
Effectiveness of the Anti-Crisis Policy in the Period of COVID-19 Pandemic in the Road Transport Industry*

Submitted 27/08/20, 1st revision 16/09/20, 2nd revision 10/10/20, accepted 30/11/20

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Abstract:

Purpose: The purpose of the paper is to examine the effectiveness of the tools introduced as the Anti-Crisis Shield Acts, which have been announced by the government of Poland during the pandemic in the road transport industry.

Design/Methodology/Approach: The contribution is based on a review of literature, preparing of an original questionnaire-based survey directed for road transport companies and estimating ordered multi-nominal logit, and binary logit model.

Findings: Transport industry is particularly sensitive to the business cycle phases due to the fact that limitations in trade are very often the first sign of incoming recession. We found out that the government introduced the Anti-Crisis Shield Act aimed to preserve jobs was widely utilized by the transport industry.

Practical Implications: The Polish government similar to other European authorities has introduced a programme to reduce losses in the economy caused by the pandemic. The program was intended to reduce negative short-term consequences of the crisis caused by the COVID-19. The transport enterprises widely used the offered aid although it was directed rather *ex post* (to reduce) than *ex ante* (to prevent).

Originality/Value: The study is based on primary data obtained from road transport companies and related to the consequences of the COVID-19 pandemic for the road transport industry. The research is fairly up-to-date, since the survey was conducted in June-July, 2020. A logit model is applied to evaluate determinants of the wide use of the government aid by the enterprises useful for practitioners and analytics of the transport industry to forecast probability of economic performance of enterprises.

Keywords: COVID-19 pandemic, anti-crisis shield, survey data, logit models.

JEL: R40, L91, C25.

Paper type: Research study.

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³ This work was supported by the project Future/05/2020 Sustainable Development and the Society of The Future realized at the Nicolaus Copernicus University in Torun

*Paper presented in ICABE 2020.

1. Introduction

By September 1, 2020, there had been reported 25.9 million of COVID-19 cases and the death toll was 861.5 thousand worldwide (Worldometers, 2020). In the second quarter of 2020, the pandemic wiped out the global labour equivalent by 195 million full-time workers - mostly in the service sector (Nebehay, 2020), with millions of others working from home. Just a year earlier, the double-digit unemployment rates in the US, China, Australia, Germany, and the UK were unthinkable; in 2020, this is already a reality.

One of the key services allowing the implementation of the plans of both companies and individual citizens is transport. During the pandemic, travel restrictions were obvious, and the slogan #stay at home encouraged people to abandon transport services. However, road haulage was an industry that could not stop because it had to deliver the necessary goods, especially pharmaceuticals, food, sanitary products, *etc.* Due to the closure of many sectors of the economy, especially in the area of production and services, the demand for transport services has decreased significantly. In the report prepared by the International Road Transport Union (IRU) the impact of the COVID-19 pandemic for the road transport industry is analysed. It has been emphasized that in the case of the freight carriage, certain segments are almost at a standstill, including the transport of automotive parts, flowers, clothing, and construction materials. Other road freight operators, including those transporting basic goods, have seen their revenues decrease by up to 40 per cent due to the lack of new contracts or they are running empty more frequently (up to 40 per cent more) (IRU, 2020a).

Due to the fact that the pandemic dragged on over time and has not been brought under control to this day, the governments of most countries were forced to intervene in the economic sphere by protecting jobs and easing short-term payment obligations, especially tax and credit obligations (Grima *et al.*, 2020). As concerns the organizational and financial consequences of the adopted solutions, it will be possible to analyse them only after the end of the pandemic period. It is already known today that the scale of government involvement in supporting particular areas of social and economic life is enormous. The aim of the article is to analyse the effectiveness of the tools used as part of the anti-crisis policy in Poland in the period from March to June 2020 in road transport of goods. The choice of this branch of the economy was dictated by its presence in global supply chains, which were interrupted during the pandemic. Moreover, Polish road transport companies carry out the most transport in the territory of the European Union, competing with companies from Germany, France, and Spain. Due to the fact that the anti-crisis policy tools were used to mitigate the effects of the pandemic and were used *ex post*, it can be assumed that their impact on the shaping of the transport services market was small. However, the use of new technologies and the widespread replacement of traditional documents with electronic forms may create a new quality in business, official, and social contacts.

The added value of the article is that it uses data derived from a specially designed survey questionnaire addressed to entrepreneurs managing road freight transport companies. 500 randomly selected companies took part in the study from among approximately 5,000 companies registered in Poland. Ordered multinomial logit models were used to identify the factors influencing the probability of using the anti-crisis shield tools. The study also analyses the probability of a reduction in profitability in road transport companies, using a binary logit model for this purpose.

The literature on the assessment of the pandemic impact on transport and on government assistance in this sector is still scarce. Certain transport-related effects during the pandemic were analysed in the report published by the International Energy Agency (IEA, 2020). The authors mentioned that crises can result in long-lasting reductions in transport demand, especially where transport is not considered essential. They conclude that governments designing sustainable transport policies for the post-lockdown period can draw on experiences from previous crises to predict likely behaviours and design policies that are fit for purpose. Berry *et al.* (2020) focus on the services safety. They conclude that the COVID-19 pandemic has given service firms no choice but to adapt and transform their offerings in order to make customers and employees feel safe. Trust is what service firms must focus on primarily in the face of the pandemic. To maintain that trust, organizations must learn how to inform more authentically and effectively and educate customers, employees, and other key stakeholders, particularly given the need for security on social media and online more broadly.

The impact of the pandemic on other sectors of the economy is still rather limited, although Cullen (2020) analysed the impact of the pandemic on food supply chains. Stiller and Zink (2020) analysed the situation in the European banks in the time of the COVID-19 pandemic. Korzeb and Niedziółka (2020) described resistance of commercial banks in Poland to the crisis caused by the COVID-19 pandemic. Zhang *et al.* (2020) show the impact of the pandemic in transport services in China, taking into account spatial dissemination of the virus. Gallego and Font (2020) investigated changes in air passenger demand as a result of the COVID-19 crisis. They analysed the implications for tourism policy. The remainder of the paper is organized as follows: in the next section the anti-crisis policy of the Polish government and other institutions is characterized. Section 3 describes the research methodology related to the construction and estimation of the logit models used. Section 4 contains the results of the survey and estimation of the empirical logit models and describes the factors that supported effectiveness of the anti-crisis policy in Poland. In Section 5 we conclude.

2. Anti-Crisis Policy in COVID-19 Pandemic Period

In Poland, the government's priority in the face of the coronavirus pandemic was to protect jobs and ensure the financial and health security of citizens and companies.

The principle of solidarity was adopted, consisting in the fact that the costs related to the current economic situation should be distributed among the enterprise sector, employees, the financial system and the public sector in a joint and several and adequate manner, with care for the safety of all spheres of social and economic life in Poland. This goal is intended to be achieved by a package of acts containing legal and financial solutions called the ‘anti-crisis shield’ (Anti-Crisis Shield 1.0 Act and following 2.0; 3.0 and 4.0). The majority of new regulations have been in force since 31 March 2020. On 16 April, 2020 the Polish Government announced a new Anti-crises program called the Financial Shield. On 16 May 2020 the Polish parliament adopted the Anti-Crisis Shield 3.0 Act - a new support program that broadens the criteria of the antecedent Anti-crises Shields. On 19 June, 2020 the last modification, called the Anti-Crisis Shield 4.0 Act was introduced. The proposed package is, in fact, one act, the solutions of which have been changed in a flexible manner, extending the aid with new instruments, and adapting them to the needs of entrepreneurs. The estimated total value of the anti-crisis shield amounts to over PLN 300 billion, *i.e.*, approximately 15% of GDP. It is the largest scale of aid that has been noted in the history of contemporary Poland.

The main goals of the anti-crisis policy during the pandemic were as follows:

- employment protection and minimization of dismissal of employees,
- reducing the financial burden on enterprises,
- maintaining the highest possible level of financial liquidity,
- guaranteeing and protecting against the closure of micro-enterprises, especially in the industries most affected by the epidemic (service industry, tourism, passenger transport, catering),
- protecting enterprises against bankruptcy, including consumer bankruptcy.

The main elements of the package of laws included:

- exemption from contributions for compulsory social insurance for micro-entrepreneurs, self-employed (*e.g.*, drivers market),
- furloughs for employees, self-employed persons, as well as subsidizing employee salaries,
- making working time more flexible, allowing for its adjustment to the situation and needs of the employer,
- granting micro-loans for entrepreneurs employing up to nine people and for the self-employed,
- securing against the enforcement of funds that serve to stop the COVID-19 pandemic,
- introducing more favourable rules for accounting for the company's financial loss,
- support for transport companies by the Industrial Development Agency in relation to the repayment of leasing instalments for vehicles,

- granting benefits for people who, due to the pandemic, are not able to provide other than personal care for children and are employees of enterprises,
- extension of legal stay and work permit for foreigners (very important for the transport industry),
- allowing the reduction of the burden on local taxes for entrepreneurs,
- allowing, under interbank agreements, for the automatic extension of working capital loans based on financial data from 2019,
- less stringent requirements for granting a de minimis guarantee,
- launching several partially-redeemable loan acquisition channels.

Moreover, as part of the tax and organizational support, mainly in the field of mandatory deadlines and compliance with reports by entrepreneurs, the option to postpone the payment of advance payments to payroll tax, postponing new regulations related to the VAT Act, not penalizing entrepreneurs for a period of 3 months, starting from April 2020 for delays in submitting declarations and paying current and annual tax liabilities. In addition, the payment of the retail sales tax was deferred to entrepreneurs until January 1, 2021. Under the introduced statutory regulations, entrepreneurs were also allowed to facilitate the submission of tax and financial statements, and a new format for a uniform control file for VAT settlements was introduced. The principle of the possibility of independent opening of restructuring proceedings, preparation of a list of creditors and publication in the Court and Economic Monitor was introduced. In relation to many maturing deadlines, the obligatory deadlines for technical tests of devices have been postponed and the possibility of their use for the next 6 months in a situation when the deadline for the inspection was in the period March - June, 2020.

In France the general pillars of the government aid are as follows:

1. Time limits for the payment of social and/or fiscal instalments and direct tax rebates.
2. Mobilization of investment bank, namely, BPI France to guarantee bank lines of credit.
3. Support from the State and the Bank of France (credit mediation).
4. Simplified and reinforced short-time working scheme.
5. Support in the handling of a conflict with customers or suppliers by the Business Ombudsman (KPMG, 2020).

It is visible that the solutions intended for business and employees were not prepared for a specific branch but for the entire economy. The road transport companies have used primarily liquidity tools such as relief in the tax payments, deferment of leasing instalments and on-line working system for the company administration. Similar rules, but in a different financial dimension, were introduced in other European Union countries.

According to data published by KPMG (KPMG, 2020), the German government also proposed solutions that were primarily intended to limit the growing wave of unemployment and ease the tax burden.

Overall, responses have focused on tax-related liquidity assistance, protective shield and more flexible compensation benefits. For example the crisis-related improvement of the regulations for short-time working compensation was introduced together with relieves companies from social security contributions and also enables temporary workers to access short-time working compensation. Short-time working compensation can be paid up to 12 months. Similarly to Poland and other EU countries these facilitations take effect *ex post* from 01 March 2020 and are paid retroactively. On the other hand, tax-related liquidity assistance for businesses assumed deferrals of payable income-, corporate- and trade taxes as well as of solidarity surcharge is possible if companies prove to be immediately affected by the COVID19 crisis and regular tax collection would pose a substantial severity. Facilitated possibility to reduce advance tax payments as soon as it becomes clear that a taxpayer's income in the current year is expected to be lower than in the previous year. The date for application has been extended till December 2020. This is intended to improve the liquidity situation of companies.

Also international institutions and associations reported some consequences of the pandemic for business. For example, the International Labour Organization (ILO, 2020) focuses on drivers. In many countries, most drivers are self-employed and thus many fall outside the scope of labour. While businesses of all sizes have been affected by the pandemic, this unprecedented situation has resulted in the rapid deterioration of the liquidity and profitability of most micro, small and medium enterprises (MSMEs) in the industry.

Independent drivers and MSMEs are especially at risk of bankruptcy. The ILO report indicates that most governments have declared road transport an essential service or truck drivers essential workers. Their aid is directed on tax relief, deferrals, write-offs or rebates, waiver of social security deductions, lowering business license or vehicle registration fees, fuel price controls, subsidies for social security contributions and wages, partial or total suspension of working or driving time rules, or a temporary relaxation of enforcement and inspection, extensions for the renewal of commercial driving licenses or permits, and for certification or qualification requirements and many others.

On the other hand as the transport services had to be done the drivers were imposed for the corona virus infection. To avoid this severe hygienic requirements were also prepared and used (IRU, 2020b). Since the start of the pandemic, virtually all EU Member States have imposed non-essential travel restrictions, often accompanied by quarantine requirements for cross-border travellers. The EU's external borders have been closed and many Member States have temporarily reintroduced internal border controls also for heavy goods transport.

This fact caused significant delays in the implementation of deliveries and thus a reduction in the frequency of orders performed by the fleet of enterprises that had so far crossed the borders without any stoppages (EC, 2020b). In order to improve the flow of goods across intra-Community borders, the European Commission proposed to designate the so-called ‘green border crossing lanes’. The solution proposes that lanes leading to the border crossing should be organized in such a way that the crossing of the border lasts a maximum of 15 minutes, which will reduce congestion and reduce the likelihood of infections of waiting drivers. The European Commission has also proposed to limit and simplify the procedures at border crossings for green corridors to the necessary minimum. Checks and screening tests should be carried out without the drivers having to leave the vehicle and the drivers themselves should only be subjected to minimal checks. HGV drivers should not be asked to present any document other than a passport/ID card and driving license and, if necessary, a certificate from the employer. Electronic filing and display of shipping documents should be allowed, preferably by the shipping services departments of companies.

The EU recommendation also concerned such behaviour of border services as not to discriminate against any goods vehicle or driver, regardless of the place of origin and destination, nationality of the driver or the country of registration of the vehicle. In view of this situation, the European Commission has called on the Member States to temporarily suspend all driving bans in their territory, such as weekend and night driving bans as well as sector bans. Furthermore, it encouraged Member States to create safe transport corridors to allow private drivers and their passengers, such as health and transport workers, as well as EU citizens returning home, regardless of their nationality, to direct priority passage in all necessary directions within the TEN-T network, while observing the rules regarding staying on the designated route and taking the necessary minimum breaks for rest.

Additionally, in the document entitled ‘Tourism and transport in 2020 and beyond’ (EC, 2020a) the European Commission and the European Parliament have proposed numerous recommendations for EU members in the context of the pandemic situation. The package includes guidelines and recommendations for, *inter alia*, the safe restoration of unrestricted freedom of movement and the reopening of internal borders, the safe restoration of transport and connectivity, the safe resumption of tourism services, and the resolution of the liquidity crisis and rebuilding consumer confidence.

All of the proposed elements constituted a significant organizational support for entrepreneurs providing transport. Analysing the effects of the presented solutions, the International Road Transport Union pointed to their advantages and disadvantages.

Among most important factors limiting the road transport experts of the IRU mention: additional controls at border crossings and insufficient implementation of 'green lanes', mandatory truck convoys and systematic quarantining of drivers. There are however also positive effects of the pandemic such as: exemptions on rules governing driving and resting times and extension of driving licenses and certificates. Furthermore they estimated that global average decline for goods road transport in annual turnover for 2020 is currently -18%. In Europe this scale is estimated to be -17% (IRU, 2020a).

3. The Construction of Logit Models

The limited endogenous variable models, such as logit and probit models are intended to predict probabilities of satisfying conditions, which have been defined by the researcher. In the simplest form the endogenous variable is defined as follows:

$$y_i = \begin{cases} 1, & \text{if the conditions are satisfied} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

where $i = 1, 2, \dots, n$ denote sequent observations (for instance respondents). Variable defined in (1) is binary and have only two possible variants. The corresponding linear model takes the following form

$$y_i = \beta_0 + \sum_{k=1}^K \beta_k x_{ki} + e_i \quad (2)$$

As the endogenous variable has only two variants and exogenous variables can be either metric or non-metric it is necessary to transform the model to obtain consistent estimates. One of the useful transformations is logit transformation (Cameron and Trivedi. 2008. pp. 469). Let p denotes conditional probability of a given variant of the defined variable Y given values of exogenous variables. Then we transform probability from an interval $(0;1)$ into logit values from the interval $(-\infty, +\infty)$ using

$$L = \ln \frac{p}{1-p} \quad (3)$$

Transformed model refers to the binary logit model, and takes the form:

$$L_i = \beta_0 + \sum_{k=1}^K \beta_k x_{ki} + e_i \quad (4)$$

Parameters of the model 4 are estimated using maximum likelihood method for microdata. i.e. individual data taken from the questionnaire.

If the dependent variable is observed in the ordered scale, it is possible to define an ordered multinomial endogenous variable, which has several variants. It occurs in the case of modelling preferences, for example. The variable is ordered in the logical way coming from the scale, for example Likert scale. Dependent variable and its transformation are then defined as follows. Firstly, let us assume that ordered variable y (observed) represents a special case of a continuous (latent) variable

$$y_i^* = \beta_0 + \sum_{k=1}^K \beta_k x_{ki} + e_i \quad (5)$$

The values of y are observed and classified according to several J values, which correspond to natural numbers. Mapping y^* on y is monotonic. Firstly we define $J+1$ cut points, namely α_{j+1} , $j=1,2 \dots J$ which divide the entire domain of y^* on several intervals such that $y=j$ if y^* belongs to the interval limited by α_{j-1} and α_j . It is assumed that $\alpha_0 = -\infty$ and $\alpha_J = +\infty$.

The mapping is then defined as follows:

$$\begin{aligned} y_1 = 1 & \quad \text{if and only if} \quad -\infty < y_i^* \leq \alpha_1 \\ y_1 = 2 & \quad \text{if and only if} \quad \alpha_1 < y_i^* \leq \alpha_2 \\ \text{and so on} & \quad \dots \quad \dots \end{aligned} \quad (6)$$

Replacing with the RHS of the model (6) without a constant term and re-arranging we obtain the ordered logit model (OM)

$$\begin{aligned} \alpha_{j-1} &< y_i^* \leq \alpha_j \\ \alpha_{j-1} &< \alpha_0 + \sum_{k=1}^K \alpha_k x_{ki} \leq \alpha_j \\ \alpha_{j-1} - \sum_{k=1}^K \beta_k x_{ki} &< e_i \leq \alpha_j - \sum_{k=1}^K \beta_k x_{ki} \end{aligned} \quad (7)$$

which corresponds to:

$$\begin{aligned}
 p_{ij} = P(y_i = j) &= P\left(\alpha_{j-1} - \sum_{k=1}^K \beta_k x_{ki} < e_i \leq \alpha_j - \sum_{k=1}^K \beta_k x_{ki}\right) = P\left(e_i \leq \alpha_j - \right. \\
 &\left. \sum_{k=1}^K \beta_k x_{ki}\right) - P\left(e_i < \alpha_{j-1} - \sum_{k=1}^K \beta_k x_{ki}\right) = F\left(\alpha_j - \sum_{k=1}^K \beta_k x_{ki}\right) - F\left(\alpha_{j-1} - \right. \\
 &\left. \sum_{k=1}^K \beta_k x_{ki}\right)
 \end{aligned} \tag{8}$$

To estimate simultaneously parameters β_k and α_j and to ensure identification of the parameters a constant term must be excluded from the specification. Two issues concerning the model (8) must be mentioned. The first is related with estimation which is effectively ensured using the Maximum Likelihood method. The second one refers to the proportionality of odds in model (8). It can be shown that the odds ratio in model (8) is constant that means that the parameters β_k are estimated at the same level across all variants of y_j (Gruszczynski ed., 2010). Such an assumption can be too strong in some cases. Then the general ordered logit model can be suggested. To decide whether the ordered multinomial model should be estimated we applied Wolfe and Gould's test for proportional odds (Wolfe and Gould, 1998). In the null proportional odds are assumed and the test statistics is chi squared distributed. If the null was rejected by the data the general ordered model was estimated.

The quality of the logit model is measured by a sequence of indicators. They are widely described in Cameron and Trivedi (2008) and Gruszczynski (ed.), (2010). One of the simplest and most general indicators is pseudo-R squared McFadden (1974). McFadden's pseudo-R squared measure is defined as:

$$PseudoR^2 = 1 - \frac{\log(L_c)}{\log(L_{null})}$$

where L_c denotes the (maximized) likelihood value from the current fitted model, and L_{null} denotes the corresponding value but for the model with only an intercept and no covariates. It should be noted that in empirical logit models this indicator is typically on the low level. A useful R squared measure is a count-R squared. It is related to the ratio of accurate forecasts in the number of cases, i.e.

$$CountR^2 = \frac{n_{11} + n_{00}}{n}$$

where n_{11} and n_{00} denote number of accurately predicted 1s and 0s, respectively, while n stands for the number of observations. It can be adjusted for the non-balanced sample when the number of 1s differs strongly from the numbers of 0s.

Testing for individual parameters significance uses standard z statistics and joint significance of the model is based on the likelihood ratio (LR) chi squared distributed test. In the null hypothesis parameters insignificance is assumed, so rejecting the null supports interpretation and further inference.

4. Empirical Results

4.1 Descriptive Results

As indicated by periodic reports commissioned by the National Debt Register by the research company IMAS in May and June 2020 (KRD, 2020) the sentiment of entrepreneurs regarding the aid offered by the Polish government as part of the anti-crisis shield has changed. In May, 76.5% of respondents stated that the aid offered by the government was insufficient, especially in terms of financial resources intended to improve liquidity and cover running costs, as well as simplifying the procedures related to applying for aid. In June this percentage dropped to the level of around 70% and the rest of the companies indicated that the aid was sufficient. At the same time, 74.4% of respondents indicated their willingness to use the help of the support offered. In turn, the research conducted for the purposes of this article shows that an important element that allowed road transport entrepreneurs to survive was the response to the situation by the government, which introduced in the form of acts support in various fields related to running a business, but above all tax and financial support. 500 randomly selected road haulage companies in Poland took part in the survey. The structure of the sample and the questions of the questionnaire are presented in the appendix. Among enterprises which answered the questionnaire, 50% belonged to the small enterprises and 32.4% belong to medium enterprises.

The answers provided show that 98.5% of transport enterprises benefited from the proposed forms of aid. As many as 77.6% of those benefiting from government support indicated five and above on a seven-point Likert scale, and 39% of the respondents assessed the scope and form of the aid at the level of six, which means that the aid was significant. 84.8% of the respondents examined benefited from assistance consisting in exemption from paying compulsory social security contributions for three months, and 69.6% from the possibility of financial support provided by labour offices in the form of payment of a part of remuneration to employees, *i.e.*, furloughs. Non-returnable loans, used by 31% of the respondents surveyed, as well as loans granted by the Polish Development Fund, also turned out to be a significant support for entrepreneurs. 35.6% of the companies studied took advantage of this form of support. It should be added, however, that the support was possible only in the case of a significant (25%) decrease in the company's turnover month-on-month or year-on-year for selected months. 75% of loans granted from the Polish Development Fund will be cancelled. The introduction of the anti-crisis shield was also accompanied by the postponement of leasing payments by banks and financial institutions.

Only 19% of the respondents took advantage of the option to defer leasing instalments, which was a small percentage and may suggest that the financial situation of companies was stable in this period.

It is worth emphasizing that the studies presented above are subjective responses given by the respondents before the end of the calculation period, after which it will be possible to analyse the figures. However, in order to objectify some of the answers, the scope of changes of two important parameters significant from the point of view of operating costs in road transport in Poland, *i.e.*, the exchange rate (Table 4) and the fuel price (Table 5), was also presented. In international transport in countries outside the euro zone, an important factor influencing profitability while maintaining a constant level of freight in executed orders is the exchange rate of the euro and the US dollar to the Polish currency. During the pandemic, the Polish currency was depreciated in relation to the two world currencies. As the analysis of the answers shows, only 8.4% of the respondents confirmed that this fact resulted in an improvement in their financial situation, and 91.6% of the respondents replied that the increase in the exchange rate did not affect the compensation of losses caused by the reduced number of transport orders. Moreover, the respondents were asked whether the low unit cost of fuel contributed to the maintenance of the company's profitability. However, only 15.8% of the responses in the sample of 500 companies indicated that the low fuel price that accompanied the lockdown period compensated for the losses incurred, while 84.2% of the respondents indicated that the fuel price had no effect on compensating for the losses incurred.

Table 4. Exchange rates of EUR/PLN (end of month)

2019	January	February	March	April	May	June
EUR/PLN	4.2802	4.3120	4.3013	4.2911	4.2916	4.2530
2020	January	February	March	April	May	June
EUR/PLN	4.3010	4.3355	4.5523	4.5424	4.4503	4.4660
Change 2020/2019	100.49%	100.54%	105.84%	105.86%	103.70%	105.01%

Source: Based on exchange rates statistics presented by the National bank of Poland, www.nbp.pl (accessed: 01.08.2020)

Considering that for analytical purposes related to the transport activity during the lockdown, two comparative periods are important, *i.e.*, March - June 2019 and March - June 2020, the average EUR/PLN exchange rates amounted to 4.2876 and 4.4886 respectively. Thus, the difference was +0.2010 PLN, which is about 5% increase in the exchange rate compared to 2019. Analysing the actual prices at which companies bought fuel in Poland, France, and Germany, it can be concluded that the average monthly decrease in the period March-June 2020 amounted to about 20% for Poland [in PLN], 22% for France [in EUR], and 28% for Germany [in EUR], (see Table 5).

Table 5. Average prices of fuel in Germany, France and Poland in euro and in PLN (per 1 litre)

Country	Year	January		February		March		April		May		June	
		EUR	PLN	EUR	PLN	EUR	PLN	EUR	PLN	EUR	PLN	EUR	PLN
Germany	2019	1.54	6.62	1.26	5.41	1.42	6.07	1.42	6.07	1.26	5.43	1.36	5.76
	2020	1.24	5.26	1.04	4.44	0.94	4.18	0.98	4.46	0.96	4.34	1.00	4.42
	change [%]	0.81	0.79	0.83	0.82	0.66	0.69	0.69	0.73	0.76	0.80	0.74	0.77
France	2019	1.41	6.06	1.50	6.51	1.52	6.49	1.52	6.54	1.48	6.35	1.54	6.60
	2020	1.63	6.96	1.34	5.76	1.22	5.44	1.11	5.06	1.19	5.40	1.25	5.56
	change [%]	1.16	1.15	0.89	0.88	0.80	0.84	0.73	0.77	0.80	0.85	0.81	0.84
Poland	2019	0.86	3.71	0.88	3.80	0.90	3.86	1.01	3.46	0.93	3.99	0.88	3.76
	2020	0.92	3.92	0.84	3.60	0.73	3.26	0.66	3.00	0.64	2.88	0.74	3.27
	change [%]	1.07	1.06	0.95	0.95	0.81	0.84	0.65	0.87	0.69	0.72	0.84	0.87

Source: Based on data retrieved from the computer systems of selected enterprises.

Depending on the share between the fuel purchased in Poland and abroad, especially in euro, these phenomena, proportionally to their share in the costs and revenues of transport companies, had to compensate for some of the revenues lost due to the reduction in the number of orders, but could not compensate for all losses, which resulted from cost structures, especially labour costs and huge leasing instalments for the truck fleet.

4.2 Empirical Logit Models

Based on the data obtained from the survey, two logit models were estimated. The first one is a binary model and addresses the question 'Has the company's profitability decreased during the pandemic?' The set of questions and corresponding variables is provided in the annex A2. The profitability is defined as Gross Margin = Gross Profit/Net Revenue because no full financial data are available from the enterprises. It is also expected that financial ratios in the period of the pandemic will be incomparable with 'normal' periods. The results are presented in Table 6.

Table 6. Estimated logit model of the decrease in profitability during the pandemic (dependent variable X13)

Variable	Coeff	Std error	Z stat	P value
X1	2.124	0.706	3.01	0.003
X4	1.407	0.325	4.33	0.000
X12	2.671	0.750	3.56	0.000
X14	2.816	1.221	2.31	0.021
X28	1.251	0.484	2.59	0.010
cons	-15.277	3.431	-4.45	0.000

Observations no.	500
Log likelihood	-67.372
Chi-squares	172.40 [0.000]
Pseudo R2	0.561
Count R2	0.940
Adj Count R2	0.348

Source: Own calculations in Stata14.

The variables that are significant indicate positive direction on the impact for decrease in profitability. These are: X1 – decrease in orders for transport (1 yes, 0 no), X4 – scale of decrease in orders (1 little and 7 huge), X12 – scale of decrease in profitability (1 less than 3%, 2 less than 5% 3 more than 5%) , X14 - using of government aid introduced by the Anti-Crisis Shield Act (1 yes, 0 no) and X28 – number of years of transport activity (in years). The results are in line with the answers that 90.8% of respondents indicated that the profitability fell due to the pandemic, 1.8% indicated that it was maintained at the current level and 7.4% could not answer this question unequivocally. This question is closely related to the next one, concerning the level of decline in profitability. In this case, 60% of the respondents surveyed indicated that the fall in their company's profitability exceeded 5%, 14.2% indicated a decrease of 4-5%, 17% of the respondents replied that the decrease in profitability was between 2 and 3%, and 8.4% of the respondents indicated that this decrease was less than 1% or was 0.

Lack of exchange rate and fuel price as factors influencing profitability is related with general conviction that this positive for enterprises changes did not improve the generally bad situation caused by the pandemic. It is also related to the fact that full information will be available after settlement of the all transport operations in 2020. To show impact of different factors on wide use of Anti-Crisis Shield by the road transport enterprises an ordered multinomial logit model has been utilised. Its application was reasonable for two reasons. Firstly, we considered an ordered dependent variable (X15) and secondly the test diagnostics confirmed that this model is appropriate. The results of estimation are shown in Table 7.

Table 7. Empirical ordered multinomial logit model for probability of utilising the Anti-Crisis Shield by road transport enterprises in Poland (dependent variable X15)

Variable	Coeff	Std error	Z stat	P value
X4	0.730	0.117	6.23	0.000
X7	-0.806	0.256	-3.15	0.002
X17	0.722	0.253	2.85	0.004
X18	2.401	0.296	8.09	0.000
X28	0.546	0.232	2.35	0.019
cons	NA	NA	NA	NA
<i>Ancillary parameters</i>				

	<i>Coeff</i>	<i>Std error</i>
alpha1	4.207	1.173
alpha2	5.950	1.189
alpha3	9.234	1.255
<i>Model diagnostics</i>		
Observations no.	500	
Log likelihood	-478.41	
Chi-squares	379.64 [0.000]	
Pseudo R2	0.284	
Proportional odds test	Chi2(4)= 9.84 [0.092]	

Source: *Own calculations in Stata14.*

The model presented in Table 7 shows that probability of wider application of the government aid increases when number of orders decrease (X4); business survival is problematic in the long run (X17); enterprise is threaten by the bankruptcy (X18) and when number of years in transport market performance increases (X28). The only opposite direction which decreased the probability of using public aid is just deferment on leasing instalments (X7). It is worth noting that the model corresponds to the proportional odds ratio, which means that in all thresholds shown by alpha parameters, related with increase of using the government aid, the structural parameters were constant. It means that situation concerning all road transport enterprises in Poland in the crisis caused by the pandemic is similar. It should be emphasized that deferment of leasing instalments is a supplementary tool for anti-crisis policy offered by banks and financial institutions. Although not too many enterprises used this tool it was important element in reduction of current costs. Most severe effects were visible in those enterprises which are seriously threatened by the problem of bankruptcy. The experience in the market is probably related with established business connections and places in supply chains which were broken or changed.

5. Conclusions

In the paper the anti-crisis policy of Polish government during the COVID19 pandemic was analysed, particularly its impact on situation of the road transport enterprises in Poland. It has been shown that the tools of the Anti-crisis Shield were directed widely on different aspects of business activity. In the case of the road transport industry where majority of enterprises belong to micro, small and medium sector this aid was fully justified by the conditions. Lockdown in the first and second quarters of 2020 resulted in breaking supply chains, lower demand for services as well as boarder closing. The road transport industry was stopped by additional controls at border crossings and insufficient implementation of ‘green lanes’, mandatory truck convoys and systematic quarantining of drivers. It resulted in significant reduction of revenues.

The main issue of the paper was to investigate whether the anti-crisis policy was effective in the sense of defence against adverse phenomena. It can be confirmed that the Anti-Crisis Shield tools were introduced to reduce the inconvenience of the pandemic not to support in finding new markets or new orders. That is why, many enterprises applied for the offered aid but it helped to save the enterprises in the short run. The problem of bankruptcy is still facing many road transport enterprises. The number of orders was significantly lower and even decreasing price of fuel, which helped to reduce costs was insufficient in the lack of orders and financial stability.

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Annex:

A1. The structure of the sample studied according to selected criteria

<i>Participation of companies by the form of conducted activity</i>	<i>%</i>	<i>Share of companies by the number of employees</i>	<i>%</i>
Sole proprietorship	2.20	From 1 up to 9	6.60
Limited liability company	80.80	From 10 up to 49	56.00
General partnership	13.80	From 50 up to 249	32.40
Joint-stock company	2.20	Over 250 employees	5.00
Other (limited partnerships, other)	1.40		
<i>The type of the transport</i>	<i>%</i>	<i>Share of companies by the number of transport units</i>	<i>%</i>
Universal	93.20	From 1 up to 4	3.6
Special (cold stores, cisterns)	6.80	From 5 up to 10	19.8
<i>Participation of companies by</i>	<i>%</i>	From 11 up to 20	22.0

<i>experience in running business activity</i>			
More than 10 years	95.00	From 21 up to 50	28.2
From 5 up to 10 years	2.80	From 51 up to 100	13.2
From 3 up to 5 years	1.20	From 101 up to 200	7.4
Up to 3 years	1.00	Above 200	5.8

A2. Questions related to the problem of the pandemic and corresponding variables:

1. (X1) Has the announcement of the state of the epidemic in Poland as well as the pandemic on a global scale had a significant impact on reducing the number and scope of transport in your company?
2. (X2) Please use a percentage scale (0% - 100%) to describe the decrease in the number of orders processed in this period
3. (X3) Please use a percentage scale (0% - 100%) to describe the increase in the number of orders processed in this period
4. (X4) Please indicate on a scale from 1 to 7 to what extent the closure of the borders affected the decrease in the number and value of shipments (1- we were not affected by the change, 7- the change is significant).
5. (X5, X6) Has your company reduced the employment of drivers as a result of a reduced volume of transport? If yes, what is the reduction expressed as percentage?
6. (X7, X8) Have you used the deferred payment of leasing instalments? If yes, how many months?
7. (X9) Did the increase in the EUR/PLN exchange rate allow you to compensate for the losses resulting from the decrease in transport?
8. (X10) Did the decrease in fuel prices allow you to compensate for the losses resulting from the decrease in transport?
9. (X11) Has your company's profitability decreased due to the COVID-19 pandemic?
10. (X12) By how much did your company's profitability decline during the pandemic (0%; less than 1%; 2-3%; 4-5%; more than 5%; Our company's profitability increased despite the pandemic)
11. (X13) Has the pandemic situation forced a change of existing contractors and industries served by your company?
12. (X14) Have you used the support of the government's anti-crisis shield programme?
13. (X15) Please rate on a scale from 1 to 7 to what extent the solutions of the anti-crisis shield supported the functioning of your company (1- we were not affected by the change, 7- the change is significant)
14. Which elements of the anti-crisis shield were particularly helpful for your company?
15. (X16) Have the transport associations (ZMPD, regional associations, *etc.*) provided your company with organizational support during this period?
16. (X17) Does the persistence of the COVID-19 pandemic pose a long-term threat to your company's transportation operations?
17. (X18) Does the pandemic make your transport company exposed to the risk of bankruptcy?
18. Please indicate three of the main bankruptcy risk factors in the current period (loss of suppliers; loss of customers; problems with financial liquidity; leasing instalments and charges, high contributions to the state budget, work for the industry at risk of the virus (tourism, gastronomy, *etc.*); insufficient number of drivers; change in price relations (increase in fuel prices, decrease in EUR/PLN exchange rate, increase in the level of prices of goods on the market - increased inflation).
19. (X28) How long has your company been operating on the road transport market (in years)?
20. (X29) Please provide the number of transport units used to carrying goods in your company
21. (X30) What is the number of transport units in your company that are equipped with telematics devices?
22. (X32, X33) Please provide the number of employees in your company, regardless of the form of employment (total, drivers alone)