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SELECTED IMPACTS OF REGULATION (EU) 2019/631 ON VALUE CREATION IN THE AUTOMOTIVE INDUSTRY

Romana Čižinská[1], Jana Chládková[2]

Abstract

Road transportation is responsible for a significant part of the EU's total CO2 emissions. Therefore, the automotive sector is subject to continuously strengthening environmental regulation. Regulation (EU) 2019/631 of the European Parliament and of the Council of 17th April 2019 sets, for the period from 2020 to 2024, an EU fleet-wide target of 147 g CO2/km for the average emissions of new light commercial vehicles and an EU fleet-wide target of 95 g CO2/km for the average emissions of new passenger cars, phasing in for 95% of vehicles in 2020 with 100% compliance in 2021. If a manufacturer does not meet given CO2 standards, the excess emissions premium (penalty) is to be charged. Value creation in the automotive sector across the supply chain is necessarily undergoing a process of change. Manufacturers of passenger cars and light commercial vehicles are forced either to face a massive penalty or to invest in the development of low-emission technology and in the change of the production portfolio towards zero- and low-emission vehicles with lower profit margins and a relatively unformed customer base. The aim of this paper is to identify how the excess emissions premium affects the value creation in the automotive industry. Our methodology utilizes the income-based valuation approach. First, we conduct an analysis of the key financial value drivers of automotive companies in the period from 2016 to 2019. Subsequently, we make a prognosis of value drivers for the future period affected by the above-mentioned regulation.

JEL classification: G32, Q51

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[1] ŠKODA AUTO University, Department of Finance and Accounting, e-mail: romana.cizinska@savs.cz, ORCID: 0000-0003-2313-5760.

[2] ŠKODA AUTO University, Department of Finance and Accounting, e-mail: xsimonova@is.savs.cz.

Introduction

Climate change is a serious issue that is rapidly altering the world we live in. A phenomenon known as the greenhouse effect is purported to be the main cause of climate change, which in turn results in global warming. Carbon dioxide (CO2) produced by human activity is considered the highest contributor to this environmental change (European Commission, 2014).Transport of people and goods on streets and roads is responsible for about 20% of all greenhouse gas emissions in Europe (see Daimler, 2021a and European Parliament, 2019). According to European Parliament (2021), road transportation causes three quarters of total transport CO2 emissions in the EU, with passenger cars taking the lead at 60.7%, followed by heavy duty trucks at 26.2%, light duty trucks at 11.9% and motorcycles at 1.2%.

The seriousness of climate change was recognized by the 1979 World Climate Conference, which is usually referred to as the first world climate conference. However, the first automobile emissions standards to control pollution from cars were enacted 16 years earlier in 1963 in the United States (see EPA, n.d.) and were soon followed by similar regulations in Japan, Canada, Australia, and several European countries. In June 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was signed by about 150 countries at Rio de Janeiro during the United Nations Conference on Environment and Development. In December 1997, the Kyoto Protocol was adopted. The Kyoto Protocol operationalizes UNFCCC by committing industrialized countries and economies in transition to limit and reduce greenhouse gas emissions in accordance with agreed individual targets. The Paris Agreement, which replaced the Kyoto Protocol in November of 2016, recognized that climate change is a shared problem and called on all countries to set emissions targets with the goal to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. The Paris Agreement was signed by 195 parties and ratified or otherwise joined by 191 parties (190 countries plus the European Union) representing 97% of global emissions (United Nations Climate Change, 2021). The basis of the EU's contribution to the Paris Agreement is formed in its long-term climate strategy. In 2018, the European Commission published its communication "A clean planet for all", which calls for net-zero greenhouse gas emissions by 2050. On 11 December 2019, the European Commission announced the European Green Deal to transform the European Union into an economy with net-zero greenhouse gas emissions (i.e. to become climate neutral) by 2050, to achieve economic growth not tied to resource use and to ensure no person and no place is left behind. The European Green Deal is also supposed to play an important role in the region's COVID-19 recovery (European Commission, 2021a).

In order to contribute to the objectives of the Paris Agreement (considering "A clean planet for all"), the European Parliament and the Council of the European Union have adopted Regulation (EU) 2019/631, which sets CO2 emission performance standards for new passenger cars and for new light commercial vehicles and have repealed Regulations (EC) No 443/2009 and (EU) No 510/2011 (further referred to as Regulation (EU) 2019/631). According to this regulation, the emissions from conventional combustion engine vehicles will need to be further reduced after 2020 and zero- and low-emission vehicles will need to be deployed and gain significant market share by 2030.

In 2019, average CO2 emissions from all new passenger cars registered in Europe reached 122.3 g of CO2 per kilometre (EEA, 2021). CO2 emissions from new light commercial vehicles reached an EU-wide average of over 158 g of CO2 per kilometre in 2019 (Wagner, 2021). Starting 1 January 2020, the Regulation (EU) 2019/631 sets an EU fleet-wide target of 95 g CO2/km for the average emissions of new passenger cars and an EU fleet-wide target of 147 g CO2/km for the average emissions of new light commercial vehicles registered in the European Union. The CO2 emissions target of 95 g/km must be met by 95% of each manufacturer's new passenger cars registered in 2020 and by 100% of cars from 2021 onwards. Manufacturers (except for those which have been granted a derogation under Article 10 of Regulation (EU) 2019/631)may form a pool for the purposes of meeting their specific emission targets. If a manufacturer's average specific emissions of CO2 exceed its specific emissions target, the European Commission shall impose an excess emissions premium on that manufacturer (or the pool manager). The average value of the specific CO2 emissions is calculated as the share of total of the certified CO2 emissions of the individual vehicles, divided by the number of newly registered vehicles.

The excess emission premium shall be calculated using the following formula:

Excess emission premium = (Excess emissions x EUR 95) x number of newly registered vehicles

Excess emissions refer to the positive number of grams per kilometre by which a manufacturer's average specific emissions of CO2, taking into account CO2 emissions reductions due to innovative technologies approved in accordance with Article 11 of the Regulation (EU) 2019/631, exceeded its specific emissions target in the calendar year or part thereof to which the obligation under Article 4 of the Regulation (EU) 2019/631 applies, rounded to the nearest three decimal places.

The amounts of the excess emissions premium shall be considered as revenue for the general budget of the European Union. The Commission should, in its 2023 review, evaluate the possibility of allocating the amounts of the excess emissions premium to a specific fund or a relevant programme that aims to ensure a just transition towards zero-emission mobility and to support re-skilling, up-skilling and other skills training of workers in the automotive sector (see L111/13, (45) Regulation (EU) 2019/631).

Manufacturers in the automotive industry are not yet meeting the aforementioned CO2 emissions criteria. Moreover, considerable difficulties are caused by a new test procedure, the Worldwide Harmonised Light Vehicles Test Procedure ('WLTP'), that was set up in European Commission Regulation (EU) 2017/1151in order to measure CO2 emissions from and fuel consumption of passenger cars and light commercial vehicles. WLTP provides CO2 emission and fuel consumption values that are more representative of real-world conditions (unlike the previous, less strict system called the New European Driving Cycle or *NEDC*).

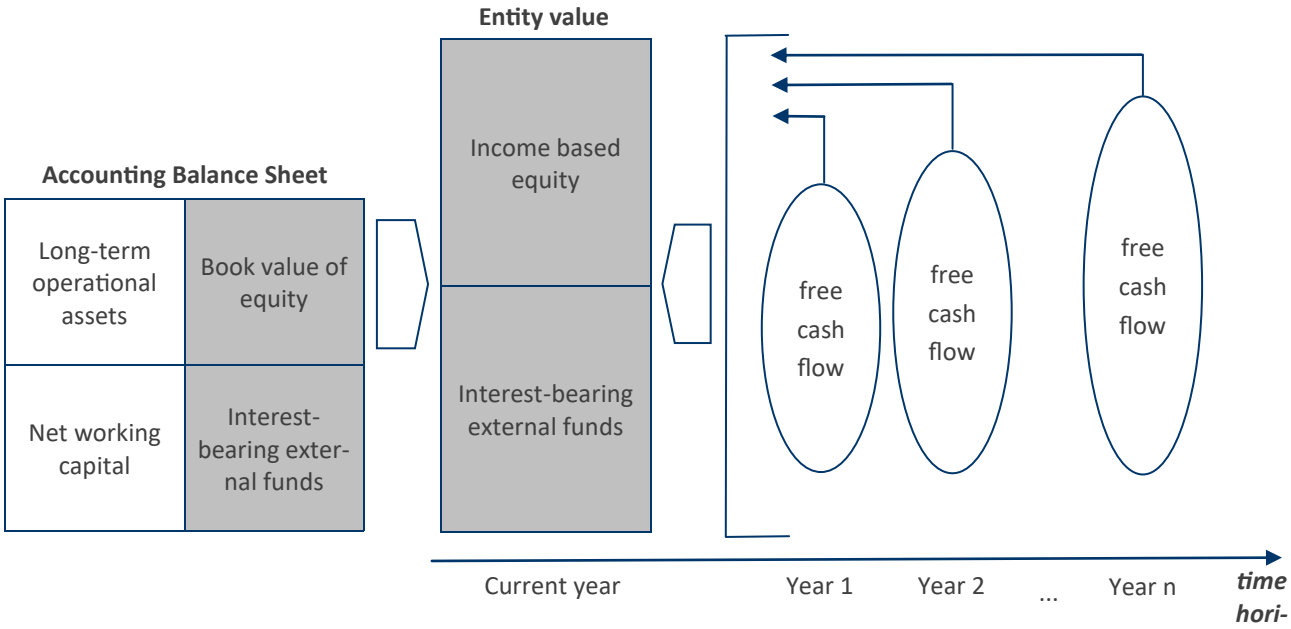
Increased environmental regulation has placed enormous pressure on automakers. The impact of this regulation, together with other challenges (such as the self-driving evolution, connected technologies, various consequences of the COVID-19 pandemic and the global semiconductor shortage) is affecting the entire value chain within the automotive industry. The business model in this crucial sector of the European economy is changing, and manufacturers across the supply chain are forced to adopt new strategies toward sustainability or even survival. The aim of this paper is to give a brief survey of the main changes in value creation that companies in the automotive industry are undergoing.

Methodology and Data

Value creation is generally understood as the main financial goal of doing business. In essence, there are three groups of valuation methods, namely methods based on the analysis of business income, methods based primarily on the analysis of current prices in the market, and methods based on the valuation of individual items constituting the business. From the perspective of an income-based approach, the value of a business is given by the present value of future benefits distributable to the owners of the business enterprise. In order to determine the present value of future benefits, a capitalisation interest rate (discount rate), which corresponds to the rate of return on the comparable alternative investment, is applied.

Valuation stemming from the analysis of income can be done by applying the discounted cash flow (DCF) method based on the updating of future free cash flow (FCF) from the perspective of the valuation date (see Figure 1). Business entity is created by the long-term operational assets and net working capital (its accounting value is displayed on the left part of Figure 1). Entity value (income-based equity value plus interest-bearing external funds) is created by the present value of future free cash flow generated by all operational assets (see the right part of Figure 1). If the value is being created and not destroyed, then income-based entity value (the value resulting from financial benefits generated by all operational assets) exceeds the current value of financial surplus obtained from the liquidation of the entire business (liquidation value of assets minus liabilities).

Figure 1: Discounted cash flow method of calculation of company value



Source: Authors based on Mařík et al., (2018).

The basic scheme of the calculation of the free cash flow on the basis of the DCF method is shown below (see Mařík et al., 2018):

+ Net profit from the operation activity after taxation (NOPAT)

+ Depreciation and amortization

– Investment into adjusted working capital required for operation (working capital investments)

– Investment for providing of investment property required for operation (CAPEX)

= Free cash flow for the company ("FCFF")

The calculation of the current value of FCFF determines the appraisal of the value of the entire business, including debts. By deducting the real value of interest-bearing external funds as at the valuation date, the appraisal of the value of the business equity, i.e. shareholder value is determined.

The business valuation is based on an income-based potential as at the valuation date. Basically, the income-based potential lies in the business prospects known at the valuation date. The appraisable income-based potential contains all potential resulting from measures taken prior to the valuation date, or from sufficiently specified measures within the current business concept and generally known market information. The financial plan for income-based valuation purposes is based on the analysis and prognosis of value drivers (Mařík et al., 2018; Copeland, Koller & Murin, 2000). In accordance with this methodology, the value drivers for the purposes of further analysis are defined as follows:

1) Sales growth,

2) Operating profit margin,

3) Investment into long-term operational assets (fixed capital investments, CAPEX),

4) Investment in operating working capital (working capital investments),

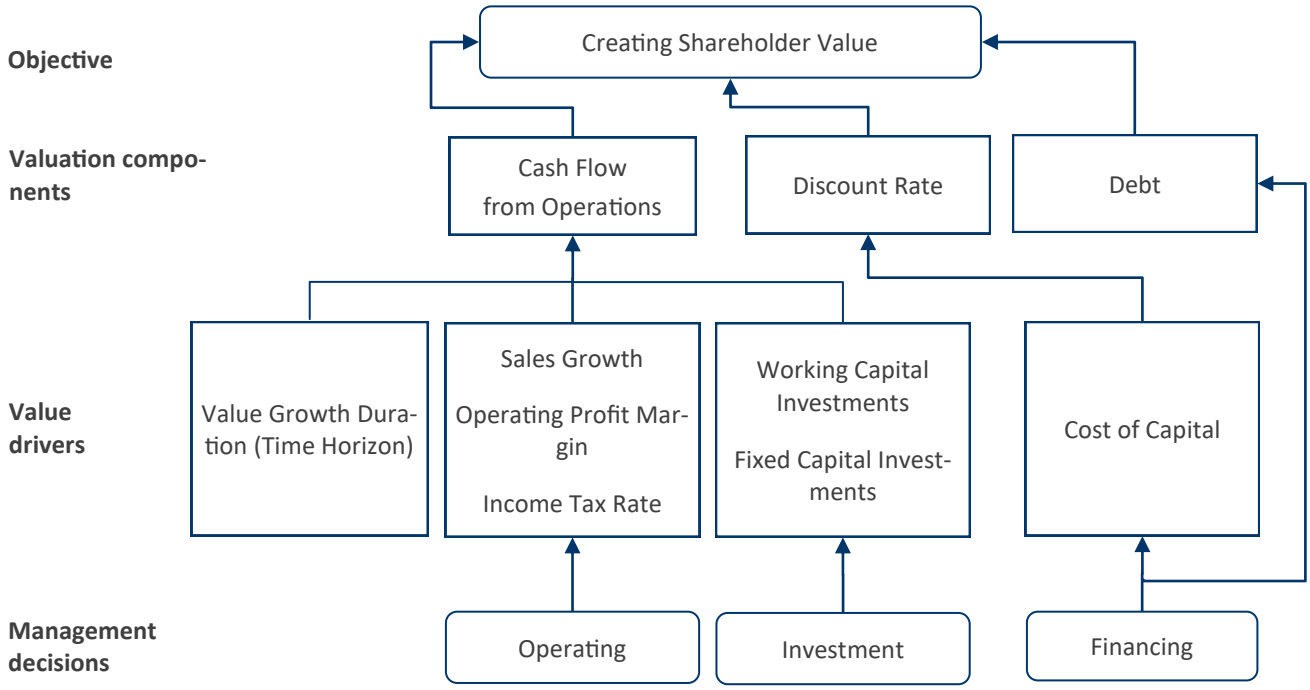
5) Discount rate (cost of capital),

6) Method of financing and usage of the interest-bearing external funds(the capital structure management),

7) Duration of the business existence (time horizon).

The inter-relationship among the above-mentioned value drivers that affect the creation of shareholder value is displayed in Figure 2. Cash flow from operations increases with the increase in sales (sales growth), doing so under the condition that the operating profit margin is preserved. Efficient investments into long-term assets and working capital drain cash flow but also support sales growth, profit margin and the time horizon of the business' existence. The boost in shareholder value is also enabled by optimizing the capital structure stemming into the reduction of the discount rate (cost of capital).

Figure 2: Value Drivers of Shareholder Value



Source: Rappaport (1999) in Mařík et al., (2018).

In our research, we focus on automotive companies in Germany, Slovakia and the Czech Republic. Germany is the backbone of the European automotive industry. The revenue generated by the German automotive industry is the largest in the EU-27 region (Čižinská & Neset, 2020a). However, using the measurement of the ratio of automotive industry revenue to GDP, Slovakia moves into the top position, followed by the Czech Republic (see Čižinská & Neset, 2020a, 2020b). Therefore, we compare selected value drivers of automotive companies in these three countries. The research is based solely on external, publicly available information. We use qualitative data (reports and news) regarding the environmental activities published by the biggest German car manufacturers (BMW, Daimler and Volkswagen Group), as well as surveys, statistics and analysis by JATO Dynamics and European Automobile Manufacturers Association ACEA. We also work with non-adjusted accounting data presented in the Orbis database of European companies and other entities (published by Bureau Van Dijk / A Moody's Analytics Company). The overall automotive industry of

Germany, Czech Republic and Slovakia is represented by selected available accounting data from 4,989 active companies that largely operate in the following industries: manufacture of motor vehicles (NACE Rev. 2: 291), manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers (NACE Rev. 2:292), and manufacture of parts and accessories for motor vehicles (NACE Rev. 2:293). We use aggregate data, where selected accounting parameters (such as revenues, EBIT, total assets or equity) of individual companies (742 companies in Czechia, 3,401 companies in Germany, 846 companies in Slovakia) were summed up for each country and used as key performance indicators of the local automotive industry in each country in question.

Discussion of the Results

Due to strengthening environmental regulation (including Regulation (EU) 2019/631), the manufacturers of passenger cars and light commercial vehicles are forced to reduce the production of internal combustion engine (ICE) vehicles that use fuel such as diesel, gasoline, LPG and CNG and move toward electrified vehicles, such as battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), hybrid electric vehicles (HEV), extended range electric vehicles (EREV) and fuel cell electric vehicles (FCEV).

The first study of JATO Dynamics (2019) viewed the CO2 targets set by Regulation (EU) 2019/631 as the apocalypse for the automotive industry in Europe. If European top car manufacturers would reach 2018 results (by sales and average CO2 emissions), excluding any kind of eco-innovation credits to offset the total emissions, then the total amount of penalties in 2021 would account for almost half of their combined net profits (for example estimated excess emission premium of Volkswagen Group according to JATO Dynamics, 2019 was EUR 9.19 billion).

The year 2020 was one of the most challenging years for the European automotive industry in decades. As a direct result of the COVID-19 pandemic, car production fell below even the 2009 financial crisis levels. The number of passenger cars registered throughout the EU region contracted by 23.7% in the European Union in 2020, and registrations of commercial vehicles dropped in 2020 compared to 2019 by 18.9%, specifically vans, i.e. light commercial vehicles up to 3.5 t including buses about 17.6%, trucks about 25.7% and buses about 20.3% (European Automobile Manufacturers Association ACEA, 2021a).

Below, Table 1 presents the sales growth (value driver 1), i.e. year-to-year increase in the operating revenue reached by the German, Czech and Slovak automotive industries. Significant slowdown of European automotive production in 2018 and 2019 is apparent and was deepened by the COVID-19 pandemic in 2020 (see above).

Table 1: Sales growth After-tax operating profit margin of automotive industry in selected countries

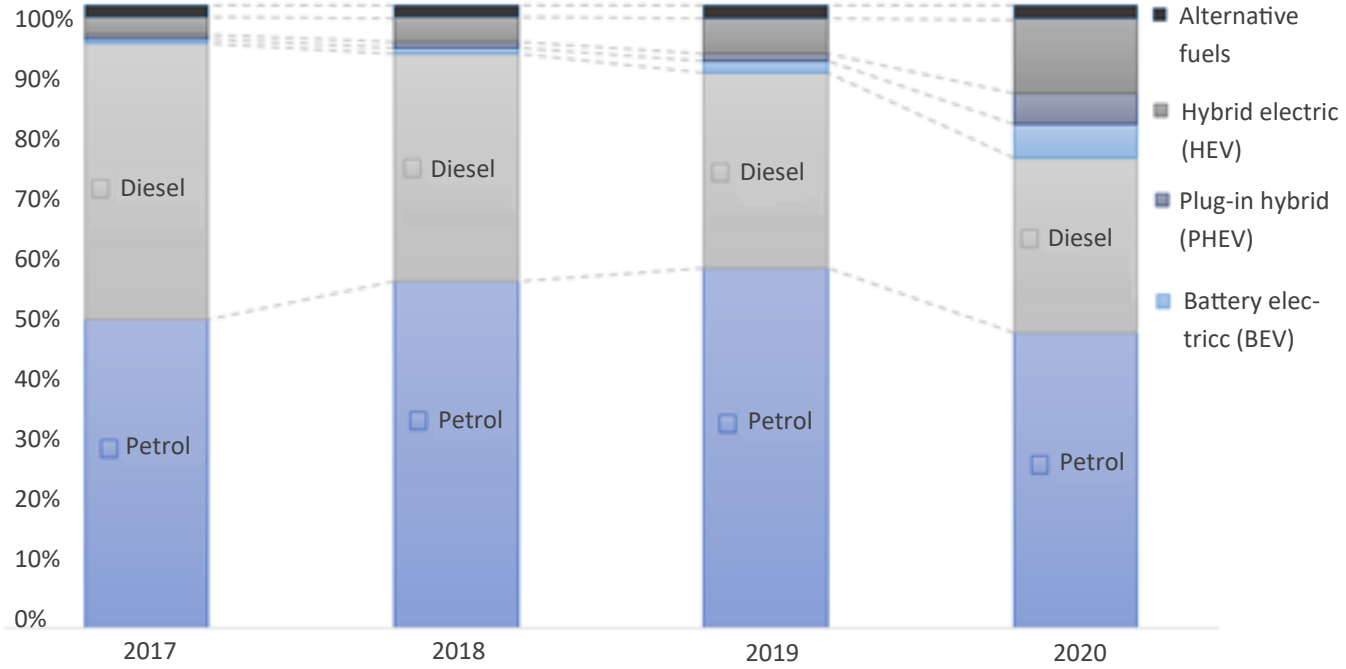
Period	2016/2015	2017/2016	2018/2017	2019/2018
Czech Republic	7.5%	14.3%	-0.1%	0.1%
Slovakia	12.2%	2.8%	13.6%	0.6%
Germany	14.1%	5.6%	6.7%	-0.6%

Note: Calculations based on aggregate accounting data from 742 active companies in Czech Republic, 3,401 active companies in Germany and 846 active companies in Slovakia that largely operate in the following industries: manufacture of motor vehicles (NACE Rev. 2:291), manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers (NACE Rev. 2:292), and manufacture of parts and accessories for motor vehicles (NACE Rev. 2:293)

Source: Authorial computations based on Orbis database.

However, despite overall registrations falling, the demand for electric vehicles increased in 2020 (see Figure 3). New purchase incentives within the economic stimulus packages in some European countries resulted in many consumers moving away from a traditional internal combustion engine and purchasing low-emissions alternatives instead (JATO Dynamics, 2021).

Figure 3: New cars in the EU by fuel type in the years 2017 – 2020



Source: European Automobile Manufacturers Association ACEA (2021b).

Table 2 displays the after-tax operating profit margin, total assets turnover and indebtedness of the automotive industry in Germany, Czech Republic and Slovakia. After-tax operating profit margin (value driver 2) ranges between 2.0% and 4.8% in the period from 2016 to 2019. Initially, Germany and Czech Republic reached the highest margins with Slovakia obtaining approximately half of Czech and German results. However, within the last two years in question there was convergence of the results among all three countries to a comparable level around 3%. As a central hub of the European automotive industry, Germany is experiencing a negative trend in operating activities (declining sales and profit margins). Total assets turnover displays how efficiently the investments into long term assets and net working capital (value drivers 3 and 4) are utilized to generate sales (operating revenue). Germany has the lowest values of turnover ratios. The operations of companies in the automotive industry are particularly demanding, especially on the fixed assets. Significantly higher values of total assets turnover in the Czech Republic and Slovakia that are relatively stable (constant number of investments necessary to generate one monetary unit of sales) might be reached due to shared technologies (in both countries the largest automotive producers are companies that are part of the Volkswagen Group). Indebtedness calculated as the share of debt on capital employed (connected with value drivers 5 and 6) is slightly declining in Slovakia and relatively stable in the Czech automotive industry. Utilization of debt by the German automotive industry is three or four times higher than in other countries in question. Demanding environmental investments are covered mainly by the debt capital.

Table 2: Profitability, turnover and debt ratios of the automotive industry in selected countries

Country	Ratio	2016	2017	2018	2019
Czech Republic	After-tax operating profit margin	4.76%	4.59%	3.70%	3.67%
	Total Assets Turnover	1.85	1.88	1.90	1.94
	Debt / Capital Employed	13.50%	13.20%	16.50%	15.60%
Slovakia	After-tax operating profit margin	2.41%	2.41%	1.98%	2.89%
	Total Assets Turnover	2.45	2.22	2.36	2.37
	Debt / Capital Employed	27.20%	24.70%	22.90%	21.00%
Germany	After-tax operating profit margin	3.80%	4.82%	4.10%	3.16%
	Total Assets Turnover	0.72	0.73	0.68	0.66
	Debt / Capital Employed	59.53%	57.09%	56.21%	58.49%

Note: Calculations based on aggregate accounting data from 742 active companies in the Czech Republic, 3,401 active companies in Germany and 846 active companies in Slovakia that largely operate in the following industries: manufacture of motor vehicles (NACE Rev. 2:291), manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers (NACE Rev. 2:292), and manufacture of parts and accessories for motor vehicles (NACE Rev. 2:293)

Source: Authorial computation according to Amadeus database.

By the end of 2020 the Volkswagen Group, together with other manufacturers, launched a CO2 pool for passenger car registrations. All pooling partners make electric vehicles, and this pool achieved average fleet-wide CO2 emissions of 99.8 g/km for the year 2020. However, since the emissions targets for 2020 were narrowly missed by around 0.8 g/km, the Volkswagen Group faces a fine of over EUR 100 million (Miller & Campbell, 2021, Volkswagen Group, 2021).

Deliveries of electric models in the EU, including the UK, Norway and Iceland, by the Volkswagen Group increased to a total of 315,400 electric vehicles (compared to 72,600 in 2019), making Volkswagen Group a clear BEV (battery-powered electric vehicles) market leader. Volkswagen Group continues to enlarge its CO2 pool even in 2021 to hedge against fines in the following years (Volkswagen Group, 2021).

According to Daimler (2021b), Mercedes-Benz Cars & Vans was compliant with the Regulation (EU) in 2020 and met the CO2 targets for passenger cars thanks to increased demand for plug-in hybrids and all-electric cars. Mercedes-Benz Cars sold more than 160,000 plug-in hybrids and all-electric vehicles.

Consumer purchasing behaviour is difficult to predict. Chládková (2021) identified the apparent relationship between economic development (nominal HDP) and the demand for CO2 sensitive vehicles (BEV, PHEV) with higher prices, higher costs of ownership and demanding requirements on the infrastructure. According to the European Commission (2021b), there is strong evidence that a regulatory framework acting on the supply side is a key factor to increase the number of efficient and zero-emission vehicle models coming to the market. Chládková (2021) also identified the positive relationship between the demand for CO2 sensitive vehicles and policy instruments to promote electric vehicles adopted especially by countries with higher nominal HDP (e.g. Germany, Sweden, Netherlands etc.).

Chládková (2021) identifies two sales management strategies recently used by car manufacturers:

1) If CO2 sensitivity is a priority, then the car manufacturer sacrifices the profit margin by replacing ICE vehicles with electric ones. According to Baik et al. (2019), most manufacturers do not profit on selling electric vehicles. Apart from a few premium models,

they lose money on almost every electric vehicle sold. The largest negative cost factor that is causing the drop of profit from electric vehicles compared to ICE vehicles is battery costs. CO2 sensitivity strategy, on the other hand, increases the probability of meeting the criteria of Regulation (EU) 2019/631and, therefore, leads to emission neutrality in the form of low or zero excess emission premium.

2) On the other hand, prioritizing profit maximization enables efficient utilization of infrastructure that was previously created (fixed capital and customer base). Higher volumes of ICE vehicles are being sold with higher profit margins. This scenario preserves the market share and brand awareness among customers. However, these financial benefits are offset by the excess emission premium. According to JATO Dynamics (2020), rising demand for SUVs is what is pushing car manufacturers further away from meeting emissions targets, due to their size and weight. However, SUVs are an essential part of the European automobile market and have driven sales and profitability over the past ten years. JATO Dynamics (2020) mentions two potential solutions – introduction of smaller SUVs and electrification of SUVs, which will likely discontinue some current SUVs from many brands in the short term.

Table 3 displays the profitability of different types of vehicles sold by ŠKODA AUTO a.s. and the type of sales management strategy needed if these vehicles are prioritized.

Table 3: Examples of Sales Management Strategies of Car Manufacturers in the Context of Regulation (EU) 2019/631

Sales management strategy	Profit maximization	Transition towards CO2 sensitivity	CO2 sensitivity
Prioritized vehicles	SUV RS (racing sport) 4x4	CNG vehicles Mid-sized vehicles	Small models PHEV BEV
Typical CO2 levels	> 125 g	100 - 125 g	< 100 g
Recent priorities	1) Profit margin 2) CO2 3) Volume		1) CO2 2) Volume 3) Profit margin

Source: Authors according to Chládková (2021).

Table 4 summarizes how the individual value drivers (see methodology chapter in this paper) are affected by the strategy of CO2 sensitivity versus the strategy of profit maximization and identifies the impact of Regulation (EU) 2019/631 on value creation in the automotive industry.

Table 4: The Impact of Different Sales Management Strategies *in the Context of Regulation (EU) 2019/631* on Value Creation in Automotive Industry

Value driver	Priority in the Management of Sales	
	CO2 sensitivity	Profit maximization
Sales growth	Potential increase in sales of electric vehicles depending on the policy instruments to promote electric vehicles and on the economic development of the target markets	Slowdown since 2018

Operating profit margin	Negative effect of battery costs	Positive effect of higher margin vehicles (e.g. SUVs); Negative effect of excess emission premium
Investment into fixed capital and operating working capital	Demanding, negative short-term effect (draining cash flow); Potential to promote sales growth in the long-term time horizon	Utilization of current infrastructure, stable relation of investments to sales
Discount rate (cost of capital)	Negative effect of higher risk of operations (lower profit margin and higher investments stem into higher operating leverage) Positive or negative effect of financial leverage (see below)	Negative effect of higher risk of excess emission premium
Method of financing and usage of the interest-bearing external funds (the capital structure management)	Higher investments will require additional debt financing – positive or negative effect depending on the situation at the financial markets (potential increase in the cost of debt due to the COVID-19 pandemic can have a negative impact on the discount rate)	Indifferent, stable capital structure
Duration of the business existence	Positive effect – sustainability	Negative effect – climate change

Source: Authors.

Conclusion

The speed of adaptation of the new EU targets for CO2 emissions according to Regulation (EU) 2019/631 is having a significant impact on value creation in the EU automotive industry. Internal combustion engine vehicles are sold with higher profit margins and have an already established infrastructure (fixed capital) and a relatively stable customer base. However, if ICE vehicles are being preferred excessively by a car manufacturer, these financial benefits can be more than offset by a massive penalty (the excess emission premium). Production of electrified vehicles results in lower profit margins and requires demanding investments into fixed assets as well as into creation of the customer base.

The European automotive industry is facing decreasing profitability, increasing fixed capital intensity and indebtedness. Tightening environmental regulation will put more and more pressure on the key financial value drivers, especially the profit margins and investments into new technologies. However, currently the challenge for the automotive industry is not only how to maintain profitability while meeting EU targets and avoiding excess emissions premiums but also how to deal with the immediate and long-term impacts of the COVID-19 pandemic that is currently causing a shortage of key material inputs and will eventually affect the labour market, customer purchasing power and financial markets (capital costs).

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