

The fourth chapter presents the results of the conducted research:

- an experimental study on eco-driving, carried out using telemetry in a fleet of light cars, consisting of Toyota Yaris passenger cars in real, everyday usage of vehicles resulting from the official tasks of fleet drivers,
- a survey using the method of structured in-depth individual interview (IDI) in insurance companies offering motor insurance for fleets on the Polish market.

At the end, the conclusions resulting from the conducted research and the results of the verification of the research hypothesis were collected. In addition, the application nature of the research results was indicated. The limitations of the conducted research and areas for further development are also described.

6. Research results and final conclusions

The observations made during the analysis of the results of the experimental study allowed the formulation of the following conclusions:

- fleet vehicles that drove more economically and ecologically had less losses than vehicles that drove less economically and ecologically (in the full comprehensive insurance). The ratio of the number of claims per 1,000,000 km and the frequency ratio had more favorable values for the group of vehicles whose drivers applied the rules of eco-driving better in practice than in the group of vehicles whose drivers drove less economically and less environmentally friendly,
- no significant differences were observed in the distribution of losses values between the group of vehicles that drove more economically and ecologically and the group of vehicles that drove less economically and ecologically. Thus, if there is damage, its amount does not depend on the driving style.

The analysis of the survey results confirmed that the most important risk factor analyzed by underwriters in the process of assessing the risk of motor insurance of passenger fleets is the loss ratio of the fleet which is confirmed in the literature on risk assessment in motor

insurance. In addition, the analysis of the study results allowed the formulation of the following conclusions:

- currently, eco-driving is not perceived by insurers offering motor insurance on the Polish market as an important risk factor in the risk assessment process,
- underwriters see risk assessment to a greater extent in identifying and assessing elements of a safe or aggressive driving style of drivers than in recognizing and assessing elements of economic driving technique of drivers,
- most insurers currently using telematics to assess risk are undecided as to the role of eco-driving as a risk factor in the risk assessment process however, most underwriters participating in the survey expect that telematics with a profile of economic driving style of drivers would have a positive impact on insurance risk, lowering its level,
- insurers who still do not use data from telematics on the driving style of drivers want to use telematics to assess the risk of motor insurance in the future,
- in the future, in the process of assessing the risk of light fleets, underwriters see the potential to use data from telematics on the driving style of drivers.

Underwriters' lack of determination in making an unambiguous assessment of the driver's economic driving style factor, combined with the expectation that eco-driving will have a positive impact on insurance risk, proves the underwriters' insufficient knowledge on the impact of drivers' economic driving style on insurance risk.

The analysis of the literature on the subject and the research results confirmed that the fleet's loss record is the most important risk factor assessed by underwriters in the risk assessment process. The observations made during the analysis of the results of the experimental study confirmed that eco-driving had a positive impact on the number of claims from the fleet's MOD insurance in the investigated fleet. A survey conducted in insurance companies offering motor insurance for fleets on the Polish market revealed that currently underwriters do not perceive eco-driving as an important factor in the risk assessment process. However, they expect that the economical driving style of drivers would have a positive impact on insurance risk, reducing its level. This leads to the conclusion that the impact of eco-driving on insurance risk has not been recognized by insurers.

The analysis of scientific achievements and the results of the conducted research allowed to answer the questions posed. The first chapter presented motor insurance in the context of its importance for the non-life insurance market. In the third chapter, drawing on the scientific

achievements defining eco-driving and its importance for the economic, ecological and energy-saving usage of motor vehicles, the important role of eco-driving in the modern approach to car use is indicated, but also the issues raised in the second chapter concerning car fleets deserve attention. The second chapter discusses the doctrine of risk, risk management and methods of its assessment, widely described in the literature, but also explains the differences that occur in insurance companies in the field of car fleet insurance and mass insurance of individual vehicles belonging to individuals. This dissertation is a contribution to the recognition of how underwriters in insurance companies identify risk factors and select and assess them in the process of car fleet insurance risk assessment with particular emphasis on the assessment of fleet motor insurance risk.

Scientific achievements extensively explore the subject of risk including insurance risk, motor insurance and their impact on the non-life insurance sector and the impact of individual eco-driving rules on ecology, operating costs and energy efficiency of motor vehicles. There is a shortage of scientific studies on motor fleet insurance which is an important element of the motor insurance sector as well as the link between insurance risk and the economic and energy-saving usage of a car.

The analysis of the results of the conducted research and the conclusions formulated on this basis allowed for partial confirmation of the research hypothesis. The group of drivers who applied the rules of eco-driving in practice had less claims, obtaining a lower number of losses per 1,000,000 km and a lower frequency rate. Drivers who systematically improved their driving style and achieved a higher and higher result of the ECO Rating index, at the same time achieved a lower and lower result of the number of claims per 1,000,000 km. The analysis of the research results shows that eco-driving positively affects the number of claims - reducing their number and in this dimension positively affects the insurance risk. However, no statistically significant effect of driving style on the value of the average claim was observed. The results of the parametric test showed that there were no significant differences in the distribution of damage values in the group of ECO and NON-ECO drivers which leads to the conclusion that in this dimension eco-driving has neither positive nor negative impact on insurance risk.