

## THE IMPACT OF FOREIGN DIRECT INVESTMENT FROM THE NORDIC COUNTRIES ON THE STRUCTURE OF LITHUANIA'S ECONOMY

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**Abstract:** *Foreign direct investment is considered a driving force for economic growth, boosting trade and reducing unemployment. The recipient country benefits from technology transfer. The host economy develops and changes its economic structure. The Baltic states, including Lithuania, attracted high volumes of Nordic FDI. The aim of the study is to evaluate the impact of inwards Nordic FDI on the economic structure of Lithuania. The research employed descriptive statistics, correlation regression and the Granger causality test. The stationarity of the data was checked by the augmented Dickey–Fuller test to evaluate the impact on the structural changes. The sectors were divided into primary, secondary and tertiary. The data have been structured according to the economic activities corresponding to the Nomenclature statistique des activités économiques dans la Communauté européenne (NACE) classification of economic activities in the European Union. The primary sector includes agriculture, forestry and mining. The secondary factors included manufacturing, construction, water and electricity supply, tertiary cover services and trade. Furthermore, for our research, we chose GDP per capita and gross value added (GVA). The GVA was chosen to evaluate the impact of each Nordic country's FDI on different sectors. The sectoral contribution to the economy is expressed as GVA. This research was performed from three perspectives. The first is focused on the analysis of the flows and distribution of FDI in Lithuania by economic sector in the Nordic countries. Furthermore, we have analysed the impact of foreign direct investment in the Nordic countries on Lithuania's economic growth. The final subsection is devoted to estimating the causal link between the distribution of FDI by economic sector in the Nordic European countries and the causal link between economic indicators in these sectors. Our study contributes to internationalization theory by extending it from a sectoral angle. In particular, the need to understand the impact of FDI from a single country on the host economy and its economic structure should be emphasized. We claim that inwards FDI might change the economic structure of the host economy in a positive or negative way. In addition, FDI should contribute to the economic advancement of host countries, which means that the tertiary sector should expand. The results of our study might be useful for improving FDI promotion policy in Lithuania while seeking long-term results in the expansion of the tertiary sector, especially knowledge-intensive activities. Main conclusion. We can conclude that Lithuania has the potential to benefit from inwards Nordic FDI; however, it still does not take all the advantages of these opportunities, as some FDI has no impact on the expansion of the tertiary sector or any sector at all.*

**Keywords:** economic growth; economic structure; Granger causality test; inwards FDI; Lithuania; Nordic FDI; primary sector; secondary sector; tertiary sector.

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**1. Introduction.** Foreign direct investment (FDI) plays a significant role in economic growth and in shaping the economic structure of the recipient country. The Nordic countries, known for their advanced technology and innovation-driven economies, have invested in various sectors in the Baltic States, including manufacturing, services, and information technology. These investments have contributed to the economic growth of the Baltic States and facilitated the transfer of knowledge and technology. Lithuania has experienced significant FDI inflow from Nordic countries, especially Sweden, Finland, and Denmark. In 2022, Lithuanian manufacturing sectors will attract the most critical part of inwards FDI from Denmark (29%), Finland (31%), and Norway (34%). Swedish companies mainly invest in banking, insurance (54%), and information technologies (24%). The wholesale and retail trade business sectors attract 41% of Finnish inwards FDI (WIPO, 2023). Lithuania has been an attractive destination for Nordic FDI due to its strategic location, skilled labour force, and favourable business environment. Even pioneering studies (Amdam et al., 2007; Hunya, 2004; Borsos & Eskila (1997)) focused on Nordic-Lithuanian relations have predicted the great potential of the positive effect of inwards Nordic FDI on economic growth, trade and knowledge transfer. However, Hunya (2004) noted that Lithuania attracted more low-tech Nordic FDI at the beginning of the 21st century than high-tech FDI. According to Rugman & Verbeke (2004), multinational enterprises (MNEs) are the key drivers of globalization and have a significant influence on economic interdependence among national markets. Nordic FDI has the potential to shape the economic structure of Lithuania. However, it is vital to consider the regional concentration of sales and the challenges faced by MNEs with multiple embeddedness. These factors may influence how Lithuania's economic structure integrates into the global market. However, further research and analysis are needed to fully understand the impact of Nordic FDI on Lithuania's economic structure. Knowledge transfer refers to sharing and disseminating knowledge, skills, and technology (Alkhazali et al., 2021). It involves the transfer of explicit knowledge, such as patents, copyrights, technical expertise, and tacit knowledge, which is embedded in the investing firm's practices, routines, and culture. Transferring knowledge through FDI can significantly affect the host country's productivity, innovation capacity, and competitiveness. The Nordic countries have a strong tradition of knowledge-intensive industries and a well-developed innovation ecosystem. By investing in the Baltic States, Nordic firms bring their expertise, best practices, and technological advancements, which can enhance the capabilities of local firms and institutions. Thus, in this way, due to knowledge transfer, economic structure changes over time. The aim of the paper is to estimate the impact of Nordic FDI on the economic structure of Lithuania. For research purposes, the paper is divided into four sections. This literature review covers scientific analyses of the impact of FDI on the whole economy and structural economic changes. The second section is devoted to the methodology of the research. The third section provides the results of the study. This section presents the results from three different perspectives, which represent the stages of our research. The last section is devoted to discussion and conclusions.

## **2. Literature Review.**

### *2.1. The impact of FDI on the host economy*

Most countries are making significant efforts to attract foreign capital to enhance the economic performance of the host country. Foreign capital may inflow via mergers and acquisitions (e.g., Gombar et al., 2022; Heckova et al., 2022; Chapcakova et al., 2022; Vozarova et al., 2022; Gladevich et al., 2022) or foreign direct investments (Tancosova, 2019; Burinskas et al., 2021). In this paper, we will focus specifically on FDI.

The positive impact of FDI on the economy (Sun et al., 2021) is reflected in growing output, employment rate growth and the transfer of new technologies. Foreign direct investment is also considered a means of financing development, technology transfer, human capital improvement and competition promotion (Abdullah & Chowdhury, 2020; Mehmood et al., 2021). Given that foreign direct investment is described as a source of new technology and management knowledge transferred to local companies and employees, foreign direct investment is considered to promote entrepreneurship (Chen & Zhou, 2023; Maalej, 2022). In general, the impact of FDI in the economic context is manifested in the dissemination of local capital growth, technology and knowledge, productivity gains, and integration into the global economy in receiving countries (Makin & Chai, 2018).

It should also be stressed that foreign direct investment can negatively impact income inequality, given that the income of low-skilled workers increases and that the economic growth driven by foreign direct investment reduces the poverty rate in the host country (Huynh, 2021). In addition, foreign direct investment also stabilizes the trade balance, improves the trade process, introduces new knowledge, and increases export volumes and employment rates (Sucubasi et al., 2021). Researchers have confirmed that foreign direct investment leads to economic growth, which is perceived as a long-term upwards trend in the host country's production, consumption and well-being (Samborskyi et al., 2020). According to Prah (2019), the impact of

FDI is most noticeable in developing economies, where the transfer of knowledge and technology resulting from FDI flows increases the competitive advantage of foreign-owned companies. Developing countries seek to attract foreign direct investment to reduce dependence on the primary sector. Nevertheless, the impact of FDI on the economy depends on its domestic absorption potential (Govori & Fejzullahu, 2020). The links between FDI and economic growth are closely linked to technological and financial development, human capital development, the degree of trade openness and the quality of institutions in the host country (Hobbs et al., 2021). In addition, Gochero & Boopen (2020) highlight the importance of technological advancement in the host country, arguing that the more significant impact of FDI on economic growth comes when the technological gaps between the host and the issuing country are small. The strength of the foreign direct investment effect may be due to the level of economic development and technological progress of the host country.

### 2.2. FDI and structural economic changes

In addition, foreign direct investment is considered one of the most effective means of achieving structural economic change in developing countries due to the impacts of poverty reduction and resource scarcity (Hauge, 2019). It should be emphasized that structural changes involving the transformation from labour-intensive to knowledge-intensive sectors are seen as a factor of economic growth (Thirion, 2020). According to Mamba et al. (2020), foreign direct investment leads to structural changes in the economy, helping host countries raise capital, create new jobs, increase tax revenue flows and expand market opportunities. Moreover, foreign direct investment has an impact on changes in the structure of the economy through the development of productive capacity through technology transfer and management skills, the transfer of labour and other resources to higher productivity sectors and the creation of more competition for domestic companies (Emako et al., 2022). In this context, multinational enterprises can encourage the redistribution of labour between sectors of economic activity. Elekes et al. (2019) noted that foreign direct investment can indirectly impact structural changes in the host country's economy by encouraging more competition and forcing domestic enterprises to innovate. Against this background, the impact of the distribution of foreign direct investment by economic sectors on economic development is increasingly analysed as countries attract foreign direct investment to different economic sectors depending on the economic development stage. Despite the positive impact of FDI, the literature highlights the negative aspects of FDI for the host country. Research (Chen & Zhou, 2023) shows that foreign-invested companies have more excellent management experience and a competitive advantage in terms of pay and employee competence, which may create difficulties for start-ups in finding qualified potential workers in the labour market. Moreover, multinational individuals can exert competitive pressure on their competitors' behaviour in the host country, leading to the withdrawal of local competitors from the market (Mensah & Mensah, 2021). It is also noted that technological advances resulting from foreign direct investment affect the labour market and the growth of income inequality between skilled and unskilled workers (Wang et al., 2023). It should also be emphasized that high-tech enterprises can benefit from foreign direct investment effects but may harm lower-tech enterprises (Sugiharti et al., 2022). Therefore, in some cases, foreign direct investment can hinder economic growth. The author assumed that foreign direct investment creates monopolies that limit the full use of domestic resources (Chaudhury et al., 2020). It is also important to mention that research studies analyse the links between the distribution of FDI by main sectors of the economy and changes in the individual sector economy of the receiving country, given that FDI inflows into different sectors may have different impacts on the economic indicators of the primary, secondary or tertiary sector (see Table 1).

**Table 1.** Summary of empirical studies examining the interaction between the distribution of FDI by economic sector and the economic indicators in these sectors

Author	Region	Method	Results of the study
Siddiqui & Parikh (2018)	India	The Random Effect Model	Foreign direct investment has an impact on gross value-added growth in manufacturing sectors.
Saucedo et al.(2020)	Mexico	Panel regression	FDI inflows to the manufacturing sector contribute to the growth of both low and highly skilled workers.
Nguyen et al.(2020)	Vietnam	Least squares method	FDI inflows into the primary sector harm employment rates and the number of skilled labour.

**Table 1 Continued**

Author	Region	Method	Results of the study
Okechukwu et al. (2018)	Nigeria	ARDL model	FDI inflows to the primary and manufacturing sectors have a positive and statistically significant impact on exports in the long term.
Shah & Raza (2022)	Countries with a newly industrialized economy	The Fixed Effect Model	FDI inflows to the services sector positively and significantly impact services exports.

Sources: developed by the authors based on (Siddiqui & Parikh, 2018; Saucedo et al., 2020; Nguyen et al., 2020; Okechukwu et al., 2018; Shah & Raza, 2022).

Based on the analysis of the scientific literature and empirical research, it can be assumed that the study of the interaction between FDI flows in three economic sectors and economic indicators in these sectors, taking into account the availability of data, mainly distinguishes between gross domestic product or gross value added and export indicators. The authors use various research methods to analyse the impact of the distribution of FDI by economic sector or the interrelationship with the economic indicators of these sectors. In this work, correlation and Granger causation were applied, taking into account the applicability of these methods to the research theme selected. We calculate the impact of FDI inflows from each Scandinavian country on economic sectors' gross value-added indicators (Makiela et al., 2021). This indicator is used to measure productivity and is defined as 'country output minus intermediate consumption' and is used for decision-making to measure the contribution of different sectors of the economy to gross domestic product (Sahu & Garcia, 2022).

### 2.3. The concept of FDI promotion

An effective policy to attract FDI requires a comprehensive approach that takes into account various factors. However, the promotion of FDI often includes financial and fiscal measures and FDI legislation. FDI regulation, effective business regulations and strong institutions within an economy have been found to promote FDI (Duodu et al., 2022; Yakubu, 2020). On the other hand, inflation and regulations aimed at promoting private sector development can have a negative impact on FDI flow (Sujit et al., 2020). It is important for governments to formulate FDI policies and investment promotion strategies that consider these factors. This also includes strengthening the quality of institutions, which provides a conducive investment climate. Moreover, efficient institutional reforms should be a priority for policymakers, as they create a conducive investment environment to attract FDI (Owusu-Nantwi, 2019). Another important factor is the implementation of targeted investment policies. These policies can have significant impacts on FDI inflows and the activities of multinational enterprises (MNEs) (Inada, 2022). It is essential to quantify the effectiveness of these targeted measures in attracting FDI inflows. Furthermore, investment promotion agencies have a significant impact on attracting FDI. Their function is different from that of other strategies, such as special economic zones, as they focus on promoting investment through various means. Macroeconomic and industrial policies are relevant factors when attracting FDI through IPAs (Bezuidenhout & Pietersen, 2015). Infrastructure development, including air connectivity, is another important aspect of attracting FDI. Studies have shown that improving infrastructure, particularly air connectivity, should be an integral part of the strategy to attract FDI inflows (Banno & Redondi, 2014). Thus, an effective policy to attract FDI should focus on improving the quality of institutions and the policy environment, implementing targeted investment policies, leveraging investment promotion agencies, and investing in infrastructure development, including air connectivity. By addressing these factors, countries can create a conducive investment climate and attract FDI inflows. Competition for FDI among countries can lead to a dissipation of social benefits at the provincial level, as countries with similar competitive advantages may reduce taxes and relax regulations on environmental protection, wages, and working conditions to attract FDI (Tang & Selvanathan, 2008). This highlights the need for balanced FDI promotion strategies that take into account the social and environmental impacts of FDI. FDI spillovers, which refer to the positive externalities generated by FDI on the domestic economy, can be influenced by competition levels. Higher levels of competition increase the possibility of FDI spillovers, which can contribute to technological innovation and economic development. In the context of environmental impact, FDI can have both positive and negative effects. Effective environmental regulation policies can maximize FDI technology spillover and promote the environmental technology innovation of industrial enterprises, leading to a "win-win" situation for the environment and the economy (Wei, 2020). Thus, countries seeking to attract FDI often develop FDI promotion policies. For example, Lithuania targets attracting MNCs to high-tech and/or other business sectors that require a highly educated labour force. Moreover, Lithuania, as a North European country, has highly focused on attracting FDI from the Nordic

countries. It is believed that short distances and cultural similarities are determinants of FDI. The measures directed to attract Nordic FDI have been successfully employed, as the inwards FDI from these countries has tended to increase constantly within the last 30 years. Thus, we can assume that Lithuania created a friendly business environment for Nordic MNCs and introduced flexible FDI regulation.

**3. Methodology and research methods** The data for 1999-2022 are collected from Statistics Lithuania's database in quarters. The sectoral data are structured according to the economic activities corresponding to the NACE classification of economic activities in the European Union, i.e., subdivided into primary, secondary and tertiary economic sectors based on the standard industrial classification (Table 2).

**Table 2.** Industry Standard Classification

Sector	Subcategories covered by sector	Classification code of economic activities
Primary	Agriculture, forestry, fisheries, Mining and quarrying	A-B
Secondary	Manufacturing; Electricity, gas, water supply; Construction	C-F
Tertiary	Wholesale and retail trade, accommodation and food services; Transport and storage, information and communication; Financial, insurance, real estate and business services; Public administration and defence; Community, social and personal services.	G-T

Sources: developed by the authors.

The impact of FDI in the Nordic countries on the growth of Lithuania's economy will first be assessed in terms of the Nordic countries' total FDI flows and their distribution by economic sectors. A correlation-regression analysis is applied to determine the effect, during which the modelling continues to be modelled after the significance of the correlation coefficient, model and individual regressors is assessed. The Granger causation test reveals a causal link between the distribution of FDI from Northern Europe across economic sectors and the gross value added generated by these sectors, considering the stationary nature of the variable time series. To determine Granger's causal link, we first checked whether the variables analysed satisfied the assumption of insularity. Stationary testing should be performed using a single root ADF test to ensure that the variance, mean and covariation of the time series of variables remain constant over time.

In the insularity test, this study uses an equation without a free member and a trend (Dudzeviciute et al., 2021):

$$\Delta y_t = \delta y_{t-1} + u_t \quad (8)$$

where  $\delta$  is the coefficient;  $u_t$  is white noise; and  $t$  is the time variable.

There is a null hypothesis of the existence of a single root, the verification of which is based on the obtained p value of ADF statistics, which is measured by the selected materiality level. Given that this study uses a materiality level of 5%, the null hypothesis is rejected if the p value does not exceed the 0.05 level, and an alternative hypothesis is accepted, based on which the time series is considered stationary. If the p value of the variable exceeds the materiality level, time series differentiation is applied (Tanaya & Suyanto, 2022). After assessing the stationarity of the time series, a vector autoregression (VAR) model is established, in which the maximum number of delays in the queue is chosen. The delay queue to be applied to causation analysis shall be determined based on the information criteria calculated by the model (Tanaya & Suyanto, 2022). A Granger causality test is then performed to determine the direction of causality. Two regression equations are used for this test (Setyanti & Wahyudi, 2021):

$$Y_t = \sum_{i=1}^m a_i Y_{t-i} + \sum_{j=1}^m \beta_j X_{t-j} + v_t \quad (9)$$

$$X_t = \sum_{i=1}^m a_i X_{t-i} + \sum_{j=1}^m \beta_j Y_{t-j} + v_t \quad (10)$$

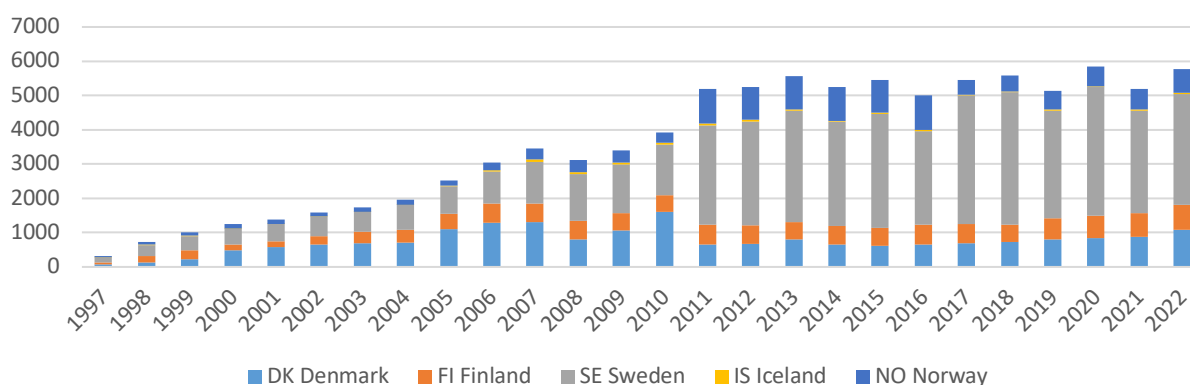
where  $Y$  is a dependent variable;  $X$  is an independent variable;  $m$  = series of delays;  $a\beta$ — coefficient of variables; and  $V$  is the error.

The results of the Granger causal test are assessed against the Fischer criterion statistical values. Suppose the p values of the resulting F statistics are greater than the selected materiality level of 0.05. In that case, the null hypothesis shall be rejected, and an alternative hypothesis shall be accepted, indicating that the variable to be analysed is the reason for changes in another variable.

#### 4. Results.

##### 4.1. Flows and distribution of foreign direct investment in Lithuania by economic sector in the Nordic countries

In 1999-2022, significant fluctuations in foreign direct investment flows were observed in all Nordic countries. The data provided show that Iceland's foreign direct investment inflows in Lithuania were the lowest in the reference period compared to those in other Nordic countries. Moreover, in 2008, Denmark's foreign direct investment in Lithuania decreased by 61%, Finland by 2%, and Iceland by 48% compared to 2007. These changes can be seen as the consequences of the global financial crisis. Since the beginning of the analysed period, Denmark's foreign direct investment in Lithuania has increased by 78%, Finland's by 65%, Sweden's and Norway by 87%, and Iceland's by 80%. In the context of the Nordic countries, it can be said that, in 1999-2022, Lithuania invested mainly in it, while its average annual investment amounts to approximately EUR 2.663 billion. A large part of foreign direct investment from the Nordic countries consists of Denmark's foreign direct investment in Lithuania, amounting to EUR 817.73 million on average annual investments. Moreover, Norwegian and Finnish foreign direct investment in Lithuania, measured in terms of average annual investments in 1999-2022, amount to EUR 484.51 million and EUR 483.98 million, respectively. At the very least, foreign direct investment from the analysed Nordic countries in Lithuania came from Iceland, which on average amounted to EUR 28.51 million per year.



**Figure 1.** The dynamics of foreign direct investment in Lithuania at the end of the period of the Nordic countries 1999-2022

Sources: developed by the authors.

The descriptive statistics (Table 3) indicate that the minimum foreign direct investment varied from 47 million. eur per year (Iceland) to 8084 mln Eur (Sweden). The greatest maximum was also observed in the case of Sweden. All the descriptive statistics showed that Swedish FDI contributes to the majority of inwards Nordic FDI to Lithuania. However, this does not mean that Swedish capital dominated all business sectors during the analysed period.

**Table 3.** Descriptive statistics

	DK FDI	FI FDI	SE FDI	IC FDI	NO FDI
Mean	73532.5000	42123.1923	176456.0769	2003.9615	45042.5000
Median	70181.5000	50037.5000	140333.0000	1614.5000	35403.0000
Mode	1239.00a	4965.00a	8084.00a	47.00a	376.00a
Std. Deviation	37906.09710	20764.79273	132305.08637	1767.86885	34913.81768
Skewness	.035	-.560	.217	.976	.547
Std. Error of	.456	.456	.456	.456	.456
Skewness					
Minimum	1239.00	4965.00	8084.00	47.00	376.00
Maximum	161365.00	72786.00	388026.00	6763.00	101572.00

Sources: developed by the authors.

It is also worth noting that the total flow of foreign direct investment in the Nordic countries from 1999-2022 accounted for 31.26% of total foreign direct investment inflows in Lithuania. Based on the defined

standard industry classification, FDI by industry was divided into primary, secondary and tertiary sectors in Denmark, Finland, Sweden, Iceland and Norway to determine the economic sector to be used for Granger's causation analysis. This classification of sectors allows us to assess which sectors of the Lithuanian economy attract the most foreign direct investment from the Nordic countries. Given the constraints on data availability, the largest available dataset covering 2004–2022 was selected to analyse the distribution of FDI by economic sector. The calculated data are presented in Table 4.

**Table 4.** Distribution of foreign direct investment by economic sector in Lithuania at the end of the period 2004-2022

The Investing Party	Sector	Foreign direct investment, EUR million		
		2004	2022	Average 2004-2022
Denmark	Primary	11.44	101.35	57.42
	Secondary	177.83	246.68	182.12
	Tertiary	506.09	729.14	645.62
Finland	Primary	0	18.85	1.67
	Secondary	92.35	250.93	176.33
	Tertiary	265.33	414.59	355.22
Sweden	Primary	1.65	55.6	13.34
	Secondary	101.62	363.65	171.15
	Tertiary	608.94	2801.71	2280.64
Iceland	Primary	0	0	0.00
	Secondary	0.91	17.08	9.08
	Tertiary	4.6	20.33	10.52
Norway	Primary	3.16	2.01	5.90
	Secondary	35.62	230.97	142.29
	Tertiary	92.62	466.77	436.16

Sources: Developed by the authors based on the data of Statistics Lithuania.

It can be seen that all Nordic countries have the lowest foreign direct investment in the primary sector in the period 2004–2022 compared to investments in the secondary or tertiary sectors. The largest share of foreign direct investment in the primary sector in the Nordic countries comes from Denmark. Moreover, Finland's FDI in the primary sector of Lithuania averages EUR 1.67 million per year, Sweden's average EUR 13.34 million per year, and Norway's average EUR 5.90 million per year. Moreover, Iceland's FDI flows are not directed to the primary sector. By emphasizing the flows of foreign direct investment in Lithuania into the secondary sector of the Nordic countries, Denmark's foreign direct investment in this sector in the period 2004–2022 was the largest of the Nordic countries analysed, amounting to EUR 182.12 million, while the main investment direction was manufacturing. The investments made by Finland, Sweden, Norway and Iceland in the secondary sector over the period under review are mainly focused on manufacturing economic activities, while total foreign direct investment in the secondary sector amounted to EUR 176.33 million, EUR 171.15 million, EUR 142.29 million and EUR 9.08 million, respectively. The data also reveal that the foreign direct investment of all Nordic countries in Lithuania is mainly directed towards the economic activities of the tertiary sector. In the third sector of Lithuania, the largest foreign direct investment comes from Sweden, whose average investment in 2004–2022 amounts to EUR 2.280 billion per year, while the main investment directions include information and communications, financial and insurance activities, and the economic activities of wholesale and retail trade. It should also be noted that Denmark's foreign direct investment in Lithuania's tertiary sector averages EUR 645.62 million, with the most significant investment in financial and insurance, hospitality and food services and transport and storage activities. It should also be stressed that Norway's foreign direct investment in the tertiary sector mainly focuses on financial and insurance activities, wholesale and retail trade and real estate operations. In contrast, the total foreign direct investment in the tertiary sector reaches an average of EUR 436.16 million. In the case of Finland and Iceland, foreign direct investment in Lithuania, the third sector, is mainly invested in wholesale and retail activities. Moreover, these countries have average investments of EUR 355.22 million and EUR 10.52 million per year, respectively. In summary, in 1999–2022, Lithuania received the most FDI from Sweden; less significant inflow came from Denmark, Norway and Finland, followed by Iceland. It was found that from 2004–2022, FDI in the Nordic countries was mainly directed to the secondary and tertiary sectors. Against this background, foreign direct investment flows into the primary sector of the countries analysed in Lithuania are not included in the analysis

of Granger's causal link between the distribution of foreign direct investment by economic sectors and the economic indicators of these sectors.

*4.2. Assessment of the impact of foreign direct investment in the Nordic countries on Lithuania's economic growth*

Correlation-regression analysis was applied to determine the link between foreign direct investment in each of the Nordic countries and the economic indicators of Lithuania, gross domestic product and its strength. First, the relationships between Denmark, Finland, Sweden, Iceland and Norway's inflows of foreign direct investment and Lithuania's gross domestic product were assessed using the criteria of the correlation coefficient and probability of this coefficient (see Table 5).

**Table 5.** Results of the assessment of the correlation between Northern European foreign direct investment and Lithuania's GDP

Correlation between Y and X	Pearson's correlation coefficient	P value	Interpretation of the connection
GDP of Denmark and Lithuania	0.221	0.030	Weak positive correlation
Finland's FDI and Lithuania's GDP	0.866	&0.001	Strong positive correlation
Swedish FDI and Lithuanian GDP	0.846	&0.001	Strong positive correlation
GDP of Iceland and Lithuania	0.437	&0.001	Average positive correlation
Norwegian FDI and Lithuanian GDP	0.597	&0.001	Average positive correlation

Source: Developed by the authors based on SPSS software package calculations.

Based on the results of the correlation analysis in Table 4, there is a statistically significant correlation between Lithuania's gross domestic product and FDI in the Nordic countries since the materiality of the correlation coefficients is lower than the materiality level of 0.05. Emphasizing the strength of the link between the dependent variable and individual independent variables, there is a strong positive correlation between Lithuania's gross domestic product and foreign direct investment from Finland and Sweden. Moreover, there is a moderate correlation between Lithuania's gross domestic product and foreign direct investment from Norway and Iceland. Moreover, there is a weak correlation between Lithuania's gross domestic product and Denmark's direct foreign investment.

Considering the significant relationship between the foreign direct investment of the individual Nordic countries and the gross domestic product of Lithuania, five linear regression analysis models were sought to assess the impact of the respective Nordic countries on Lithuania's gross domestic product. To create paired regression equations for the variables analysed, the eligibility criteria for the models were assessed – the coefficients of determination, the standard error and the values of the Fischer criterion statistics (see Table 6):

**Table 6.** Results of the assessment of the adequacy of FDI and Lithuania's GDP models in the Nordic countries

Model	R <sup>2</sup>	Standard error	F statistics	P value of statistics F
1. Danish FDI with Lithuania's GDP	0.049	3547.88	4.840	0.030
2. Finnish FDI with Lithuanian GDP	0.749	1821.11	281.144	&0.001
3. Swedish FDI with Lithuanian GDP	0.716	1938.63	237.041	&0.001
4. Iceland's FDI with Lithuania's GDP	0.191	3273.19	22.126	&0.001
5. Norwegian FDI with Lithuanian GDP	0.356	2919.68	51.949	&0.001

Source: Developed by the authors based on SPSS software package calculations.

Based on the results obtained, it appears that the model analysing the impact of Danish foreign direct investment on Lithuania's GDP (R<sup>2</sup>= 0.049) and the model analysing the impact of Iceland's foreign direct investment on Lithuania's GDP (R<sup>2</sup>=0.191) do not fulfil the R<sup>2</sup> > 0.20 condition. In this context, these models are not used in further calculations. Moreover, Finland's direct foreign investment determination factor is R<sup>2</sup>=0.749, which explains 74.9%. In terms of Lithuania's GDP, the Swedish FDI determination factor is R<sup>2</sup>=0.716, which explains 71.6%. In terms of Lithuania's GDP, the Norwegian FDI determination factor is R<sup>2</sup>=0.356, which explains 35.6% of Lithuania's GDP dissemination. In addition, the p values of the Fisher criterion statistics are less than 0.05 for all the models; therefore, all the models are considered significant. The models satisfying the statistical conditions of the determination coefficient and the Fischer criterion were



used to assess the significance of the model coefficients and their estimates to determine whether foreign direct investment from Finland, Sweden and Norway has a significant impact on changes in Lithuania's gross domestic product (see Table 7).

**Table 7.** Results of the assessment of the coefficients of the Nordic direct foreign direct investment and Lithuania's GDP linear regression model and their materiality

Model	Nonstandardized coefficients		Standardized coefficients	t-statistics	P value	
	B	Residual error	Beta			
2	Free Member	-1614.921	606.381		-2.663	0,009
	Finnish FDI	20.239	1.207	0.866	16.767	&0,001
3	Free Member	3180.344	373.800		8.508	&0,001
	Swedish FDI	2.426	0.158	0.846	15.396	&0,001
5	Free Member	5011.083	517.784		9.678	&0,001
	Norwegian FDI	6.304	0.875	0.597	7.208	&0,001

Sources: developed by the authors.

According to the data in Table 5, the independent variables analysed in the models – Finland, Sweden and Norway – for foreign direct investment (FDI) T Student p values are below the materiality level. In this context, these independent variables are considered to be significant and impact changes in Lithuania's gross domestic product. The results obtained show that an increase in Finland's foreign direct investment of EUR 1 million would increase Lithuania's GDP by an average of EUR 20.239 million; an increase in Sweden's foreign direct investment of EUR 1 million would increase Lithuania's GDP by EUR 2.426 million on average; and an increase in Norway's foreign direct investment of EUR 1 million would increase Lithuania's GDP by EUR 6.304 million on average.

#### 4.3. Results of the assessment of the causal link between the distribution of FDI by economic sector in the Nordic European countries and the causal link between economic indicators in these sectors

Granger's causality test is applied to assess the distribution of FDI by economic sector in the Nordic European countries and the indicators of the Lithuanian economy in these sectors. This study aims to determine whether foreign direct investment in the secondary and tertiary sectors of Denmark, Finland, Sweden, Iceland and Norway influences the gross value added of these sectors. Before the Granger causality test, the aim was to establish a correlation between Northern Europe's foreign direct investment attracted to the secondary and tertiary sectors and gross value added. The data obtained are presented in Table 8.

**Table 8.** Correlations between Nordic countries' foreign direct investment in the secondary sector and Lithuania's gross value added in the secondary sector

	Gross value added of Lithuania in the secondary sector
Danish foreign direct investment in Lithuania's secondary sector	0.582
Finland's foreign direct investment in Lithuania's secondary sector	0.750
Swedish foreign direct investment in Lithuania's secondary sector	0.550
Iceland's foreign direct investment in Lithuania's secondary sector	0.352
Norwegian foreign direct investment in Lithuania's secondary sector	0.892

Note: All the coefficients are significant at the p and 0.01 levels.

Sources: developed by the authors.

It was established that all Nordic countries have a statistically significant link between foreign direct investment in Lithuania in the secondary sector and the total value added of the secondary sector, as the materiality level p is less than 0.05. It was found that there is a medium-strength correlation between foreign direct investment in Denmark, Sweden, Iceland and Lithuania's gross value added in the secondary sector. There is a strong correlation between Lithuania's gross value added in the secondary sector and foreign direct investment in Finland and Norway in the secondary sector. After analysing the correlation between the indicators of the selected countries and the Lithuanian economy in the secondary sector, the correlation between the Nordic foreign direct investment in the tertiary sector and Lithuania's gross value added was further assessed (see Table 9).

**Table 9.** Correlations between Nordic countries in foreign direct investment in the tertiary sector and Lithuania's gross value added in the secondary sector

	<b>Gross value added of Lithuania in the tertiary sector</b>
Danish foreign direct investment in the Lithuanian tertiary sector	—0.378*
Finland's foreign direct investment in the Lithuanian tertiary sector	0.548*
Swedish foreign direct investment in the Lithuanian tertiary sector	0.740*
Foreign Direct Investment of Iceland in the tertiary sector of Lithuania	0.152
Norwegian foreign direct investment in the Lithuanian tertiary sector	0.265**

Note: \*  $p < 0.01$ ; \*\*  $p < 0.05$

Sources: developed by the authors.

The link between Iceland's foreign direct investment in the tertiary sector and Lithuania's gross value added is weak and statistically insignificant, as it exceeds the selected significance level of 0.05. These results may be based on the small inflows of FDI in Iceland into the tertiary sector. It is also important to mention that the correlation between foreign direct investment in Denmark, Finland, Sweden, Norway and the analysed indicators of the Lithuanian economy is statistically significant. However, there is a weak correlation between Norway's foreign direct investment in the tertiary sector and gross value added in the tertiary sector. There is an average inverse link between Denmark's foreign direct investment in the tertiary sector and Lithuania's gross value added. It should also be noted that a medium-strength correlation exists between Finland's foreign direct investment in the sector analysed and Lithuania's gross value added. At the same time, there is a strong correlation between Sweden's foreign direct investment in the tertiary sector and Lithuania's gross value added and exports. Iceland and Norway link foreign direct investment in the third sector with Lithuanian exports.

After we estimated the correlation between the Nordic countries' FDI in the secondary and third sectors and the added value added, Granger's causation analysis was continued. First, the stationarity of the time series of selected variables—foreign direct investment in Denmark, Finland, Sweden, Iceland and Norway, Lithuania's gross value added to the secondary and tertiary sectors—was analysed using the ADF test. The systematic results of the stationary assessment are presented in Table 10.

**Table 10.** Assessment of the sectoral distribution of foreign direct investment in Nordic countries and the stationarity of Lithuania's economic indicators

Indicator	Sector	Differentiation queue	ADF	Meaning of
			t-statistics	P
Foreign Direct Investment in Denmark	Secondary	1	—9.3026	0.0000
	Tertiary	1	—5.4954	0.0000
Foreign Direct Investment from Finland	Secondary	1	—10.2489	0.0001
	Tertiary	0	—2.9619	0.0432
Foreign Direct Investment in Sweden	Secondary	1	—13.0206	0.0001
	Tertiary	1	—7.7220	0.0000
Foreign direct investment by Iceland	Secondary	1	—14.506	0.0001
	Tertiary	1	—8.8428	0.0000
Foreign Direct Investment from Norway	Secondary	1	—9.6579	0.0000
	Tertiary	1	—8.5146	0.0000
Gross value added of Lithuania	Secondary	1	—3.5329	0.0097
	Tertiary	1	—14.7765	0.0001

Source: Developed by the authors based on calculations via the Eviews software package.

The p values of the analysed indicators are lower than the chosen materiality level, so the data fulfil the stationary condition. Based on the data stationarity, VAR models have been developed to properly determine the number of delays in Granger's causality test. Based on the models developed and the optimal number of delays they indicated, Granger's causality test was applied to assess the sectoral distribution of FDI in the Nordic countries and the causality of Lithuania's gross value added (see Table 11).

The results of the Granger causality test revealed a reciprocal causal link between Denmark's foreign direct investment in the secondary sector and Lithuania's gross value added. In this case, the results obtained mean that Denmark's foreign direct investment in the secondary sector impacts Lithuania's gross value added in the secondary sector, and Lithuania's gross value added in the secondary sector affects Denmark's foreign direct

investment in the secondary sector. In addition, it was established that Lithuania's gross value added in the tertiary sector affects Sweden's direct foreign investment in the tertiary sector.

**Table 11.** Results of the assessment of the sectoral distribution of foreign direct investment in the Nordic countries and the causal link between Lithuania's gross value added

Sector under investigation	The Null Hypothesis	Number of observations	F statistics	Meaning of P	The Null hypothesis is accepted/rejected
Denmark					
Secondary	Danish FDI_2SECT $\neq$ Lithuanian GVA_2SECT	73	7.43408	0.0081	Rejected
	Lithuanian GVA_2SECT $\neq$ Danish FDI_2SECT		4.46507	0.0381	Rejected
Tertiary	Danish FDI_3SECT $\neq$ Lithuanian GVA_3SECT	74	1.62889	0.2061	Accepted
	Lithuanian GVA_3SECT $\neq$ Danish FDI_3SECT		0.19952	0.6565	Accepted
Finland					
Secondary	Finnish FDI_2SECT $\neq$ Lithuanian GVA_2 SECT	74	0.03405	0.8541	Accepted
	Lithuanian GVA_2SECT $\neq$ Finnish FDI_2SECT		0.40629	0.5259	Accepted
Tertiary	Finnish FDI_3SECT $\neq$ Lithuanian GVA_3SECT	73	0.09308	0.7612	Accepted
	Lithuanian GVA_3SECT $\neq$ Finnish FDI_3SECT		1.58067	0.2128	Accepted
Sweden					
Secondary	Swedish FDI_2SECT $\neq$ Lithuanian GVA_2SECT	74	0.58868	0.4455	Accepted
	Lithuanian GVA_2SECT $\neq$ Swedish FDI_2SECT		1.51363	0.2226	Accepted
Tertiary	Swedish FDI_3SECT $\neq$ Lithuanian GVA_3SECT	68	1.48993	0.1988	Accepted
	Lithuanian GVA_3SECT $\neq$ Swedish FDI_3SECT		2.84385	0.0175	Rejected
Iceland					
Secondary	Icelandic FDI_2SECT $\neq$ Lithuanian GVA_2SECT	74	1.06077	0.3065	Accepted
	Lithuanian GVA_2SECT $\neq$ Icelandic FDI_2SECT		0.00182	0.9661	Accepted
Tertiary	Icelandic FDI_3SECT $\neq$ Lithuanian GVA_3SECT	73	0.14873	0.7009	Accepted
	Lithuanian GVA_3SECT $\neq$ Icelandic FDI_3SECT		0.71348	0.4012	Accepted
Norway					
Secondary	Norwegian FDI_2SECT $\neq$ Lithuanian GVA_2SECT	73	0.11119	0.7398	Accepted
	Lithuanian GVA_2SECT $\neq$ Norwegian FDI_2SECT		2.11137	0.1506	Accepted
Tertiary	Norwegian FDI_3SECT $\neq$ Lithuanian GVA_3SECT	74	0.92235	0.3402	Accepted
	Lithuanian GVA_3SECT $\neq$ Norwegian FDI_3SECT		0.28532	0.5949	Accepted

Sources: developed by the authors.

In summary, from the analysis of the causal link between the distribution of FDI in the Nordic countries by economic sector and the indicators of the Lithuanian economy, it can be concluded that there is a reciprocal causal link between Denmark's FDI in the secondary sector and Lithuania's gross value added. In addition, the results revealed that Lithuania's gross value added in the tertiary sector affects Sweden's foreign direct investment in the tertiary sector.

**5. Discussion and conclusions.** Considering the results of the empirical research, in the Scandinavian context, the most significant foreign direct investment inflows are from Sweden. At the same time, the smallest part is Iceland's foreign direct investment in Lithuania. The most significant flow of foreign direct investment in all Scandinavian countries is directed to the economic activities that make up Lithuania's secondary and tertiary economic sectors. The results of the correlation-regressive analysis revealed the positive impact of FDI in Finland, Sweden and Norway on Lithuania's gross domestic product. These results overlap with those of the study by Hlavacek and Bal-Domanska (2016), which argued that foreign investment from Nordic countries positively impacts the Lithuanian economy. However, this impact is much smaller than that in Latvia and Estonia (Simelyte et al. 2017). This can be explained by not all Nordic countries investing in branches that generate a significant share of GDP. In our case, the impact of foreign direct investment from Denmark and Iceland on Lithuania's gross domestic product could not be assessed because the model eligibility criteria were unmet. Moreover, Irandoust (2016) found a positive one-way causal link between Northern European FDI and Lithuania's gross product. This shows that FDI has a positive impact on economic growth. One of the early studies based on firm-level data from Lithuania found evidence of positive productivity spillovers from FDI through contact between foreign affiliates and local suppliers in upstream sectors (Javorcik, 2004). This finding suggests that FDI has the potential to increase the productivity of domestic firms in Lithuania. Another study highlights the importance of FDI in research and development (R&D) for Lithuania, as it brings significant benefits and opportunities (Simelyte et al., 2017). This indicates that attracting FDI in the R&D sector can contribute to a country's economic growth and development. Moreover, a recent study (Simelyte & Tvaronaviciene, 2023) proved that in the Baltic States, inwards FDI from Nordic countries has a significant impact on economic growth; however, it does not play a significant role in high-tech trade or knowledge-intensive sectors. In terms of FDI patterns, Lithuania has taken a relatively passive approach compared to its neighbors, with Estonia attracting a larger share of FDI (Irandoust, 2016). However, the sectoral distribution of inwards FDI in Lithuania includes sectors such as financial and insurance activities, manufacturing, and real estate services (Ciešlik & Gurshev, 2021). This suggests that FDI has been concentrated in these sectors, which can have implications for the country's economic structure. In addition, our study found that changes in foreign direct investment in the secondary sector in Denmark could predict changes in Lithuania's gross value added in the secondary sector and vice versa. The results of the Granger test revealed the impact of Lithuania's gross value added on Swedish foreign direct investment in the tertiary sector, which confirms the results of Ciešlik & Gurshev (2021). Thus, it is worth mentioning that a significant volume of inwards Swedish FDI is attracted to the financial sector.

Investment promotion agencies, such as Invest Lithuania, play a crucial role in attracting FDI to the country.

*5.1. Theoretical and practical implications.* The study added value to internalization theory and revealed that the global economy, multinational enterprises and foreign direct investments may stimulate economic growth via trade and knowledge transfer, specifically in knowledge-intensive sectors. However, this approach is strongly dependent on various factors, such as the goal of investment in the country and the ability of the recipient to absorb knowledge and empower it in practice. In addition, the efficiency of the intermediary institution and the availability of a highly educated labour force are significant players. From a practical point of view, the Lithuanian government should focus on inwards Nordic FDI, which contributes to knowledge-intensive sectors or introduces innovations by introducing additional measures. For example, tax reduction or tax holidays could be attractive measures for Nordic companies that tend to invest in the tertiary sector. Additionally, Denmark has an impact on the secondary sector. Thus, a more detailed sectoral analysis would allow us to attract targeted Danish companies that might contribute to greater productivity or innovation development. Furthermore, Nordic countries that have not had an impact on sectoral growth should be reconsidered, and specific measures should be introduced. In particular, we focus on the development and advancement of specific sectors in Nordic countries. The strong leading MNCs from Nordic countries should be contacted individually, and specific measures should be adopted based on the peculiarities and needs of the business.

Considering the research results, Lithuania has the potential to attract foreign direct investment from Scandinavian countries, which positively impacts the country's gross domestic product. The results of

empirical research in the context of individual economic sectors help identify priority sectors and shape the policy of attracting FDI, encouraging investments from Scandinavian countries.

5.2. *Research limitations and further research* A greater availability of a statistical dataset covering the classification of FDI according to the investing country and the distribution of these investments and gross domestic product by economic activity would allow a more accurate assessment of the relationship between Scandinavian FDI inflows in individual economic sectors and the economic indicators of these sectors.

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**Вплив іноземних прямих інвестицій з країн північної Європи на структуру економіки Литви**

Іноземні прямі інвестиції розглядаються як рушійна сила економічного зростання, сприяючи розвитку торгівлі та зменшенню безробіття. Країна, яка отримує іноземні прямі інвестиції, користується перевагами від передачі технологій. В результаті цього розвивається та змінюється економічна структура країни, що надає їй нові можливості та перспективи. Країни Балтії, включаючи Литву, залучають значні обсяги іноземних прямих інвестицій (ІПІ) з країн Північної Європи. Метою дослідження є оцінка впливу внутрішніх ІПІ з країн Північної Європи на економічну структуру Литви. Методичним інструментарієм проведеного дослідження стали методи описової статистики, кореляційно-регресійного аналізу та тести причинно-наслідкового зв'язку Грейнджера. Стаціонарність даних перевірялася за допомогою розширеного тесту Дікі-Фуллера для оцінки впливу на структурні зміни. Дані були структуровані згідно з економічними видами діяльності, що відповідають класифікації Номенклатури видів економічної діяльності в Європейському Союзі (NACE). Первинний сектор включає сільське господарство, лісівництво та видобування корисних копалин. До вторинного сектору входять виробництво, будівництво, водопостачання та електропостачання, а третинний охоплює послуги та торгівлю. Для дослідження обрано показники, такі як ВВП на душу населення та валова додана вартість (ВДВ). ВДВ використана для оцінки впливу кожної країни Північної Європи на різні галузі. Внесок галузей в економіку виражений у вигляді валової доданої вартості. Дослідження структуровано за трьома аналітичними напрямками. Перший спрямований на аналіз розподілу іноземних прямих інвестицій (ІПІ) в Литві за економічними секторами в контексті країн Північної Європи. Другий направлений на вивчення впливу цих інвестицій на економічний розвиток Литви. Остання частина присвячена оцінці причинно-наслідкового зв'язку між розподілом ІПІ за секторами економіки в країнах Північної Європи та економічними показниками цих секторів. Дослідження емпірично підтверджує та теоретично доводить, що внутрішні ІПІ можуть змінити економічну структуру господарства-одержувача. Крім того, ІПІ сприяють економічному розвитку країн-одержувачів, що означає розвиток третинного сектора. Результати дослідження можуть бути корисні для вдосконалення політики просування ІПІ в Литві з метою досягнення довгострокових результатів у розвитку третинного сектора, зокрема в галузі знань-інтенсивних технологій. Литва має потенціал використовувати ІПІ з країн Північної Європи; однак вона все ще не використовує дані можливості, оскільки деякі ІПІ не мають впливу на розширення третинного сектора або будь-якого сектора взагалі.

**Ключові слова:** корпоративна соціальна відповідальність; людські ресурси; ланцюжок поставок; стійке виробництво.