# ASSESSMENT OF THE FINANCIAL HEALTH AND THE RISK OF BANKRUPTCY OF PASSENGER CAR DEALERSHIPS IN THE CZECH REPUBLIC DURING THE COVID-19 EPIDEMIC

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## Abstract

***Research background****: The Covid-19 pandemic has affected all sectors of the economy. The automotive sector was among the worst affected.*
***Purpose****: This article assesses the financial health and bankruptcy risk of passenger car and light commercial vehicle dealerships in the Czech Republic during the Covid-19 pandemic.*
***Research Methodology****: The study uses publicly available data from 24 selected dealerships. Models Z' score, Z" score and IN05 are used to assess financial health and bankruptcy risk.*
***Results:*** *Surprisingly, the Covid-19 pandemic did not have a significant negative impact on the financial health of retailers on average during the period under review and there was no significant increase in the number of retailers at risk of financial problems or even bankruptcy.*
***Novelty****: Many studies have looked at the impact of Covid-19 on the automotive industry. However, only few have focused on the automotive sales sector (car dealerships), which is an important part of the value chain.*

**Keywords*****:*** *car dealerships, financial health, risk of bankruptcy, automotive, Z-score, IN05*

**JEL classification:** G3

## INTRODUCTION

The first reports of the virus, later known as Covid-19, appeared at the turn of 2019 and 2020. At that time, hardly anyone could have imagined the huge impact it would have on people's lives, the economy and the functioning of society in general.
Ignoring the tragic loss of life for once, in terms of the economy, one of the hardest hit segments of the economy was the automotive segment, i.e. vehicle manufacturing and related activities. As reported by the OICA (International Organization of Motor Vehicle Manufacturers), while nearly 97 million vehicles (all classes) were produced globally in 2018 and around 92 million in 2019, global production fell to just 78.7 million units in the first "Covid" year of 2020. The year 2021 then saw only a slight increase to 82.7 million motor vehicles (OICA, 2023).

Many studies have looked at the impact of Covid-19 on car manufacturers. For example, Pelle and Tabajdi (2021) and Klein, Hoj and Machlica (2021) have looked at it from a Central and Eastern European perspective. However, one specific area has not yet been the focus of most researchers. It concerns car dealerships (branded dealers), i.e. the retail part of the business chain, whose importance within the industry is also not negligible. According to data of ČSÚ (Czech Statistical Office) (2023), around 90,000 people work in the Czech Republic alone in the CZ-NACE 45 sector, i.e. wholesale, retail trade and repair of motor vehicles.

In one of the few papers that looks at the impact of Covid on dealers (but through qualitative questionnaire research, not their financial performance), the authors Block, Gellerich and Russ (2021) state: "Car dealerships are a main component of the automotive industry until today: No dealerships mean no sales (with exception of online sales) and no aftersales. Therefore, car dealerships are of central importance for ensuring individual mobility. The question is to what extent the COVID-19 pandemic has once again raised the bar of challenges for car dealerships." (Block et al., 2021, p. 60).

This article assesses the financial health and bankruptcy risk of passenger car and light commercial vehicle dealerships in the Czech Republic during the Covid-19 epidemic, i.e. from 2018 to 2021 (2018 and 2019 are included for comparison with the pre-crisis period).

The basic idea is that the decline in the number (units) of passenger cars and light commercial vehicles sold was partially offset by increased vehicle prices in terms of sales. The question is whether dealerships were also able to maintain financial stability, profitability and liquidity in this way and whether the risk of bankruptcy has increased significantly.

The research hypotheses were as follows:

**Hypothesis 1:** Revenues of dealerships developed similarly to sales of passenger cars and light commercial vehicles (number of units sold per year) on the Czech market, but with a smaller amplitude (smaller fluctuations).
**Hypothesis 2:** The economic results (represented by EBIT and net profit) and profitability ratios also developed similarly to sales of passenger cars and light commercial vehicles (number of units sold per year) on the Czech market with a smaller amplitude (smaller fluctuations).
**Hypothesis 3:** The volume of dealerships' inventories decreased during the period under review as manufacturers/importers were unable to supply the required quantities of cars and the inventory turnaround ratio decreased.
**Hypothesis 4:** The Current Ratio of liquidity (i.e. including current assets, including inventories) decreased during the period under review due to the decrease in inventories; the Quick Ratio of liquidity (excluding inventories) did not change much or only slightly decreased during the period under review.
**Hypothesis 5:** The financial health of dealerships deteriorated during the period considered and there were more dealerships at risk of financial difficulties or even bankruptcy.

## 1. DATA AND METHODOLOGY

A total of 24 authorised dealerships of passenger cars and light commercial vehicles in the Czech Republic were selected for the research. The selection was chosen to include dealers of the five most successful brands for 2021 (Skoda, Hyundai, Volkswagen, Toyota and Kia), with some dealers offering several car brands simultaneously. This selection eliminated the effect of a change in the popularity of any particular brand with buyers.
Of course, in addition to the actual sale of new cars, authorised dealerships also deal in used cars, carry out servicing activities, sell spare parts and accessories and other related activities.

At the same time, the sample was chosen to include dealers of different sizes in terms of sales volume. From this perspective, the dealers surveyed were divided into three groups: small (revenues for all activities in 2021 up to CZK 400 million), middle-sized (revenues of CZK 400 million to CZK 1 billion) and large (revenues of over CZK 1 billion).

Other monitored data for the selected group of dealers were:

- EBIT and net profit (mentioned below),
- inventory (mentioned below),
- balance sheet amount (sum of assets), which ranged from CZK 45 to 176 million in the group of small dealerships, from CZK 114 to 660 million in the group of medium dealerships and from CZK 372 million to 2.9 billion in the group of large dealerships,
- equity, which ranged from almost zero to CZK 136 million in the small dealership group, from CZK 40 to 322 million in the medium dealership group and from CZK 60 million to 2.3 billion in the large dealership group,
- the share of equity in total capital varied greatly within the given group of dealerships, ranging from 0 to more than 90%, with an average of 44.3% for small companies, 33% for medium-sized and 30.7% for large dealerships.

There are seven small dealerships, eight middle-sized dealerships and nine large dealerships in the sample. Among the large dealers, the largest ever group selling new passenger cars in the Czech Republic (Auto Louda) is included. In terms of legal form of business, they were either limited liability companies or joint stock companies.

For the 24 selected dealerships, information on financial results for the years 2018 to 2021 was obtained from publicly available data. In most cases, this included the balance sheet, income statement and appendix or full annual report.
The values of the following indicators were then calculated for the entire data set:

$$ROA = \frac{annual\ net\ income}{total\ assets} \quad (1)$$

$$ROE = \frac{annual\ net\ income}{equity} \quad (2)$$

$$inventory\ turnaround\ ratio = \frac{inventory}{(\frac{revenues}{365})} \quad (3)$$

$$Current\ Ratio = \frac{current\ assets}{current\ liabilities} \quad (4)$$

$$Quick\ Ratio = \frac{current\ assets - inventories}{current\ liabilities} \quad (5)$$

$$Z' = 0.717X_1 + + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5 \quad (6)$$

where $X_1$ = net working capital / total assets,
$X_2$ = retained earning / total assets,
$X_3$ = earning before interest and tax (EBIT) / total assets,
$X_4$ = book value of equity / book value of total debt,
$X_5$ = revenues / total assets.

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 + 3.25 \quad (7)$$

where $X_1$ to $X_4$ are the same as in Z'.

$$IN05 = 0.13 * A + 0.04 * B + 3.97 * C + 0.21 * D + 0.09 * E \quad (8)$$

where A = total assets / liabilities,
B = EBIT / interest cost,

C = EBIT / total assets,
D = revenues / total assets,
E = current assets / current liabilities.

Subsequently, the values of these indicators were also calculated for the entire set of dealerships studied and also for individual subsets according to size (small/middle/large – see above). The calculation for the groups was performed by summing the individual input values for each group and then substituting them into the calculation formula, thus corresponding to a weighted average according to the importance of each subject in the group.

It is also worth noting that none of the retailers surveyed qualified to receive government assistance from the COVID – 2021 and COVID – Nepokryté náklady (Uncovered Costs) programs during the pandemic in terms of declining sales and profitability.

Data on new car sales were obtained from the SDA (Car Importers Association).

## LITERATURE REVIEW

There is an extensive literature on the selection of appropriate creditworthiness and bankruptcy models for assessing the financial position of a firm. As a starting point, the article by Edward Altman (Altman, Iwanicz-Drozdowska, Laitinen, Suvas, 2014), the author of one of the best known and most used models, the so-called Z-score, was chosen. Here, Altman evaluates the results of its more recent modification, referred to as Z", under the current conditions. Using a sample of companies from 31 countries, including the Czech Republic, he concludes "that the original Z"-Score model performs very satisfactorily in an international context." (Altman et al. 2014 p. 20) and that it is not necessary to modify the model for the current conditions. It is for this reason that the Z"-Score model has been used for the analysis in this article, along with another modification of the Z-score called Altman Z' for non-listed companies. Altman also mentions this model (Z') in his article.

Furthermore, the IN05 model, introduced by Neumaierová and Neumaier in 2005, was chosen for the analysis. As the authors state, the advantages of the model include "its construction combining the creditor's (bankruptcy threat) and owner's (value creation) perspectives in a single index. In doing so, the value creation view does not require knowledge of the capital market price. A not insignificant advantage is the verification of the predictive power of the index on a sufficiently representative sample of data in the conditions of the Czech economy. The IN index can be used just as well to evaluate the past and current performance of companies as it can be used to evaluate their expected future performance. It is a criterion for evaluating and comparing the quality of firms' performance and can be used as an early warning indicator." (Neumaierová and Neumaier, 2005, p. 147).

Different variants of Altman's Z score as well as the IN05 model are commonly used by other authors, e.g. Gerantios (2009). In the conditions of Central and Eastern Europe or the Czech Republic, we can mention Klečka and Scholeova (2010), Dolejšová (2015) and many others. Confirmation of the good applicability of the Z score and the IN05 model in Czech conditions is also shown by the study Machek (2014), conducted on a sample of 8924 Czech enterprises with more than ten employees from the Albertina database maintained by the Bisnode company in the period 2007–2012. The author concludes that "We can confirm the usefulness of the credibility indexes (IN99 and IN05) in predicting a company's distress in the Czech

environment, which is consistent with the findings of most authors, as well as the Altman Z'-score model. Moreover, it seems that the models do not significantly lose their predictive ability over the course of time; even five years prior to going bankrupt, a model may provide a useful warning on the possible financial distress of a company." (Machek, 2014, p.17)

As for the actual problem under study, i.e. the impact of Covid on the automotive industry, most authors tend to focus on car and component manufacturers. For example, Pelle and Tabajdi (2021) state that "the Covid-19 pandemic has mainly affected the European automotive industry (and especially CEE) trough global value chains (GVCs). (...) Due to the outbreak of the pandemic, and the related declining demand, supplier problems, and government decisions, many companies decided to close factories or significantly reduce production. This is especially true for the automotive industry whose just-in-time production system was quickly disturbed by production suspensions (Betti & Hong, 2020)." (Pelle and Tabajdi, 2021, p.22).

Klein, Hoj and Machlica (2021) conclude that "The impact of the coronavirus pandemic on the automotive industry has rapidly gone from a supply to a demand shock, which is rippling through the industry. In the spring of 2020, CEE countries almost fully stopped car production as lockdown measures disrupted supply chains. Production lines and supply chains have then progressively been re-established. Nevertheless, the Covid-19 crisis poses important challenges to the CEE automotive sectors. First, the economic crisis will likely depress demand for cars and will negatively affect the sector with large spillover effects to the CEE economies. It might increase liquidity and solvency problems for sub-contractors, especially tier 2 and 3 suppliers that are more fragile, hereby raising the risk of bankruptcy-related interruptions in supply chains." (Klein, Hoj and Machlica, 2021, p.16). Following these conclusions, this text focuses both on the monitoring of dealerships' inventories and, more importantly, on the risk of their bankruptcy.

In contrast, the direct effects of Covid-19 on car dealerships in Switzerland are addressed by Block, Gellerich and Russ (2021). This was a questionnaire-based quantitative study of 259 dealers. "The results show that, generally, the car dealerships investigated meet the basic requirements for overcoming the COVID-19 crisis. A comparison of how the sustainability of the car dealerships was assessed before the outbreak of the coronavirus and after the end of the Lockdown shows that the pandemic does not generally have an influence on the assessment of sustainability. Thus 50% see their future more optimistically. (...) In this paper, the term 'sustainability' is used in the sense of 'survivability' of car dealerships." (Block, Gellerich and Russ 2021 p.61). However, these results were probably influenced by government financial support for car dealerships during the Covid-19 pandemic, mentioned by the authors in the text.

Török (2020) compares, among other things, the decline in GDP and the decline in car sales in individual European countries, including the Czech Republic, and concludes that "(...) the crisis caused by Covid-19 in the member states of the European Union is causing a recession, as a result of which new car sales have fallen drastically, exceeding the decline in GDP." (Török, 2020, p.1039).

The rising nominal prices of passenger cars on the Czech market are illustrated (in addition to general inflation data) by the regularly published Ernst & Young index, which maps the development of passenger car prices on the Czech market since the beginning of 2018. In the period under review, the index included 42 models across market segments.

A press release on Ernst & Young's website from March 2022 (i.e. shortly after the end of the period covered in this text) says: "The trend of recent years has been confirmed during the tracking period – passenger car prices are rising and price increases are gaining momentum. Compared to the baseline period (April 2018), when we started regularly charting passenger car prices on the Czech market, average prices have risen by 19.4%, excluding inflation." (Ernst & Young, 2022).

## RESULTS AND DISCUSSION

**Hypothesis 1**: Revenues of dealerships developed similarly to sales of passenger cars and light commercial vehicles (number of units sold per year) on the Czech market, but with a smaller amplitude (smaller fluctuations).

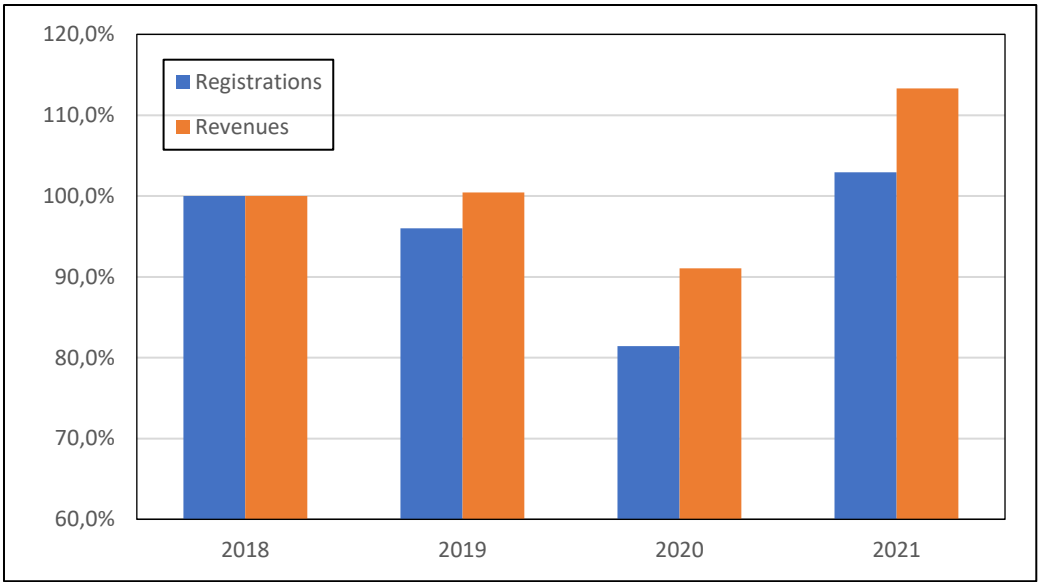
As shown in Table 1 and Figure 1 below, the revenues of car dealerships indeed roughly followed the development of the number of units sold, but both their year-on-year changes and especially the change over the whole period under review were smaller in percentage terms. While the number of units sold fell by 18.6% in 2020 compared to the previous year and increased only slightly (by 2.9%) in 2021, the fall in revenues in 2020 was smaller (8.9%) and the increase in revenues in 2021 was, on the contrary, significant – 13.3%. Thus, in 2021, revenues (in nominal terms) even slightly exceeded the 2018 level (103.6%), while the number of vehicles sold was almost a fifth lower (80.4%).

***Table 1: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and revenues of selected dealerships***

| | 2018 | | 2019 | year-on-year change | 2020 | year-on-year change | 2021 | year-on-year change | **change 2018 to 2021** |
|---|---|---|---|---|---|---|---|---|---|
| Registrations in thsnd | 282 | 100.0% | 270 | 96.0% | 220 | 81.4% | 227 | 102.9% | **80.4%** |
| Revenues (in millions CZK) | 29 654 | 100.0% | 29 783 | 100.4% | 27 122 | 91.1% | 30 729 | 113.3% | **103.6%** |

Source: own elaboration

***Figure 1: Year-on-year changes of registrations of passenger and light commercial vehicles and revenues of dealerships (year 2018 = 100%)***



Source: own elaboration

The smaller amplitude (fluctuation) of revenues is due to two factors:

(a) rising prices of cars (see above) and other goods, so that even if the dealership sells fewer units, the drop in revenues has not been as dramatic;

(b) servicing (repairs and maintenance of cars) and other activities contribute significantly to revenues, i.e. the dealership gets only a part of its revenues from sales of new vehicles. These other activities are not directly linked to the sale of new vehicles as customers from previous years continue to come in for servicing. There may even be a reverse effect, where customers keep their older cars longer due to the lack of new vehicles or their higher prices and thus need more frequent servicing and spare parts sales.

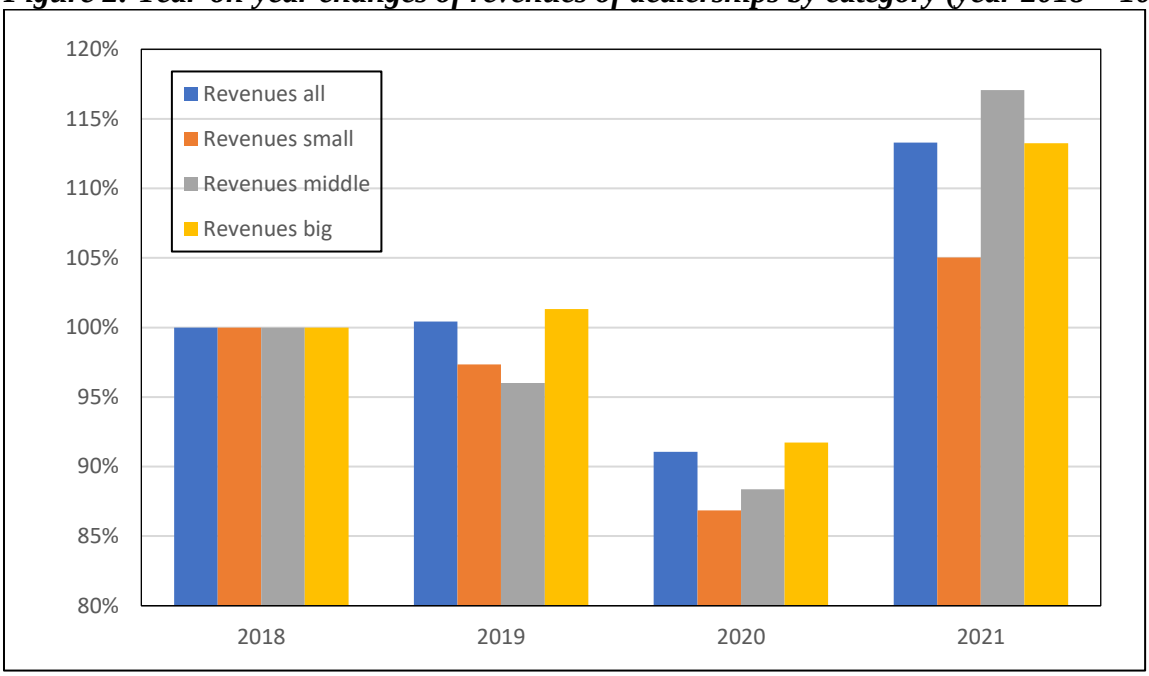
If we divide the dealerships into groups according to revenues (see above) into small (revenues for all activities in 2021 up to CZK 400 million), middle-sized (revenues of CZK 400 million to CZK 1 billion) and large (revenues of over CZK 1 billion), we can see that large dealerships have the most stable sales over the whole period under review.
When comparing 2018 with 2021, large dealerships are at the highest index value compared to 2018 (105.3%), while the two lower categories on average do not reach 2018 values at all, with middle-sized dealerships only narrowly (99.3%), while the deficit for small dealerships is quite significant (88.8%). Table 2 and Figure 2 show the details.

***Table 2: Revenues of dealerships by category***

| in mil CZK | 2018 | | 2019 | year-on-year change | 2020 | year-on-year change | 2021 | year-on-year change | **change 2018 to 2021** |
|---|---|---|---|---|---|---|---|---|---|
| Revenues all | 29 654 | 100.0% | 29 783 | 100.4% | 27 122 | 91.1% | 30 729 | 113.3% | **103.6%** |
| Revenues small | 1 554 | 100.0% | 1 513 | 97.4% | 1 314 | 86.8% | 1 380 | 105.0% | **88.8%** |
| Revenues middle | 3 842 | 100.0% | 3 688 | 96.0% | 3 259 | 88.4% | 3 815 | 117.1% | **99.3%** |
| Revenues big | 24 258 | 100.0% | 24 581 | 101.3% | 22 549 | 91.7% | 25 534 | 113.2% | **105.3%** |

Source: own elaboration

***Figure 2: Year-on-year changes of revenues of dealerships by category (year 2018 = 100%)***




Source: own elaboration

Hypothesis 1 was therefore confirmed.

**Hypothesis 2:** The economic results (represented by EBIT and net profit) and profitability ratios also developed similarly to sales of passenger cars and light commercial vehicles (number of units sold per year) on the Czech market with a smaller amplitude (smaller fluctuations).

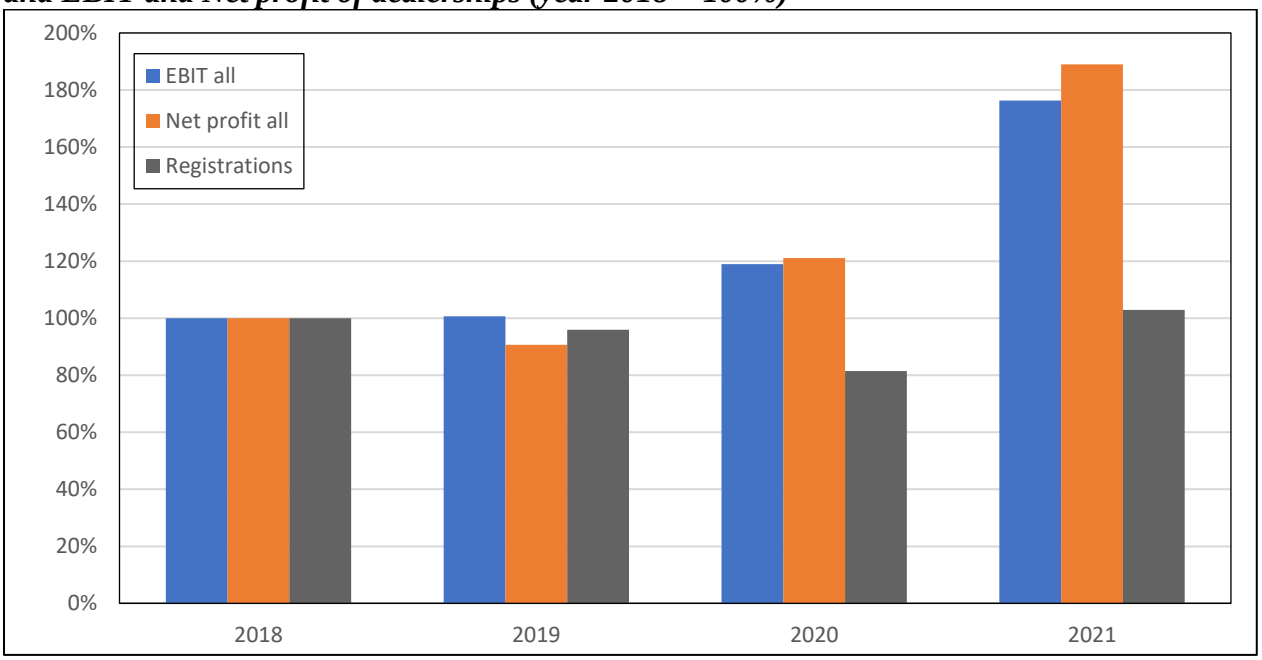
As Table 3 and Figure 3 show, the decline in registrations in 2019 had a significant impact on net profit across the dealership group, but not on EBIT. In subsequent years, dealerships have already been able to increase both their EBIT and net profit far more than would be consistent with growth in the number of vehicles sold or sales, thanks to rising prices and presumably margins (see above, Hypothesis 1).

***Table 3: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and EBIT and Net profit of dealerships***

| in mil CZK | 2018 | | 2019 | year-on-year change | 2020 | year-on-year change | 2021 | year-on-year change | **change 2018 to 2021** |
|---|---|---|---|---|---|---|---|---|---|
| Registrations in thsnd | 282 | 100.0% | 270 | 96.0% | 220 | 81.4% | 227 | 102.9% | **80.4%** |
| EBIT all | 423 | 100.0% | 425 | 100.7% | 506 | 118.9% | 892 | 176.3% | **211.1%** |
| Net profit all | 314 | 100.0% | 285 | 90.7% | 345 | 121.1% | 653 | 189.0% | **207.6%** |

Source: own elaboration

***Figure 3: Year-on-year changes of registrations of passenger and light commercial vehicles and EBIT and Net profit of dealerships (year 2018 = 100%)***




Source: own elaboration

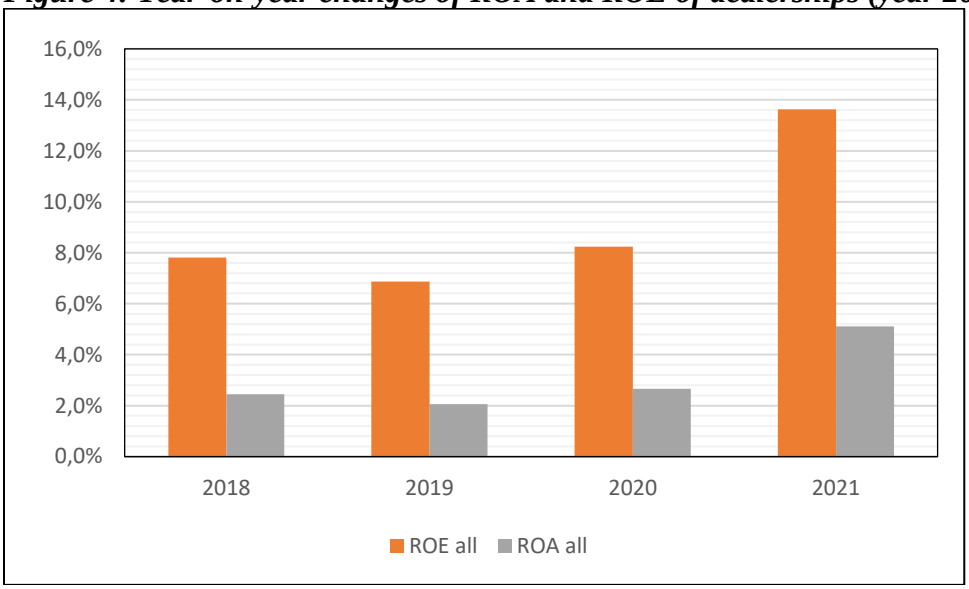
Table 4 and Figure 4, including ROE and ROA, show a similar picture. The increase in both indicators in 2020 (despite the decline in the number of vehicles sold) and especially in 2021 shows the ability of individual companies to generate solid profitability thanks to higher vehicle prices.

***Table 4: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and ROA and ROE of dealerships***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Registrations in thsnd | 282 | 270 | 220 | 227 |
| ROE all | 7.8% | 6.9% | 8.2% | 13.6% |
| ROA all | 2.4% | 2.1% | 2.7% | 5.1% |

Source: own elaboration

***Figure 4: Year-on-year changes of ROA and ROE of dealerships (year 2018 = 100%)***




Source: own elaboration

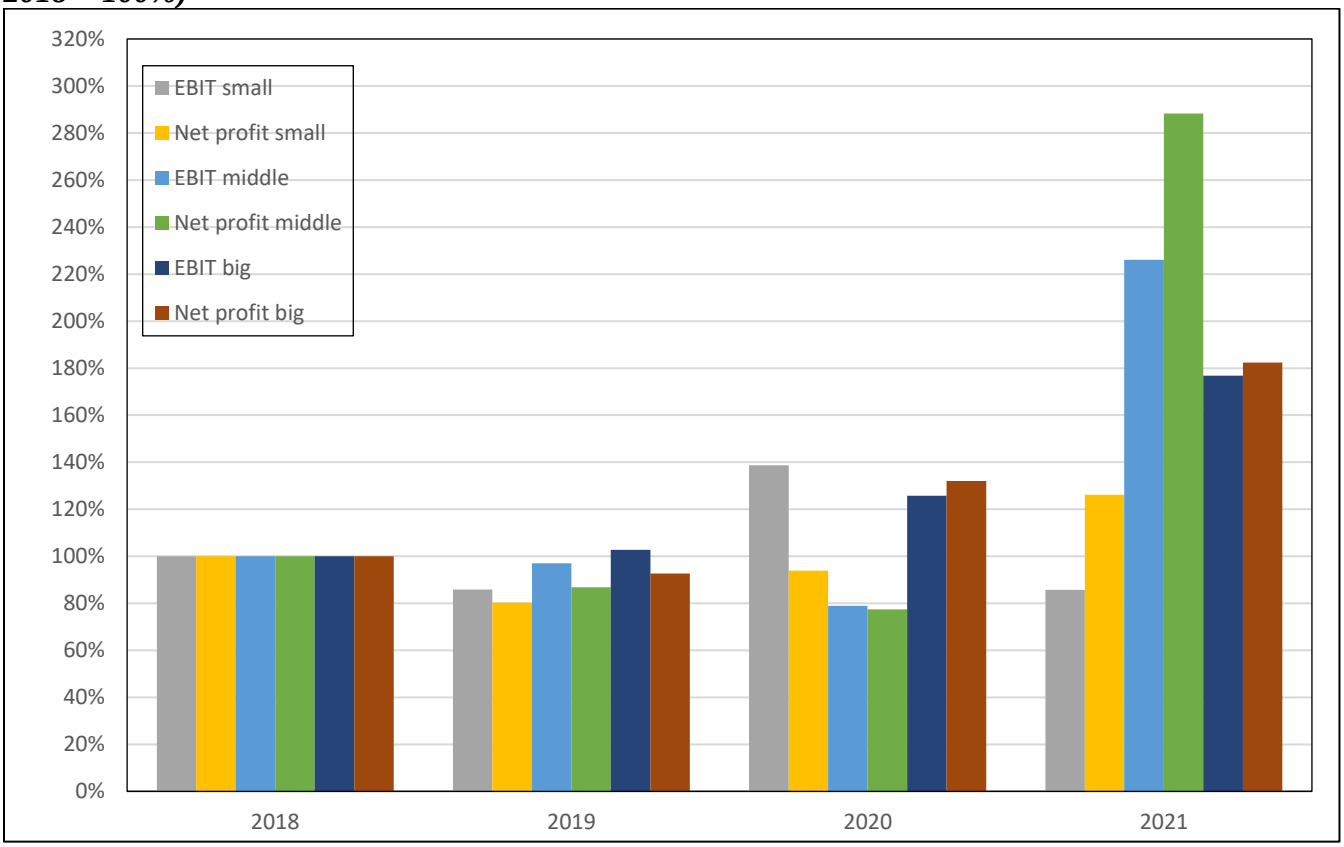
In terms of dealerships' size distribution, it is definitely worth noting the significant fluctuations in EBIT and net profit for the middle-sized dealerships category: in 2020, both values experienced a relatively significant decline (larger than for the other groups) and, on the contrary, a steep year-on-year increase in 2021. However, in the overall view for the period 2018–2021, as in the case of revenues, the large dealerships are the most successful with indices of 228.4% (EBIT) and 223% (net profit) respectively. This is a remarkable result in a situation where the number of cars sold in the last year of the reporting period was just over 80% of the first year's value.
Details are given in Table 5 and Figure 5.

***Table 5: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and EBIT and net profit of dealerships by category***

| in mil CZK | 2018 | | 2019 | year-on-year change | 2020 | year-on-year change | 2021 | year-on-year change | **change 2018 to 2021** |
|---|---|---|---|---|---|---|---|---|---|
| Registrations in thsnd | 282 | 100.0% | 270 | 96.0% | 220 | 81.4% | 227 | 102.9% | **80.4%** |
| EBIT small | 27 | 100.0% | 23 | 85.9% | 32 | 138.7% | 27 | 85.7% | **102.1%** |
| Net profit small | 27 | 100.0% | 21 | 80.2% | 20 | 93.9% | 25 | 126.1% | **95.0%** |
| EBIT middle | 70 | 100.0% | 68 | 97.1% | 54 | 78.9% | 122 | 226.1% | **173.2%** |
| Net profit middle | 48 | 100.0% | 42 | 86.8% | 32 | 77.4% | 93 | 288.3% | **193.7%** |
| EBIT big | 325 | 100.0% | 334 | 102.7% | 420 | 125.8% | 743 | 176.9% | **228.4%** |
| Net profit big | 240 | 100.0% | 222 | 92.7% | 293 | 132.0% | 534 | 182.4% | **223.0%** |

Source: own elaboration

***Figure 5: Year-on-year changes of EBIT and net profit of dealerships by category (year 2018 = 100%)***




Source: own elaboration

Hypothesis 2 was therefore not confirmed: dealerships were able to outperform the trend in the number of vehicles sold (units) by increasing the prices of vehicles sold.

**Hypothesis 3**: The volume of dealerships' inventories decreased during the period under review as manufacturers/importers were unable to supply the required quantities of cars and the inventory turnaround ratio decreased.

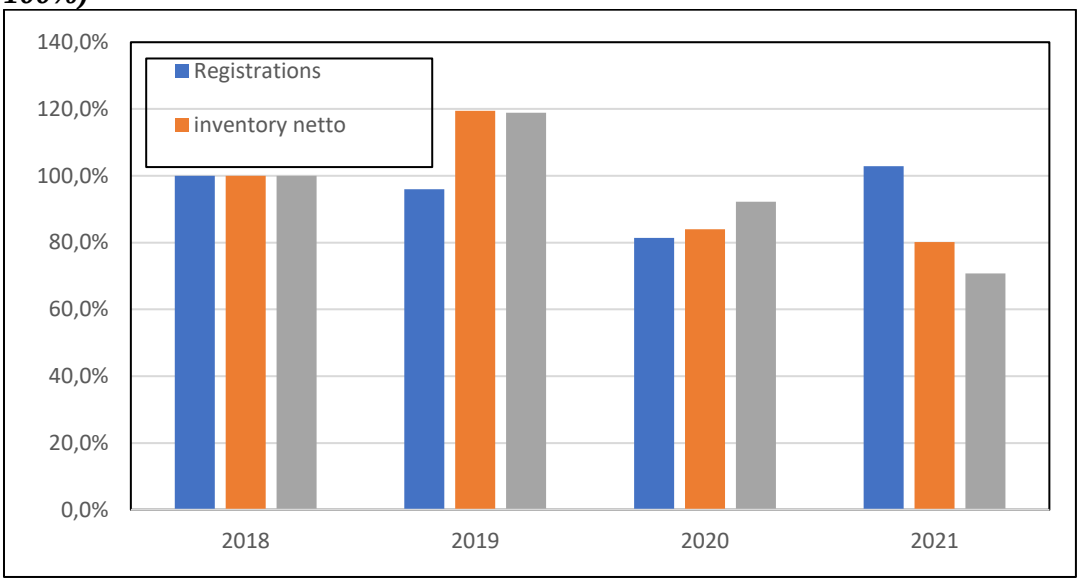
As shown in Table 6, in the pre-pandemic year 2019, average dealerships' inventories as well as inventory turnaround ratios were increasing. In contrast, in the pandemic years 2020 and especially 2021, both values declined rather sharply. This is consistent with the assumption that the declines in sales (new registrations) in the pandemic years were at least partly due to a shortage of cars (i.e. insufficient supply) and not just a lack of buyer interest.
It should also be added that the inventories shown in dealers' accounts are far from representing only new cars. This accounting category also includes used cars as well as spare parts, accessories/accessories and other categories.

***Table 6: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and inventory netto and inventory turnaround ratio of dealerships***

| | | | | year-on-year change | | year-on-year change | | year-on-year change | **change 2018 to 2021** |
|---|---|---|---|---|---|---|---|---|---|
| in mil CZK | 2018 | | 2019 | | 2020 | | 2021 | | |
| Registrations in thsnd | 282 | 100.0% | 270 | 96.0% | 220 | 81.4% | 227 | 102.9% | **80.4%** |
| inventory netto | 5 127 | 100.0% | 6 123 | 119.4% | 5 141 | 84.0% | 4 121 | 80.2% | **80.4%** |
| inventory turnaround ratio | 63.1 | 100.0% | 75.0 | 118.9% | 69.2 | 92.2% | 49.0 | 70.8% | **77.6%** |

Source: own elaboration

***Figure 6: Registrations of new passenger cars and light commercial vehicles in the Czech Republic and inventory netto and inventory turnaround ratio of dealerships (year 2018 = 100%)***




Source: own elaboration

Hypothesis 3 was therefore confirmed.

**Hypothesis 4**: The Current Ratio of liquidity (i.e. including current assets, including inventories) decreased during the period under review due to the decrease in inventories; the Quick Ratio of liquidity (excluding inventories) did not change much or only slightly decreased during the period under review.

Table 7 and Figure 6 show the Current Ratio, while Table 8 and Figure 7 below show the Quick Ratio. It can be concluded that these ratios were relatively little affected by the Covid-19 pandemic, and the changes in the values over the range of years under review are not very significant. However, it is worth noting that small dealerships clearly have the best performance in both indicators and that a clear positive trend can be observed for them.
Overall, the values of the liquidity ratios for dealerships are not very favourable: the literature recommends a range between 2 and 2.5 for the Current Ratio and around 1 to 1.5 for the

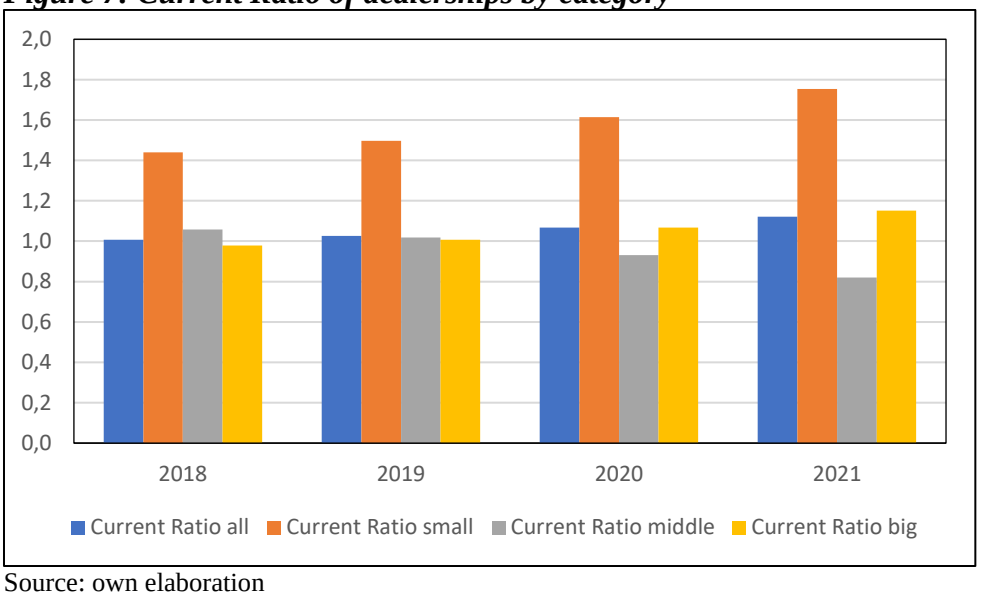
Quick Ratio. Virtually no group of surveyed companies reaches these values (except for QR for small dealerships in 2021). However, the specifics of the industry, in which the surveyed companies operate, must be taken into account. Car sales, as well as servicing and other operations are usually either paid immediately or with a short payment term (e.g. when payments for vehicles come from financing companies). Short-term liabilities are mainly to financing providers, especially inventory financing. While such liabilities are (quite correctly from an accounting point of view) usually reported as short-term, the dealership can very likely expect to extend or renew them if necessary. Inventories have already been discussed above (Hypothesis 3).
Thus, the lower values of liquidity ratios are not very significant in terms of bankruptcy risk for the group of companies under consideration.

***Table 7: Current Ratio of dealerships by category***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Current Ratio all | 1.0 | 1.0 | 1.1 | 1.1 |
| Current Ratio small | 1.4 | 1.5 | 1.6 | 1.8 |
| Current Ratio middle | 1.1 | 1.0 | 0.9 | 0.8 |
| Current Ratio big | 1.0 | 1.0 | 1.1 | 1.2 |

Source: own elaboration

***Figure 7: Current Ratio of dealerships by category***



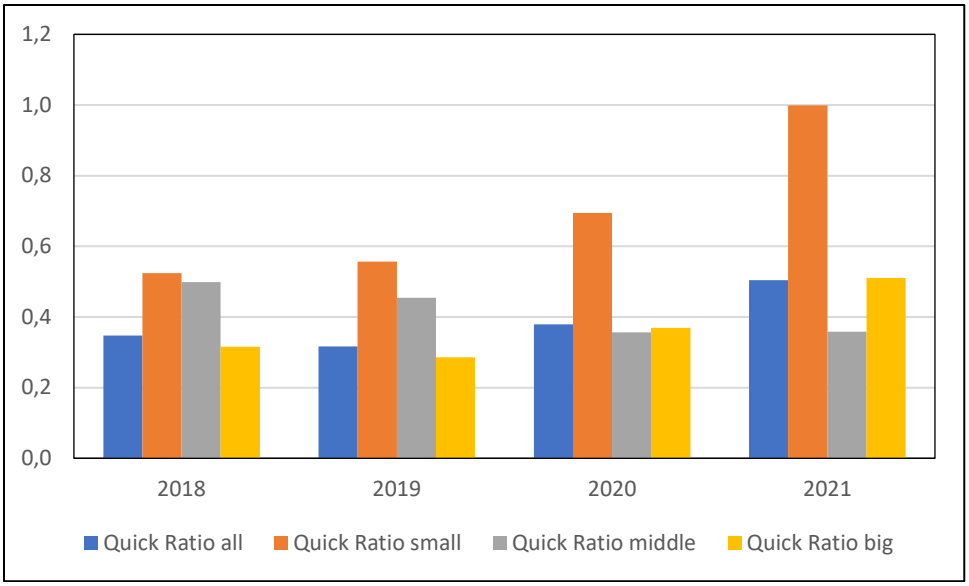

Source: own elaboration

***Table 8: Quick Ratio of dealerships by category***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Quick Ratio all | 0.3 | 0.3 | 0.4 | 0.5 |
| Quick Ratio small | 0.5 | 0.6 | 0.7 | 1.0 |
| Quick Ratio middle | 0.5 | 0.5 | 0.4 | 0.4 |
| Quick Ratio big | 0.3 | 0.3 | 0.4 | 0.5 |

Source: own elaboration

***Figure 8: Quick Ratio of dealerships by category***




Source: own elaboration

Thus, Hypothesis 4 was not confirmed: The Current Ratio did not decline during the period under study, contrary to the hypothesis, and the Quick Ratio increased slightly.

**Hypothesis 5**: The financial health of dealerships deteriorated during the period considered and there were more dealerships at risk of financial difficulties or even bankruptcy.

As mentioned above, the Altman Z' score (for LLCs), Altman Z'" score (for non-manufacturing companies and emerging markets) and IN05 were chosen to assess the financial health of the companies or the degree to which they werre at risk of bankruptcy.

The results are shown in the following Tables 9, 10 and 11 and Figures 8, 9 and 10. The figures also show the different zones for the evaluation of the results:

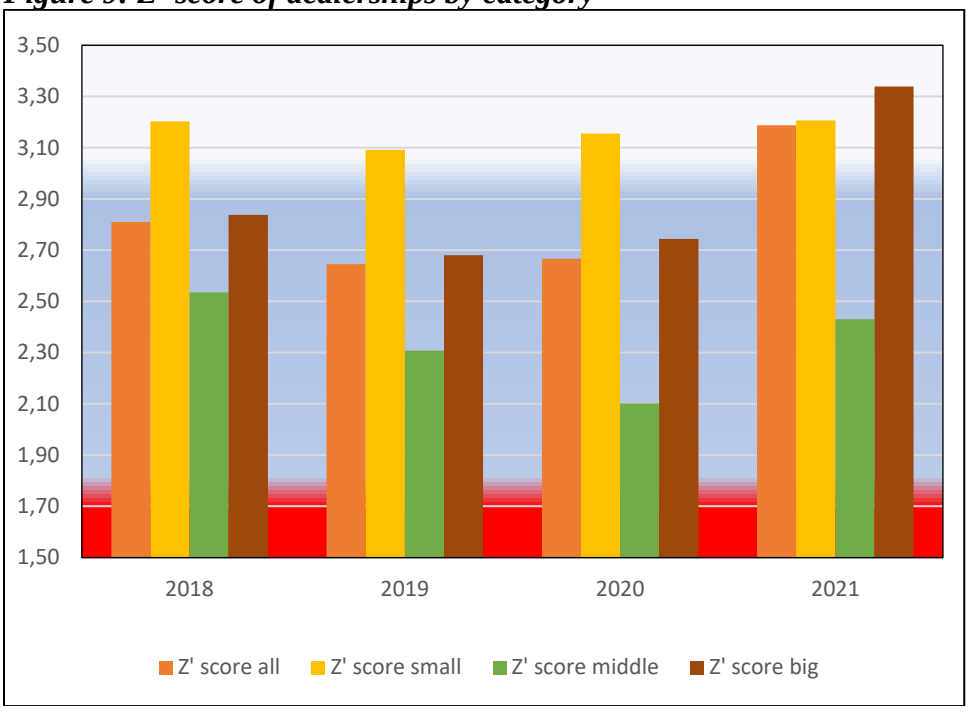
- For Altman Z' score (for LLCs) the financial situation is considered satisfactory at a value of 2.99 and higher. The range from 1.81 to 2.99 is considered a "zone of ignorance" or a "grey area" where no clear decision can be made on the basis of the indicator. In some cases, the threshold Z' = 2.675 is used as a limit. Below 1.81, the company is considered a direct candidate for bankruptcy.
- For the Altman Z'" score (for non-manufacturing and emerging markets), values above 2.9 are considered satisfactory, the grey zone ranges from 1.2 to 2.9 and below 1.2 the firm is considered a candidate for bankruptcy.
- For IN05, thresholds are set separating enterprises in good shape, the grey zone and enterprises at risk of serious financial problems at 1.6 and 0.9.

***Table 9: Z' score of dealerships by category***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Z' score all | 2.81 | 2.65 | 2.67 | 3.19 |
| Z' score small | 3.20 | 3.09 | 3.16 | 3.21 |
| Z' score middle | 2.54 | 2.31 | 2.10 | 2.43 |
| Z' score big | 2.84 | 2.68 | 2.74 | 3.34 |

Source: own elaboration

***Figure 9: Z' score of dealerships by category***



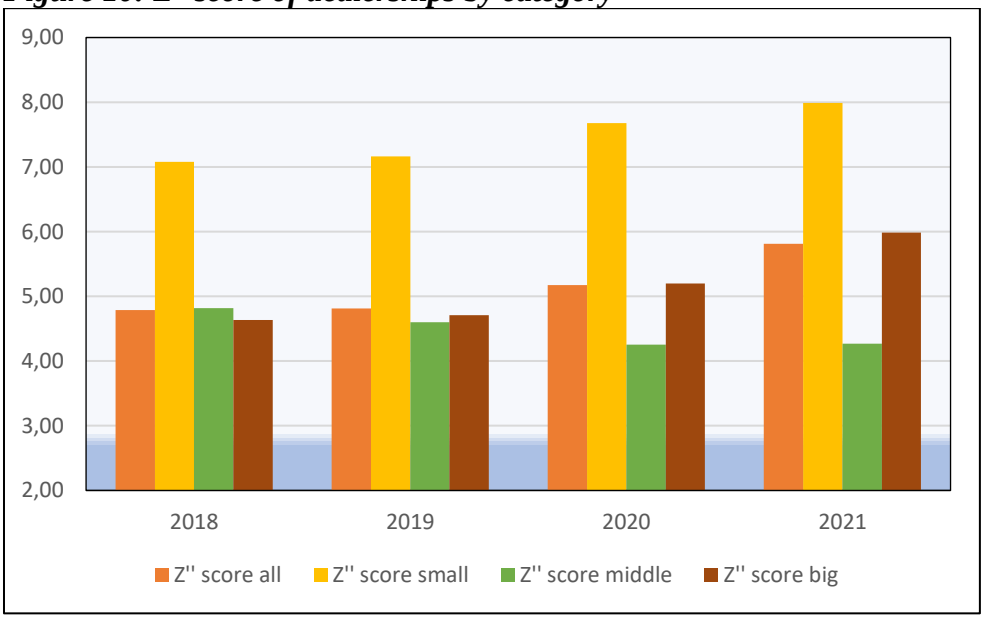

Source: own elaboration

***Table 10: Z"' score of dealerships by category***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Z"' score all | 4.79 | 4.81 | 5.18 | 5.81 |
| Z"' score small | 7.08 | 7.17 | 7.68 | 7.99 |
| Z"' score middle | 4.82 | 4.60 | 4.25 | 4.27 |
| Z"' score big | 4.64 | 4.71 | 5.20 | 5.98 |

Source: own elaboration

***Figure 10: Z" score of dealerships by category***



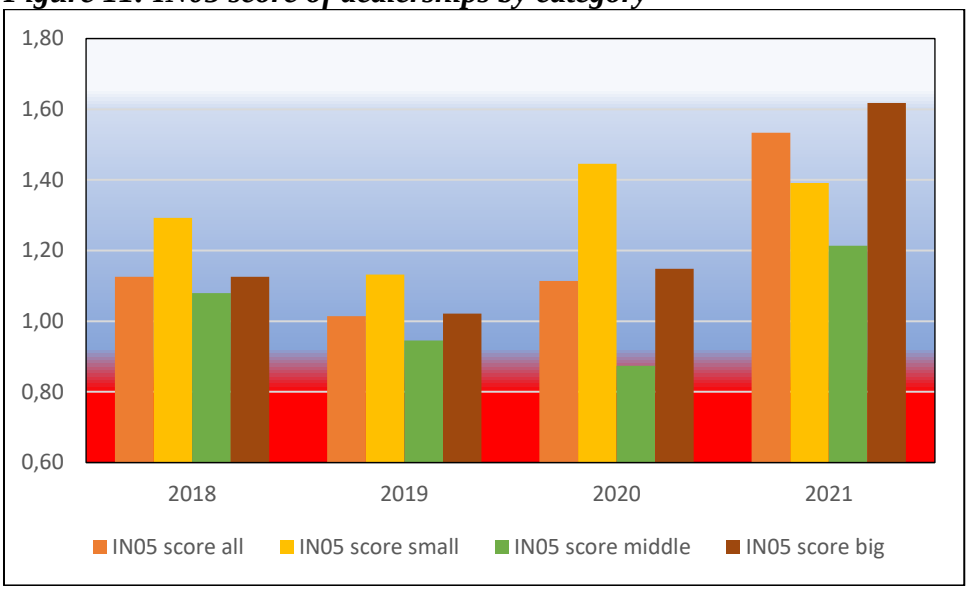

Source: own elaboration

***Table 11: IN05 score of dealerships by category***

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| IN05 score all | 1.13 | 1.01 | 1.11 | 1.53 |
| IN05 score small | 1.29 | 1.13 | 1.45 | 1.39 |
| IN05 score middle | 1.08 | 0.95 | 0.87 | 1.21 |
| IN05 score big | 1.13 | 1.02 | 1.15 | 1.62 |

Source: own elaboration

***Figure 11: IN05 score of dealerships by category***




Source: own elaboration

**Model Z'** shows several facts:

- Small dealerships' results have, on average, stayed within the zone of satisfactory financials all along, albeit only relatively little above the zone threshold (i.e. above 2.99). If the values are measured against the threshold of 2.675, small dealerships on average stayed reliably above it throughout the period.
- The values for all dealerships regardless of size, i.e. corresponding to the weighted average of all dealerships, were, like the values for large dealerships, inside the indecisive grey zone in 2018–2020 inclusive and also close to the threshold Z' = 2.675. It was only in the last year under review, 2021, that the financial situation of large dealerships clearly improved and, with a value of 3.3, fell safely into the satisfactory financial value zone. Even in this year, large dealerships surpassed the value of small ones (3.2).
- An analysis of the individual components of the Z' score calculation formula showed that the overall improvement was the result of a shift in all components of the formula, i.e. all indicators experienced a positive shift from 2020 to 2021. This is, therefore, not the result of an isolated improvement in one or two parameters, but an overall improvement in the financial situation as a whole. This is shown in Table 12:

***Table 12: Components of Z' score of big dealerships in 2020 and 2021***

| | **2020 big dealerships** | **2021 big dealerships** |
|---|---|---|
| 0.717 $X_1$ | 0.03 | 0.06 |
| 0.847 $X_2$ | 0.24 | 0.29 |
| 3.107 $X_3$ | 0.12 | 0.23 |
| 0.42 $X_4$ | 0.19 | 0.25 |
| 0.998 $X_5$ | 2.15 | 2.52 |
| **Z' score** | **2.74** | **3.34** |

Source: own elaboration

- By contrast, the values of middle-sized dealerships remained deep in the grey zone and even below the threshold value of Z' = 2.675 throughout the period under review. Analysis of the individual components of the indicator (here in Table 13 for 2021 compared to large dealerships) clearly indicates that the reason for this is again about all components of the pattern, not one or two isolated issues.

***Table 13: Components of Z' score of big and middle dealerships in 2021***

| | **2021 middle dealerships** | **2021 big dealerships** |
|---|---|---|
| 0.717 $X_1$ | -0.07 | 0.06 |
| 0.847 $X_2$ | 0.17 | 0.29 |
| 3.107 $X_3$ | 0.19 | 0.23 |
| 0.42 $X_4$ | 0.24 | 0.25 |
| 0.998 $X_5$ | 1.90 | 2.52 |
| **Z' score** | **2.43** | **3.34** |

Source: own elaboration

The results of the **Z" model** are much clearer: all three groups under study and, indeed, the aggregate group of all firms under study were safely in the zone of satisfactory financial health, i.e. without the threat of bankruptcy, throughout the entire period under study. Again, the category of small dealerships stands out and, as in the Z' model, performs significantly better than the other categories. Worse results for the middle-sized dealership category can be observed, especially in both Covid years 2020 and 2021, when the results of small and large dealerships improved in contrast.

A comparison of the individual components of the indicator in Table 14 shows that the large dealership category again outperforms in all components, but the largest differences are shown by indicators $X_1$ (= Working Capital / Total Assets) and $X_2$ (= Retained Earnings / Total Assets). For indicator $X_1$, half of the surveyed entities in the middle-sized dealerships category showed negative working capital values, i.e. higher current liabilities than current assets.

***Table 14: Components of Z" score of big and middle dealerships in 2021***

| | **2021 middle dealerships** | **2021 big dealerships** |
|---|---|---|
| 6.56 $X_1$ | -0.63 | 0.53 |
| 3.26 $X_2$ | 0.65 | 1.10 |
| 6.72 $X_3$ | 0.41 | 0.49 |
| 1.05 $X_4$ | 0.59 | 0.61 |
| constant | 3.25 | 3.25 |
| **Z" score** | **4.27** | **5.98** |

Source: own elaboration

The IN05 model gives results more similar to the Z' model than the Z" model. All the dealerships categories studied were in the grey zone between 0.9 and 1.6 throughout the study period, with only the middle-sized dealerships group falling just below the 0.9 threshold in 2020 (the indicator value was 0.87). However, this category showed a significant improvement to a value of 1.21 in 2021.
Small dealerships again showed the best results in three of the four years under review, with only 2021 showing a slight deterioration (from 1.45 to 1.39), resulting in a higher IN05 value for large dealerships (1.62) for that year.

Hypothesis 5 was therefore not confirmed.
For two of the three models used, dealerships of all categories were in the grey indeterminate zone. However, the values of the models' indicators tended to improve, and in one of the models, two of the three categories reached a clearly positive value in the last year under review.
The third model used subsequently showed positive values (i.e. that firms on average achieved good financial health) for all categories during the period under review.

## CONCLUSION

Thus, it can be concluded that:

- The revenues (in CZK) of the selected sample of passenger car and light commercial vehicle dealerships in the Czech Republic in the period 2018–2021 developed similarly to the total sales volume of passenger cars and light commercial vehicles (number of units sold per year) on the Czech market, but with a smaller amplitude (smaller fluctuations). This was due to the rising prices of cars and other goods, as well as the significant share of servicing (unaffected by the decline) in revenues.
- Dealerships were also able to make higher profits than the trend in the number of vehicles sold (units) would suggest, thanks to the increase in the prices of vehicles sold.
- Dealerships' inventory levels decreased during the period under review as manufacturers/importers were unable to supply the required quantities of cars and inventory turnaround times became shorter.
- The Current Ratio did not decline during the period under stud, and the Quick Ratio increased slightly.
- In terms of financial health and bankruptcy risk, two of the three models used had dealerships in the grey uncertain zone. However, the values of the models' indicators tended to improve and in one of the models reached a clearly positive value in two of the three categories in the last year under review. The third model used then showed positive values (i.e. that firms on average achieved good financial health) for all categories during the period under review.

As a result, it can be said that the Covid-19 pandemic did not have a significant negative impact on the financial health of dealerships on average during the period under review and that there was no increase in the number of dealerships at risk of financial problems or even bankruptcy.

Naturally, the research results are limited in some respects. It was not possible to determine from public sources, for example, how much of the changes in vehicle registrations and in the sales (revenues) of individual dealerships were caused by outages on the side of suppliers (i.e. manufacturers or importers of vehicles) and what part corresponded to a decrease in customer demand for new vehicles.
The effect of significantly longer delivery times for most brands, related precisely to problems in the supply chain, is also not captured. The revenues of individual dealerships were (also because of comparability and audit trail) obtained from the annual reports for individual years (as mentioned above).

In terms of further research, the author recommends a comparison with similar data in other countries, especially in Central and Eastern Europe, where car sales operate in a similar way as in the Czech Republic. Conversely, in other countries, especially non-European ones, the conditions are fundamentally different (e.g. in the USA, a much higher percentage of cars is sold from warehouses instead of to order, etc.). This of course also limits the generalisability of the results.

It could certainly be interesting to continue to monitor the financial indicators in future years, too. The situation in the automotive industry has been and remains highly turbulent in the years following the period under review, although the major influence is no longer the Covid-19 pandemic and the resulting shortfalls, but other influences. Not negligible will be the

impact of restrictions on international trade, the uncertainty linked to the war in Ukraine and, above all, the impact of current and expected legislative changes in the automotive trade (e.g. the forthcoming Euro 7 standard, the ban on the sale of new passenger cars with internal combustion engines for 2035...), etc. All these influences will again have an impact not only on vehicle manufacturers and their subcontractors, but also on the entire sales chain, including dealerships.

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