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51/2023

2023

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Assessment of the impact of the economic factors on stock prices: cross-sectoral approach

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Abstract. This paper analyses the impact of economic factors on stock prices based on a cross-sectoral approach. After the analysis of academic literature in the field, the graphical analysis of stock price movements in different sectors is conducted and multiple stock price factors panel regression models are constructed. The results of the research show that the strongest difference between sectors was observed in the effect on stock prices of such factors as inflation and interest rates. When analyzing other factors, no significant difference in effect between sectors was observed.

Keywords. Stock prices, economic factors, cross-sectoral approach.

1. Introduction

Macroeconomic factors can often be linked to systemic risk explanations (Asiedu et al., 2021). W. Sharpe (1964) implies that portfolio systemic risk can not be managed by portfolio diversification. On the other hand, some researchers state that the impact of macroeconomic factors on the stock market is different between sectors (Albulescu et al., 2017; Asiedu et al., 2021; Bagirov and Mateus, 2019; Killins et al., 2022; Mouna, Anis, 2017) and indicates diversification possibility for non-systematic economic factors risk.

The Global Industry Classification Standard reveals a theoretical approach to sector classification by sensitivity to economic factors, which is rejected by Asiedu et al. (2021), after establishing that interest rates have a stronger effect on defensive sectors than cyclical sectors. The scientific discussion (Asiedu et al., 2021; Killins et al., 2022) among different researchers indicates potential difficulties in defining the sensitivity of individual sector stock prices to economic changes. It is important to understand how the stock prices of different sectors will be affected by economic indicators and whether it is possible to diversify this economic risk.

Thus this research aims to identify the differences between the sectors by studying the impact of economic factors on stock prices. To reach this aim graphical analysis of stock price movements in different sectors is conducted and panel data models are constructed to investigate the relationship between the stock prices of companies from different sectors and economic factors.

The results of this research allow us to state that the typical sector classification is not acceptable from the economic point of view for the stock markets of the Northern European

countries for non-systematic risk management. The strongest difference between sectors was observed in the effect on stock prices of such factors as inflation and interest rates. Nevertheless, these results reveal a stronger impact of economic factors on stocks of companies in the defensive sector than on cyclical ones. When analyzing other factors, no statistically significant difference in effect between sectors was observed.

Thus, in Section 2 this paper analyzes the theoretical aspects of the impact of economic factors on stock prices based on a cross-sectoral approach. In Section 3 the research design is described. In Section 4, the results of the research are presented, while in Section 5, the conclusions as well as directions for future research are discussed.

2. Theoretical aspects of the impact of economic factors on stock prices in different sectors

The impact of economic factors on stock prices is widely analyzed in scientific research. The analysis of academic literature allows us to state, that the following stock price factors are most often analysed: (i) interest rate (Toraman and Basarir, 2014; Lv et al., 2015; Mouna and Anis, 2017; Eldomiatty et al., 2020; Asiedu et al., 2021); (ii) inflation (Durai and Bhaduri, 2009; Albulescu et al., 2017; Mishra and Debasish, 2018; Eldomiatty et al., 2020; Asiedu et al., 2021); (iii) exchange rate (Chen and Chen, 2012; Mouna and Anis, 2017; Mroua and Trabelsi, 2020; Sheikh et al., 2020; Saidi et al., 2021); (iv) political uncertainty (Kang and Ratti, 2013; Chau et al., 2014; Asteriou and Sarantidis, 2016; Li, R. et al., 2020; Killins et al., 2022).

However, the analysis of economic factors of stock prices revealed that the classification of companies by sector is very significant. There are significant differences between sectors, therefore, it is likely that the impact of economic and other stock price factors may vary by sector.

The Global Industry Classification Standard (GICS) divides the industry into the following sectors: energy, basic materials, industrials, consumption of essential goods and non-essential goods, health care, financial services, technology, communication services, utilities, and real estate. Based on the GICS classification, Morningstar (2011) provides a global equity classification structure which can be considered as a broader classification of sectors based on the impact of economic cycles. According to Morningstar (2011), sectors are consolidated into three supersectors: (i) cyclical (basic materials, consumer cyclical, financial services, and real estate); (ii) defensive (consumer defensive, health care, and utilities); and (iii) sensitive (communication services, energy, industrials, and technology). Such a classification also indicates that the impact of economic factors on the stock market may be different depending on the sector.

It is argued that companies operating in the same sector face the same conditions, such as regulation, politics, or macroeconomic conditions, and therefore their stock prices should be similarly affected by these factors (He et al., 2020). Bartolini and Dong (2022) reveal that economic cycles have different effects on stocks in different sectors, for example, in a good economic situation, the prices of the stocks in technologies, non-essential goods, and real estate sectors tend to increase, while prices of the stocks in consumer goods, health care, and utilities sectors tend to decrease. He et al. (2020) argue that the economic shock and uncertainty caused by the pandemic negatively affected traditional industries, while companies whose activities are related to information technology, education, and healthcare were positively affected. The research of Asiedu et al. (2021) revealed that stock prices in the defensive sector (consumer essentials) are more strongly affected by interest rate changes, while the strongest effect of inflation is observed in the oil sector (the effect on other sectors appeared to be weaker).

Moreover, as revealed by Mouna and Anis (2017), there are some differences in the impact of economic stock price factors in different sectors across the countries.

Summarizing it can be stated that the results of the scientific research in the field do not allow unambiguously identifying how various sectors, when classified according to economic cyclicity, are affected by economic factors. Thus further analysis is necessary.

3. Research design

In this section, the design of the research aimed to assess the impact of economic factors on the stock prices in different sectors is discussed.

The analysis of scientific literature carried out in Section 2 revealed that, in economic terms, the reaction of the stock market to the changes of economic factors may vary across the sectors. First, economic cyclicity affects sectors differently (Bartolini and Dong, 2022), second, it has been noticed that the impact of economic factors can differ between sectors (Mouna, Anis, 2017; He et al., 2020; Asiedu et al., 2021; Killins et al., 2022). For this reason, the assessment of the impact of economic factors expanded based on the classification of sectors provided by the financial company Morningstar (cyclical, defensive, sensitive) is conducted.

To reach the aim of this research, i.e. assess the impact of economic factors on the stock prices in different sectors, based on the findings of the analysis of academic literature, the following hypothesis is formulated:

H: cyclical sectors stock prices are more responsive to the changes of economic factors.

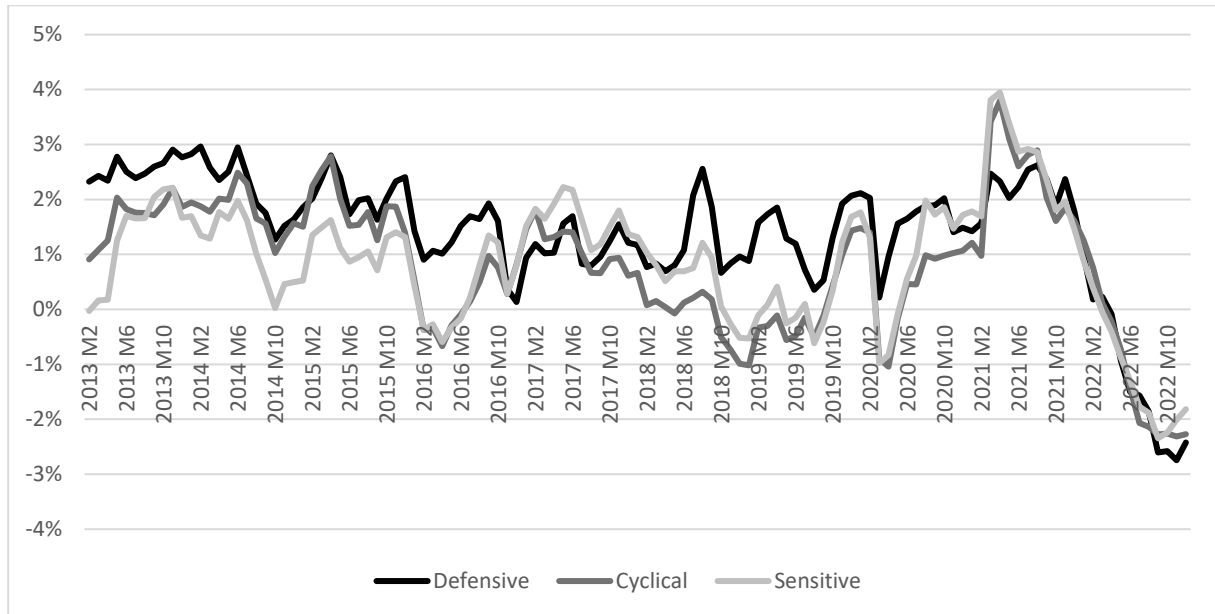
The research analyses data from Danish, Swedish, and Finnish large-cap stock markets (90 companies) in the period from 2012 to 2022. According to Morningstar classification, selected companies are assigned to one of sectors (cyclical, defensive or sensitive).

To test the hypothesis, the research consisting of two steps, is carried out. First, a graphical analysis of stock price movements in different sectors is conducted: (i) the growth of stock price for each analyzed company is calculated, and (ii) the average growth for companies from different sectors (defensive, cyclical, and sensitive) is calculated and shown graphically.

Second, multiple panel regression models with constant, fixed, and random effects are constructed. As a dependent variable an adjusted closing price of a stock is selected. Based on the results of academic literature analysis, carried out in Section 2, the following independent variables are chosen: (i) interest rate (long-term government bond interest rate); (ii) inflation (consumer price index); (iii) exchange rate (effective exchange rate index); (iv) political uncertainty (economic policy uncertainty index). Seeking to reflect market expectations, (v) business confidence index, and (vi) consumer confidence index are also selected as independent variables. The data is obtained from Nasdaq Nordic, OECD, IMF, BIS, and FRED databases.

4. Results and discussion

In this section, the results of the assessment of the economic factors on the stock prices in different sectors are discussed. At first, stock price movements in defensive, cyclical, and sensitive sectors were analyzed graphically (Figure 1).



Graph 1. Stock price changes over 12 months by sectors
Source: compiled by the authors based on their calculations.

Figure 1 shows the average 12-month share price movements across sectors, after smoothing out short-term market volatility and providing an overall trend. The analysis reveals that under normal market conditions, price changes in defensive sectors are stronger and more positive. In 2021, due to particularly optimistic moods in the markets, price changes in cyclical and sensitive sectors outperformed changes in the defensive sector. However, at the moment of a stronger market fall, as in 2022, the observed price changes converge between different sectors. These results call into question the efficiency of diversification between sectors in the context of a market downturn.

Second, panel data models were constructed and tested for fixed and random effects. Breusch-Pagan Lagrange Multiplier confirms the random effects model compared to OLS. However, the Hausman test prefers a fixed effects model over a random effects model. Redundant Fixed Effects test F statistics reveal a reasonable choice of fixed effects model (Table 1). This shows that according to the results of statistical tests, the fixed effects model appeared to be the most appropriate and thus is used in further research.

Table 1. Statistical tests of model suitability confirmation

Test	Statistical	Redundant fixed effects test		Breusch-Pagan Lagrange Multiplier		Hausman test	
		Cross-section F Statistics	Prob.	Cross-section Statistics	Prob.	Chi-Sq Statistics	Prob.
	Super Sector						
	Defensive	913.94	<0.00001	99411.14	<0.00001	0.0000	1.0000
	Cyclical	1234.31	<0.00001	233477.0	<0.00001	0.0000	1.0000
	Sensitive	1195.90	<0.00001	220478.4	<0.00001	0.0000	1.0000

Source: compiled by the authors based on their calculations.

The results of the research are summarized in Table 2.

Table 2. Impact of the economic factors: cross-sectoral approach

Super Sector	Sector	Interest rate	Inflation	Exchange rate	European EPU Index	Consumer confidence index	Business confidence index
Defensive	Consumer Defensive	-0.34	7.96	0.43*	-0.12	1.16*	3.68
	Healthcare	-0.39	9.73	-0.44*	-0.16	4.01	4.15
	Total	-0.38	9.19	-0.26*	-0.16	3.03	3.99
Cyclical	Consumer Cyclical	-0.27	0.60*	1.37	-0.15	-1.96*	8.03
	Financial Services	-0.18	5.59	-0.13*	-0.17	3.21	3.84
	Real Estate	-0.24	6.46	-2.99	-0.14	8.97	0.23*
	Basic Materials	-0.10	3.87	0.14*	-0.01*	2.29	5.17
	Total	-0.17	4.10	0.69	-0.12	3.20	4.11
Sensitive	Communication Services	-0.16	1.97	3.83	0.10*	-0.94*	4.80
	Industrials	-0.18	6.89	-0.64	-0.14	0.94	3.53
	Technology	-0.23	5.61	0.31*	-0.25	1.30*	0.96*
	Total	-0.18	5.96	0.06*	-0.13	3.34	3.25

Source: compiled by the authors based on their calculations.

Note: * t statistics probability $p > 0.05$ (parameter is irrelevant with 95% confidence level).

The obtained results are somewhat surprising because, on a theoretical level, stocks of defensive sectors should not react so strongly to economic changes. However, the results of our research reveal that these sectors are the most strongly affected by the changes of analyzed economic factors: (i) stock prices of consumer durables and healthcare sectors are significantly more affected than prices in cyclical and sensitive sectors; (ii) when assessing other economic factors, such as political uncertainty, business, and consumer confidence indices, no significant differences in impact between sectors can be identified (the real estate and cyclical goods sectors appeared to react more strongly to the changes of consumer or business confidence index, however, the general regression of the group of cyclical sectors did not show such a strong reaction); (iii) in most sectors, the impact of the effective exchange rate appeared to be insignificant.

The obtained results indicate that the impact of inflation and interest rate variables is stronger in defensive sectors, while the impact of other factors such as political uncertainty, and consumer and business confidence, does not differ significantly across sectors. Such results at least partially coincide with the results of Asiedu et al. (2021), where different effects of inflation and interest rates between sectors were observed, and a stronger effect of interest rates on the defensive sector – essential goods – was determined. On the other hand, when discussing the impact of inflation, it can be said that the results of our research contradict the results of Asiedu et al. (2021), as this study found that inflation has a stronger impact on cyclical sectors, while the results presented in Table 2 reveal that inflation appeared to have a stronger impact on cyclical sectors.

So, as can be seen from the results of the research, the research *hypothesis*, stating that, cyclical sectors stock prices are more responsive to the changes of economic factors, *can not be supported*.

The analysis of the cross-sectoral comparison of the impact of economic factors on stock prices reveals that it is crucially important to study the impact of economic factors by classifying companies by sector, as different effects are possible, so for more accurate results, it is worth considering the cross-sectoral distribution.

5. Conclusions and implications for future research

The analysis of academic literature reveals contradictions in results regarding the sensitivity of stock prices in different sectors to changes in the economy and there is no consensus on which sector's stock prices will be more strongly affected. Thus, a more in-depth assessment of the impact of economic factors on stock prices is necessary, especially based on cross-sectoral analysis.

The results of the research allow us to state that the impact of political uncertainty, and business and consumer confidence on stock prices is almost the same in all analyzed sectors. For many sectors, the effect of the exchange rate is statistically insignificant, so the significance of this factor in explaining the dynamics of stock prices can be doubted.

The largest differences are observed when analyzing the impact of inflation and interest rates. However, these differences are the opposite of what would be expected based on the theoretical cross-sectoral classification of companies. The results show that the stock prices of the Northern European countries in the defensive sectors are more strongly affected by inflation and interest rates. These results implicate the necessity of research in the cross-sectoral field.

In further studies, it would be useful to expand the research by comparing the cross-sectoral differences between different markets. Also, emerging cross-sector studies on ESG topics indicate possible differences in the sensitivity of stock prices to economic factors between sectors based on companies' ESG parameters. ESG research could be expanded on this topic as well because the traditional classification of companies into sectors from an economic point of view can not fully explain the emerging differences between sectors.

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