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IMPACT OF COVID PANDEMIC ON MARKET VALUATION OF LARGEST AIRCRAFT MANUFACTURERS

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Abstract. The COVID-19 pandemic has significantly affected the global economy, including a major impact on the transport sector. It has also directly influenced the market valuation of the most important aircraft manufacturers – Boeing and Airbus. Therefore, it should be determined how this period has affected the aircraft manufacturing industry and the rate of stock development in relation to individual events that occurred in the given period. Specifically, it was investigated how investors were responding to the spread of the disease and increased market risk. For this purpose, the analysis includes the data on stock prices from the Finex database managed by FINEX MEDIA s. r. o. For the analysis of stock price trends, it is also necessary to select events to be considered in the analysis (primarily measures taken against the spread of the COVID-19 disease). Stock prices are correlated with the date, or in other words, selected companies are compared with the selected dates and a correlation of these values is determined in terms of the decline in stock prices and the speed of the decline. The results of the research show that in the case of sudden events such as serious accidents, investors react immediately, while in the case of the pandemic, despite its global scale, the reaction of investors was delayed, with an impact on the current development of the pandemic in the countries where trading takes place. Based on the correlation between the trend of share prices of the above aircraft manufacturers and the number of ill people, it can be stated that investors do not effectively exploit opportunities to reduce risk and increase returns in this area. The paper also presents further research on the impacts of the pandemic and its further global development.

Keywords: transport, aviation, COVID-19, Boeing, Airbus, market valuation, impact of crisis, stock, risk, return

1. INTRODUCTION

Sudden events, such as accidents or regulatory interventions significantly affect the market capitalization of major publicly traded corporations. Events in the aviation industry have impacts on the stock prices of transport companies as well as on the market valuation of the relevant aircraft manufacturers [1]. It follows that the prices of Boeing and Airbus shares respond immediately to such events, with some investors reacting to the increased risk by selling shares, while others seek to capitalise by means of shorting. Interestingly, according to the authors who compared market valuation in the context of 38 selected events in the aviation industry, the effects on the above companies were rather short-term and became apparent within seven days. Such market responses are predictable; transport companies, manufactures, or even airport operators should be prepared for them and should be able to estimate their financial impact [2]. Given that these are important events, companies should be prepared for them within crisis management in order to avoid fatal consequences for their existence.

From the perspective of transport companies, global events, of which the COVID-19 pandemic is of particular importance, can be similarly devastating. In the USA, compared to the pre-pandemic period, the covid-related economic upheavals have reduced GDP by about 20 % of GDP and negatively affected 23 % of job positions [3]. The pandemic has directly influenced the valuation of companies; in some cases, it helped some companies operating e.g., in the sector manufacturing protective equipment or

companies providing online services, but it has also caused huge financial damage to other companies that would have almost gone out of business without government support [4]. This risk is crucial for investors since the financial health of a company is a critical factor for the success of a business, or for achieving a competitive edge [5].

However, the problem is that markets did not react clearly to this event, unlike in the case of crashes or unexpected regulatory interventions, as shown by [6] in the example of a comparison of the Chinese and US capital markets. Tradable shares of major transport companies reacted with a delay, unlike in the case of the impacts of one-off events. According to the authors, there was a noticeable flight-to-liquidity, but the markets did not evaluate the risk of negative impacts of the pandemic as severe. The situation started to change in March 2020, when the Director General of the World Health Organization (WHO) characterized the spread of COVID-19 as a pandemic and called for global restrictions on air transport [7]. Nevertheless, unlike the disease, the "spread" of the financial contagion from Asia to the USA and Europe was rather sudden and slower.

The paper consists of five main chapters, namely *Introduction*, *Literature Research, Methodology, Results,* and *Conclusion*. The aim of the *Introduction* is to introduce the reader to the basics of the given issue, i.e., the market valuation of aircraft manufacturing companies in relation to COVID-19. The next chapter, *Literature Research,* provides an overview of the existing research by authors dealing with similar issues. *Methodology* provides information about the dataset and the methods used for the purposes of the research. The chapter *Results* restates the main goal of the paper and presents all the outputs achieved. *Conclusion* provides an overall summary and conclusions resulting from the research, including recommendations.

2. LITERATURE RESEARCH

Boeing and Airbus form an imperfect duopoly in the sector of transport aircraft manufacturing, generating most of the financial turnover and patents [8] but are direct competitors, and their disputes, or the US and EU disputes related to illegal public support with the WTO show the importance of political and economic determinants for their line of business [9]. These disputes are subjects of extensive economic research, especially in terms of the innovation potential linked to market valuation or consequences related to the setting of subsidy rules in both areas [10]. The subsidy-related disputes addressed by the WTO also influence the localities where both manufacturing companies operate [11]. Subsidies are related to the impact of the performance of these companies on the whole sector. An and Zhao [12] propose a method for calculating the contribution of the strengthening and merger of Boeing with its former competitor, McDonnell Douglas in 1997. This company is also a subject of research on management systems due to its high market capitalization and strong position. Haddad et al. [13] thus assess this company from the perspective of selecting a method of Multi-Criteria Decision Making (MCDM) for ranking four global market regions. In the case of Airbus, economic research deals also with a similar topic of the strategic management system of a large consortium of major global companies, which, according to Kazeminia [14], may influence the complex organizational structure, but also enables synergies in innovations and mutual support. A similar issue addressed by Baumann et al. [15], who analyse the impact of outsourcing on the performance of this company. Mrass et al. [16] assess the benefits and risks associated with a high degree of separating production and outsourcing in the example of Airbus.

As stated by Kleczka et al. [17], neither of the companies are limited to civil aviation. According to the authors, Airbus can be seen an example of a successful consortium for other arms manufacturers, when integrated companies benefit from the joint development and application of individual components and can thus successfully compete with other large US and Chinese companies. This is confirmed by research conducted by Fernadez et al. [18], who deal with the assessment of the innovation potential of Airbus Defence and Space.

The application of individual components and the increase in innovation potential play a role, as well as the co-marketing of big brands, which in the case of Airbus include Rolls-Royce, Zodiac, etc [19].

The events relevant to the study submitted are two aviation disasters of the new progressive Boeing 737 Max model. Cioroianu et al. [20] argue that mainly the second accident and taking one of the key models of this manufacturer out of service persuaded shareholders that the identified future generation of revenues is now on indefinite hold. The researchers also assess the impact of the social media index that contributed to the stock decline, with the impacts on market valuation following immediately after the second crash of Ethiopian Airlines 302. Collings et al. [21] provide significant evidence of an interaction between Boeing´s stock price and airlines with large orders for 737-MAX aircraft, particularly in the case of low-cost carriers and leasing companies. The estimates of DCCGARCH are consistent investor response to the second crash and subsequent impact both on suppliers and customers of this aircraft manufacturer. There was undoubtedly also a factor of crisis communication of the company analysed by Butler [22], who believes that public attitudes towards corporate responsibility affect decision-making (especially by investors); however, the public also showed some empathy, which may have partly eliminated the negative impact. In the case of the Airbus consortium, there is no such research, except the observed course and impact of the bribery scandal analysed by Boakye et al. [23]. According to the authors, this is an example of collective myopia within the corporate systems setup and culture, the revelation of which damaged the company´s reputation. However, in this case, the authors argue that it did not have a direct impact on the valuation of the consortium, given that such impacts are typically associated with subsequent regulatory interventions or fines.

Generally, it can be stated that any accident or event of this type, whether in transport or e.g., in the nuclear industry [24] has significant and direct immediate effects on the market valuation of a company. Obviously, in the case of both major aircraft manufacturers, any accidents during a fully automated digital flight without direct human intervention, for example, will have a major impact on the adoption of this currently highly discussed and disputed technology [25]. Also, both aircraft manufacturers and carriers have to face competition and economic pressure, which results in a passive attitude to safety, which is seen as compliance with regulations rather than a continuous improvement process [26]

The effects of the COVID-19 pandemic on the transport sector are a frequent subject of current research. A review of the existing literature on the given issue is provided in the study by Brodeur et al. [27], who analysed and classified the current state of research. Relevant outputs also provide a detailed overview of the current situation and open the space for the assessment of socio-economic impacts and the issue of the dilemma of public health protection versus economic development [28]. In the context of the transport sector, Zhang et al. [29] point out the existence of big geographical differences concerning the measures as such and the subsequent economic effects. However, they state that the global society was not prepared for the pandemic, which once again confirmed the importance of risk assessment and hedging against risk, especially in the transport sector. The level of competence of all stakeholders in the pre-pandemic and post-pandemic period also plays a role, as confirmed by the hybrid competency assessment model by Kelemen et al. [30] based on fuzzy logic and a network for neuro-fuzzy assessment.

This sector and the sector of tourism are the focus of a literary review by Sigala [31], who distinguishes between the stages of first responses to the onset of the pandemic, recovery after the first wave, and the subsequent wave. The explanation for why markets in the tourism sector did not react as quickly at the beginning of the pandemic as they did in the case of sudden events such as accidents, is offered by Škare et al. [32], who deal with the economic effects using panel structural vector autoregression. They show that past pandemic crises, unlike the COVID-19 pandemic, were based on the principle of idiosyncratic shock channels and the tourism sector was exposed to large adverse shocks; however, after the crisis, the tourism sector recovered very quickly and returned to the previous values. There are various forms of quantifying the impacts. Zhang and Fricker [33] use Bayesian Structural Time Series (BSTS) to analyse the impacts while considering the fluctuations in local trends, seasonality, and exogenous covariates. The restrictions and changes in transport imposed by governments as a response to the pandemic have been the most significant ones in recent decades. According to the statistical survey by Borkowski et al. [34], people significantly reduced travelling, both due to the government restrictions as well as due to fear of the disease, with those who most suffered from fear reducing travelling most. A specific methodology for quantifying the impacts of the pandemic

on airlines is proposed by Szabo et al. [35], who introduce an algorithm applicable to indexing the development of the pandemic and its financial impacts.

Another interesting area of the presented research is the impact of the pandemic on financial markets and market valuation of indexes, sectors, and companies. The fact that the impacts are still developing means that categorical conclusions can be drawn in the short or medium term; furthermore, it is an area that requires further extensive research. The opening section of the paper submitted states that irrational factors rather than economic data play a key role in the correlation between stock returns and the impacts of the pandemic on the basis of the daily figures on confirmed cases and deaths related to COVID-19 and stock market returns from 64 countries for the period from 22 January 2020 to 17 April 2020. Ashraf [36] claims that stock markets responded negatively to the increase in the number of confirmed cases of COVID-19, which means that stock market returns decreased with the growing number of confirmed cases and vice versa. The author also states that the stock market responded relatively quickly to the COVID-19 pandemic, but the response varied over time depending on the situation and the locality.

3. METHODOLOGY

The data on stock prices used for the analysis are obtained from the Finex database managed and maintained by FINEX MEDIA s.r.o.

To analyse the trend of stock prices, it is necessary to select events to be considered in the analysis. The events will mainly include measures taken against the spread of the COVID-19 pandemic.

The monitored period covers the period from the beginning of the COVID-19 pandemic to the present, specifically from 1 December 2019 to 1 March 2022.

3.1. Selecting important events

At this point, important dates in the period under review that could affect stock prices are identified:

Restriction of movement – 13 March 2020 – blanket restriction of movement of persons within the European Union

1 April – quarantine in almost all US states

COVID-19 pandemic waves:

March 2020 – the first wave of the COVID-19 pandemic
November 2020 – the second wave of the COVID-19 pandemic
March 2021 – the third wave of the COVID-19 pandemic
July 2021 – the fourth wave of the COVID-19 pandemic
December 2021 – the fifth wave of the COVID-19 pandemic

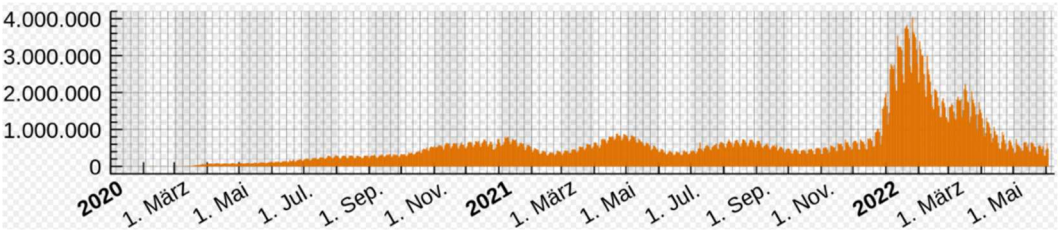

Figure 1 Number of the infected during the whole period of pandemic
Source: Finex.cz [37]

3.2. Correlation of stock prices with selected dates

The correlation refers to the comparison of the individual companies with the selected dates and finding correlation between these values in terms of the decline in stock prices and the rate of this decline.

4. RESULTS

The results concern the period from 1 December 2019 to 1 March 2022, i.e., the period of the COVID-19 pandemic. The main goal is to find out how the pandemic has affected the sector of aircraft manufacturing and the stock price development rate in relation to the individual events that occurred in the period under review.

4.1. Selecting important events

Between 1 December 2019 and 1 March 2022, several events occurred that affected the air transport and thus the whole aviation industry. The greatest impact is attributed to the COVID-19 pandemic. The global restrictions concerning the movement of persons within the European Union (hereinafter referred to as the EU) adopted in March 2020 reduced travelling to and between the EU countries. Other restrictions limiting the interstate movement were adopted in April 2020 and affected nearly all US states. Furthermore, there were considered all waves of the COVID-19 pandemic starting from the following dates: March 2020 (the first wave), November 2020 (the second wave), March 2021 (the third wave), July 2021 (the fourth wave), and December 2021 (the fifth wave).

4.2. Correlation of stock prices and data

The following chapter focuses on the comparison of the selected companies, Boeing and Airbus, and the selected dates and the correlation of these values will be sought in terms of share price decline and the rate of this decline.

4.2.1. Boeing NYSE

Boeing is one of the world leading arms suppliers and has won several major government contracts in recent years, including the supply of new combat aircraft for the Canadian army worth more than USD 12 billion. However, it shall be noted that military contracts are long-term in nature and the financial flows resulting from them can be significantly delayed from the moment of their conclusion. This means that it should be expected in the short term that arms production could significantly reverse the negative effects Boeing and the whole commercial aviation sector have to face. CNBC´s calculations show that the company has offered investors very interesting appreciation. If an investor had invested USD 1,000 in Boeing in 2009, the value of the investment would now be USD 14,000. Expressed in the Czech crowns, the invested CZK 22,600 would now be more than CZK 316,000. The graph below shows the trend of Boeing NYSE stock prices in the monitored period. The beginning of the year 2019 seemed to be positive for the development of stock prices, as the stock prices grew sharply. Unfortunately, the Boeing 737 MAX was involved in an accident, and subsequently, this type of aircraft had to be taken out of service. This had a negative effect on the trend of stock prices. The stock prices dropped to USD 350. Another decline was caused by the coronavirus crisis – the decline started 2 months after the first case of the disease was confirmed. The borders were closed, which was followed by a great decline in tourism and air travel. The value of stocks responded to the restriction of movement in the EU (March 2020) and the USA (April 2020) and to the first wave of the COVID-19 pandemic, when the value declined from USD 150 to USD 130. In January, with the beginning of another wave, the stock price grew from USD 147 to USD 237. Over the next two months, the price fell to USD 195. From February

to the end of March, the stock price grew again to USD 266, despite the beginning of the third wave of the pandemic in March. The fall in stock prices related to this wave occurred in April. With the fourth wave of the COVID-19 pandemic, the stock prices decreased one month after the beginning of this wave, i.e., in August, when the price fell from USD 230 to USD 206. Afterwards, the price grew slightly until November, when it started to fall with the beginning of the fifth wave. In 2022, stock prices experienced another dramatic period. As a result of geopolitical events, Boeing is threatened by the disruption in the supply of raw materials from Russia. In the People´s Republic of China, an airplane crash stirred debates about the operability of their aircraft.

Figure 2 Trend of stock prices of Boeing NYSE
Source: Finex.cz [37]

4.2.2. Airbus Paris/Frankfurt

The graph below shows the price trend of Airbus Paris/Frankfurt shares. The authors focused on the period from 1 December 2019 to 1 March 2022. A comparison of Airbus and Boeing stock prices shows that Boeing´s stock price is higher than the stock price of Airbus. At the beginning of December 2019, Boeing´s stock price was USD 346, while the stock price of Airbus was USD 135. From the graph, it can also be seen that the stock prices of Airbus and Boeing show a similar trend. At the beginning of 2020, Airbus stock prices saw a large decline. The reason was the same as in the case of Boeing´s stock prices, as the coronavirus crisis has brought great losses to the whole aviation industry. Since 2021, the stock prices of Airbus have been rising, achieving now USD 115. This means that the stock price is gradually but slowly achieving the same values as in the period before the coronavirus pandemic.

Figure 3 Trend of stock prices of Airbus Paris/Frankfurt
Source: Finex.cz [37]

5. CONCLUSION

The market valuation of aircraft manufacturers reacts with a delay and the negative market sentiment remains. This issue, however, requires further research, particularly in the area of predicting stock price trends in relation to some social media indexes.

It follows from the research that the stocks of both major manufacturers react similarly to the threat posed by the pandemic. Reducing the risk in long-term investing by means of investment diversification between these two dominant players thus does not have a significant effect from this point of view. However, from an investor perspective, the effect of news about the number of infected on stock prices is particularly interesting. Despite the impending global impact, the stocks of both companies show the largest decline in the period when the negative news concerns directly the examined financial markets. It follows that the risk was underestimated at the beginning of the pandemic, which was followed by a panic sell-off as the pandemic peaked in the USA and EU, even though the situation in China is already getting better.

The subsequent recovery of the market is rather gradual; however, the trend is stable, again considering the growth of the number of ill people in the individual waves. This situation represents a significant opportunity for long-term investors. On the other hand, short-term investors should pay attention to any negative news, as their impact is very strong in the first days and then diminishes over time.

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