Analysis of the Economic Factors Determining the Foreign Direct Investment Inflows of Lithuania

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Abstract

Purpose of the article: This paper investigates the economic factors that impact Foreign Direct Investment (FDI) flows to Lithuania. The reason behind this is to find the economic factors that are significantly important for Lithuania's FDI attraction to ensure FDI stability and growth during economically challenging times.

Methodology/methods: Analysis of scientific literature; data collection and systematisation; correlation analysis; and simple and multiple linear regressions.

Scientific aim: First, literature analysis was used to find possible economic factors impacting the FDI that may be useful for Lithuania's case. This was followed by the identification of 5 main factors, namely inflation, unemployment, exchange rate, imports, and the GDP. The research led to statistical analysis, which revealed a strong correlation between the FDI and mentioned economic factors.

Findings: The regression analysis answers the critical research question – the FDI flows to Lithuania are impacted by inflation, unemployment, and imports. The other two factors, namely the exchange rate and GDP, may be an underlying condition for attracting the FDI in other countries. It means that the previously mentioned three economic factors can or must be developed to attract investment to Lithuania.

Conclusions: The results of multi-linear regression, revealing the Lithuanian FDI is impacted by inflation, unemployment, and imports, is suggesting an inference to develop or give an attention to those particular areas in order to attract the investments. The authors mentioned that inflation and unemployment could indicate uncertainty, therefore investors would look to these indicators to reason investment in a country, while imports were reasoned as a factor to think before investing due to the ability to measure market demand. Policymakers can use this paper to make the right decisions when tackling issues of foreign direct investment attraction.

Keywords: FDI, Lithuanian economy, impact assessment, regression analysis

JEL Classification: M15, M21

Introduction

Economic prosperity is an important condition for the fulfilment of basic human needs, which is one of the goals for any country (Mawardi, Widiastuti, 2017). To reach this condition, a country must not only rely on its internal resources but also try to attract foreign capital and maintain good foreign relations. Since regaining independence in 1990, Lithuania has come a long way in becoming such an economically stable growing country. It is doubtful whether this could be achieved if Lithuania had not joined the European Union in 2004. The entrance was beneficial in many ways, *i.e.* free movement of labour, services, and goods impacted the growth of the economy. A bigger market created more opportunities for Lithuanian businesses to expand and more easily sell different goods and gain profit, while foreign businesses seeking expansion opportunities filled the Lithuanian market with high-quality products and services. Providing that, easier conditions for foreign capital inflows were created.

The investments made by a firm or individual in a foreign country are called foreign direct investments (FDI). The more inflows of foreign direct investments Lithuania attracts, the easier it gets to boost the economy. Therefore, it should be clear what makes the impact on these investments and how to gauge it? The question can be answered by analysing the impact of the economic indicators on the foreign direct investment inflows. The results could show what are the factors determining foreign direct investment inflows and how significant the impact itself is.

In order to evaluate the impact of the economic factors determining the foreign direct investment inflows of Lithuania and to assess their significance, the following tasks have to be accomplished:

1. After analysing scientific literature, to identify economic factors determining the foreign direct investment inflows.

2. To choose an appropriate methodology needed for the evaluation of the economic factors determining the foreign direct investment inflows.

3. By using the suggested methodology, to evaluate the impact of the selected economic factors on foreign direct investment inflows of Lithuania.

4. To provide recommendations for future works covering this topic.

The main research issue of this particular research consisted in how to assess the impact of the economic factors determining the foreign direct investment inflows of Lithuania.

1. The theoretical aspects on the factors determining foreign direct investment inflows

The foreign direct investment inflows could be affected by both non-economic and economic factors. There is plenty of research, where the theoretical aspects of the FDI are being investigated (Bailey, 2018; Han *et al.*, 2022; Krifa-Schneider *et al.*, 2022; Li *et al.*, 2018; Nguyen *et al.*, 2022; Torrecillas, Fernández, 2022); most of the research discovers the links between the FDI concerning the economic situation of the particular Country or Region (Agudze, Ibhagui, 2021; Bilas, 2020; Burlea Schiopoiu *et al.*, 2021; Glova *et al.*, 2020; Guseva, Mechik, 2020; Han *et al.*, 2022; Nguyen *et al.*, 2022; Rong *et al.*, 2020; Zaman *et al.*, 2021; Zhang, 2021). However, the authors of certain research raised the hypothesis that some commonly used economic factors may have an impact on the level of the FDI of Lithuania. Below is a review of some of them.

The first factor that potentially can determine the country's foreign direct investment inflows is a gross domestic product (GDP). The GDP is the standard measure of the value-added created through the services and the production of goods during a

specific period (usually quarterly or annually) (OECD, 2020b). The indicator is one of best known for most people as usually country's economic power is measured in the GDP. An example of that could be an article by Singh, Pradhan (2020), where the per capita real GDP is taken as a measure of the economic performance. The relationship between the gross domestic product and foreign direct investment was investigated by Burlea Schiopoiu *et al.* (2021) and Bilas (2020)cointegration, as well as causality tests. The paper employs annual data for FDI and gross domestic product (GDP as there was not found that foreign direct investment has a significant effect on the decrease or increase of the gross domestic product. While in the research of Boateng *et al.* (2015) it was stated that GDP does impact foreign direct investment inflows. Therefore, the gross domestic product is taken as a factor determining the FDI inflows to Lithuania.

Another indicator that can affect foreign direct investment inflows is inflation. Inflation measured by the change in consumer price index (CPI) is calculated using a basket of goods and services typically purchased by specific groups of households and taking the change of the same basket in the previous year OECD (2020a, 2020b). Inflation is also a wide-known indicator, since it is easy to understand it, inflation simply shows how much the price of a particular good has increased compared to the previous year, or in this case to the base year 2015.

The study of Glova *et al.* (2020) states that "the higher the inflation rate, the higher the level of uncertainty about the economic environment of the country, and thus the perception of the risk of economic operators is higher". This means that uncertainty in the economic environment is avoidable with low inflation and therefore low inflation is the target of most countries. Also, an assumption can be made, that high economic uncertainty countries will find it harder to attract foreign investments. Guseva, Mechik (2020) in the

study of foreign direct investment dynamics found that a rise in inflation has a positive impact on the net FDI increase. While Agudze, Ibhagui (2021) found contrary results as "rise in inflation dampens FDI flows in industrialized economies, whereas inflation has no statistically significant or economically meaningful effect on the FDI in non-industrialised economies". Sujit *et al.* (2020) approved the fact that inflation can negatively affect FDI inflows. Therefore, based on country, inflation can have a different impact on the FDI, and it is essential to figure out how inflation impacts FDI inflows to Lithuania.

Another economic indicator expected to affect the FDI inflows is the unemployment rate. The unemployment rate measures people of working age who are without work, are available for it, and try to find a job. It is a uniform meaning of the measure that lets the estimates be internationally comparable (OECD, 2020c). It is important to emphasise the fact that not all unemployed people are part of the statistics because people who are not available for work are not even counted. Therefore, it could be thought that this indicator is not that important. Nevertheless, people who are employed carry all the unemployed (people who are looking for work) and unavailable to be employed people (students or pensioners) as they pay taxes that for the government which provide benefits and pensions for the rest of society, this makes employment important to country's economy.

In the paper of Boateng *et al.* (2015) on macroeconomic factors impacting FDI inflows, it was concluded that the unemployment rate has a significantly negative impact on foreign direct investment inflows. The obvious reason for this could be the fact that investors are not considering the investment in countries with high uncertainty. Rong *et al.* (2020) in the research on the FDI, market flexibility and unemployment also support the fact that employment has a significant

impact on the FDI. The research by Schmerer (2014) finds a relationship between unemployment and the FDI too. As the authors find unemployment directly related to foreign direct investment, this variable can be used in the research on factors determining Lithuania's FDI inflows.

The next economic indicator that can have an impact on FDI is the imports. Imports can be defined as a transaction of goods and services coming from a foreign country to a national economy. It can be measured in a specific currency or a percentage of the GDP (OECD, 2021b). As there already is an indicator of GDP, it would be imprecise. Imports are similar to the FDI in the way that both are coming from foreign economies, therefore, it is expected that the two are related.

Some studies found a relationship between the FDI and imports. One of them is the research by Anwar, Nguyen (2011) on the FDI and trade where it was found that imports and exports make an impact on foreign direct investment. Another is the work by Dellis *et al.* (2020) studying drivers of genuine FDI inflows as it was found that trade openness (the share of exports and imports over GDP) has a significant impact on the greater inflow of the FDI. Guseva, Mechik (2020) have found an inverse relationship between the two indicators. Therefore, the research will study how imports affect the FDI inflows in Lithuania.

The last chosen factor that could have an impact on the FDI inflows is the exchange rate. Exchange rates are defined as the price of national currency in relation to another country's currency, which will be dollars (OECD, 2021a). The dollar value relation has been selected, as the dollar is another major currency. It is interesting to see whether the appreciation of the currency can impact bigger FDI inflows the same way it attracts imports.

The relationship between exchange rate and FDI was studied by Guseva, Mechik (2020) as it was found that the dependence

of FDI on the exchange rate is insignificant. While according to the study of Boateng *et al.* (2015) "exchange rate contribute significantly to FDI inflows". Mugableh (2015) confirms that depreciating exchange rate can induce international trade and attract the FDI inflows. As all mentioned authors study the relationship between the FDI and exchange rate, it is a must to include this factor in the study.

All things considered, it was found that economic factors that can have an impact on foreign direct investment inflows are the gross domestic product, inflation rate, unemployment rate, imports, and exchange rate. Most of the referenced studies found a significant relationship between factors and the FDI inflows, while some only figured out insignificant results. The authors found different results on how economic factors impact FDI: there were cases wherein one study factor impacts FDI positively and in another negatively. Therefore, it can be affirmed that results depend on a country and it is unclear how different economic factors are affecting the FDI inflows to Lithuania. This will be found out in this research.

2. Methodology for the analysis of economic factors determining the foreign direct investment inflows

In this research, various methods will be tested to analyse data the best. Data itself was collected from statistics Lithuania and the OECD (2020a, 2020b, 2020c, 2021a, 2021b) web pages.

The first used method is descriptive statistics. According to Lee (2020), "descriptive statistics are a suite of statistics that summarise the characteristics and distribution of a set of data values". Therefore, some valuable information about the data can be found just by computing the main statistics. In this case mean, median, mode, standard deviation, sample variance, minimum, and maximum statistics will be calculated as they can

be used as the basis for comparing how data series differ (Lee, 2020). These statistics are easy to calculate as "the mean is the average of all the values, the median the middle number, and the mode the most frequent value" (Herbst *et al.*, 2020). While standard deviation is a measure of how spread out or dispersed, the values are from the mean, sample variance is the average of squared differences from the mean, and minimum and maximum is the biggest and smallest values of the data set (Herbst *et al.*, 2020).

The other statistical method that will be used in this research is correlation analysis. According to Altman (2020), this and statistical significance methods are used to determine the validity of one's model. This is a clear reason to calculate correlation in this paper. The classical and commonly used Pearson correlation will be calculated in this paper, the formula for it can be defined as (1) (Edelmann *et al.*, 2021):

$$cor(X,Y) = \frac{cov(X,Y)}{\sqrt{Var(X)Var(Y)}}, \qquad (1)$$

where:
$cor(X,Y)$ – correlation coefficient,
$cov(X,Y)$ – the covariance of X and Y,
$Var(Z)$ – variance of Z.

While the significance for the correlation is tested (2) (Illowsky, Dean, 2021):

$$\begin{cases} H_0 : r = 0 \\ H_1 : r \neq 0 \end{cases}, \qquad (2)$$

where:
r – correlation coefficient,
H_0 – null hypothesis, the population correlation coefficient is not significantly different from zero,
H_1 – alternative hypothesis, the population correlation coefficient is significantly different from zero.

The significance test also requires a Student's T value, which will be compared

to the table of critical values, a bigger T value will mean that the correlation coefficient is statistically significant (Illowsky, Dean, 2021). The T statistic is presented below (3):

$$T = r\sqrt{\frac{n-2}{1-r^2}} \qquad (3)$$

where:
T – Student's t criterion,
r – correlation coefficient,
n – the size of the sample.

The significance test will tell if the calculated correlation coefficients are precise and can reveal grounded facts about our variables (Illowsky, Dean, 2021).

Next, the formula for a method that will reveal the impact on the FDI by separate independent variables – simple linear regression is presented below (4) (Athanasopoulos, Hyndman, 2018):

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \qquad (4)$$

where:
y – dependet variable,
x_1 – predictor variable,
$\beta_1, ... , \beta_2$ – denote the intercept and the slope of the line, respectively;
– deviation from the underlying straight-line model.

As simple linear regression covers dependent and one independent variable, there is multiple linear regression that explains the relationship between one dependent and more than one independent variables. The formula for it is seen below (5) (Athanasopoulos, Hyndman, 2018):

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k + \varepsilon \qquad (5)$$

where:
y – dependet variable,
$x_1, ... , x_k$ – the k predictor variable,
$\beta_1, ... , \beta_k$ – coefficients that measure the marginal effects of the predictor variables,
ε – deviation from the underlying straight-line model.

The reviewed methods can suggest a different approach to the issue of analysing the factors influencing the FDI inflows. For this reason, every mentioned method is used in this research. Descriptive statistics will help to see the main tendencies of the retrieved data, while correlation and regression models will help to see the dependency of the investigated FDI inflows indicator.

In order to provide more details about the research, which is necessary to validate the results, all the calculations on regression analysis have been implemented with the SPSS statistical software.

3. Analysis of factors determining foreign direct investment inflows

In this part, the calculations, and results empirical research will be presented. This research will analyse 19 years of quarterly data starting from the 2002 first quarter. According to the methods listed in the previous part, calculations are derived using the R statistical package. The data was differenced to analyse dynamics in the economic variables and see how changes in one variable affects changes in another one. In the first place, the descriptive statistics are derived and presented, Table 1 shows statistics for FDI inflows and chosen economic indicators that determine it.

The mean value of the FDI inflows during the 19 years is 215.86 million euros, it means that on average, the FDI inflows to Lithuanian economy increased and showed a positive trend. Inflation during the 19 years shows a 0.54 percentage points growth. The unemployment rate on average quarterly was around –0.11 per cent, which means that on average more people were employed. The imports show a positive value of 72,062 thousand euros, while the purchasing power parities and US dollar exchange rate on average is 0.00005. For the median, almost all indicators' values are very similar to the mean values. Mode was only significant for unemployment rate as a most common decrease in the rate is 0.5.

The minimum value for the FDI is –774 million euros and the maximum value is 1,138 million euros; these are huge numbers that theoretically may have a significant effect on the economy. The gross domestic product reached its heights at 1,461 million euros while the lowest value was at about –1,901, which also shows that a huge difference in the quarterly GDP was reached. For inflation, the minimum value is –1.7 per cent and the maximum is 2.8. The unemployment rate also suggests that there were some big economical changes in the last 19 years as at one period the rate of unemployment changed by 4.3 per cent. The imports values

Table 1. Descriptive statistics for FDI inflows, GDP, inflation, the unemployment rate, imports, PPP/US dollar exchange rate.

Statistics	FDI inflows (EUR million)	GDP at constant prices (EUR million)	Inflation (CPI)	Unemployment rate	Imports (EUR thousand)	PPP/US dollar rate
Mean	215.86	86.61	0.54	–0.11	72,062.91	0.0005
Median	173.33	246.25	0.47	–0.10	102,280.00	0.0019
Mode	None	None	None	–0.50	None	None
Standard deviation	322.92	727.73	0.88	1.15	362,660.59	0.0130
Sample variance	104,278.98	529,587,85	0,77	1.33	131,522,706,375	0.0002
Minimum	–774.84	–1,901.80	–1.70	–4.10	–815,014.0	–0.0238
Maximum	1,138.35	1,461.20	2.80	4.30	960,318.00	0.0239

Source: Calculations by the authors.

Table 2. Correlation between FDI and separate indicators.

Indicator	r	P-value
GDP	0,06	0.58
Inflation (CPI)	−0,07	0.55
Unemployment rate	−0,16	0.18
Imports	0.29	0.01
PPP/US dollar	0.15	0.193

Source: Calculations by the authors.

also varied a lot during this long period just as the exchange rate. All of the mentioned statistics helped to better understand the data set; consequently, other methods can be used to see the relationships between different variables.

The second used method is the correlation analysis. It will help to determine the validity of the model. The correlation and significance values can be seen in Table 2.

Each P-value except for imports is above 0.05; therefore, every calculated correlation coefficient (except imports) is statistically significant and differs from zero as zero hypotheses are not rejected, and the alternative is accepted.

It can be seen that all of the variables have a weak correlation with the FDI flows. The highest one is for imports with a value of 0.29. Nevertheless, the coefficient is not significant. The unemployment rate and inflation show a negative relationship. It may be explained that investors avoid unemployment and inflation as factors that make country risky to invest in. The correlation analysis helped to understand what relationships foreign direct investment and different indicators have, and now the impact of these indicators on the foreign direct investment can be investigated.

The third used method is simple linear regression. In this case, the dependent variable, *i.e.* foreign direct investment, will be used in the regression line where separately all the independent variables will be tested to investigate the relationship between the two.

Table 3. R-squared and the P-value for regression between the FDI and GDP.

Indicator	R-squared	P-value
Gross domestic product	−0.00962	0.583

Source: Calculations by the authors.

As previously checked, the correlation was significant for almost all variables; however, when checking their significance in regression, different results can received.

The regression line between the FDI and GDP is not significant with the p-value being not close to zero. The coefficient of determination is negative with no variance in the dependent variable is explained by the gross domestic product (see Table 4).

Table 4. R-squared and the P-value for regression between the FDI and inflation.

Indicator	R-squared	P-value
Inflation	−0.008931	0.554

Source: Calculations by the authors.

The regression line for this indicator is therefore not calculated.

This regression between foreign direct investment and inflation is also very insignificant with the p-value close to 0.5 and a low r-squared value (see Table 5).

Table 5. R-squared and the P-value for regression between the FDI and the unemployment rate.

Indicator	R-squared	P-value
Unemployment rate	0.01176	0.176

Source: Calculations by the authors.

Statistically, the regression line (7) reveals that an increase in the independent variable by one unit will add a 311.4 unit to the dependent variable.

The third regression line would be calculated for the unemployment rate. However, the p-value presented in Table 6 does not allow

Table 6. R-squared and the P-value for regression between the FDI and imports.

Indicator	R-squared	P-value
Imports	0.07252	0.0116

Source: Calculations by the authors.

the composition of the regression line, low R-squared shows that variance in the FDI could not be explained by the unemployment rate.

The third regression line was composed between the FDI and imports.

Here, the independent variable is significant with a p-value close to zero (Table 7), and the variance in the dependent variable is explained by 7.2 per cent.

Table 7. *R-squared and the P-value for regression between the FDI and the exchange rate.*

Indicator	R-squared	P-value
Exchange rate	0.009733	0.194

Source: Calculations by the authors.

The equation for it is presented below (1):

$$y = 197,1 + 0,0002599x_1. \qquad (1)$$

Looking at the regression equation (1), it is seen that the independent variable has a positive impact, as its increase by one unit will and an additional units to the dependent variable. This is the first equation where a relationship is significant. Though the impact is small, imports is a variable that can change drastically and it can have a big effect on FDI.

According to Guseva, Mechik (2020), this relationship can be explained through consumption as authors discuss that "an increase in income results in a rise in aggregate demand, and the latter stimulates imports under favourable". In simple words, investors are willing to spend in a market with high consumption.

The last indicator to be analysed in a simple linear regression line is the PPP/US dollar exchange rate. However, the p-value is too small to compose an equation (Table 8).

Table 8. *R-squared and the P-value for regression between the FDI and multiple variables.*

Indicator	R-squared	P-value
GDP	0.1111	0.00208
Lag4(GDP)		0.00202

Source: Calculations by the authors.

The simple linear regression explained the relationship between the dependent variable and separate indicators, and therefore a model of all indicators can now be composed.

The last used method is the multiple linear regression. It differs from the simple regression, as it must have at least two independent variables. In this case, all 5 variables will be added to the regression line to test the relationship with the dependent variable FDI. A backwards selection procedure will be used to omit insignificant variables.

The table below presents the p-values and r-squared for the final model. All explanatory variables are significant with a p-value lower than 0,05. The R-squared is low, 11 per cent of the variance in the dependent variable is explained by the independent variables.

The imports were not found significant in the regression with more than one variable. Lagged values of the variables were used to check if the FDI flows were affected by previous periods of the economic indicators.

The regression line received is presented below (2):

$$y = 221.2469 + 0.4691x_1 - 0.4906x_2. \qquad (2)$$

The regression line can be interpreted as follows: change in the value of by one unit will increase the dependent variable by 0.4691 (all else equal); change in the value of by one unit will decrease the dependent y variable by 0.4906 units (all else equal).

The GDP, as an important measure of a country's economic power, has a significant impact on the FDI. Even values with 4-quarter lag are important for the FDI flows. It can be stated that companies, when deciding whether to invest in a country or not, look at the GDP.

All things considered, the descriptive statistics summarised the data set, thus helping to understand it better. The central tendency measures showed how arithmetical data set values are, while other measures helped to see the biggest and lowest values in the

data. The correlation analysis contributed to the study because the verified correlation value allowed to see the validity of further methods. Simple linear regression calculations revealed the impact of each independent indicator on the dependent foreign direct investment indicator. The multiple linear regression revealed that Lithuania's inward foreign direct investment is impacted by its GDP and lagged GDP. It means that a decreased GDP may cause smaller FDI inflows in the country.

4. Discussion

The greater the number of inflows of foreign direct investment that Lithuania receives, the simpler it will be for the country to stimulate its economy. Consequently, it should be apparent what has an influence on these investments and how to assess that impact. It is possible to get an answer to this issue by examining the relationship between economic indices and foreign direct investment (FDI). The findings provide insight into the variables that influence foreign direct investment inflows as well as the significance of the effect on the economy as a whole.

The majority of the research cited discovered a statistically significant association between variables and the FDI inflows, while some simply discovered statistically insignificant outcomes. The authors discovered a variety of outcomes about how economic variables influence foreign direct investment: there were instances in which one study component had a favourable effect on the FDI, while another had a negative impact on the FDI. So it may be concluded that the findings vary from nation to country, and it is unknown how various economic conditions influence the FDI inflows to Lithuania. Scientific studies have not paid enough attention to the influence of certain economic conditions on the outcome of foreign direct investment. The authors aimed to fill in the gaps in the current information by doing their own study. There is a theoretical and practical analysis of these links in the work, and there are substantial new insights into the subject area as well.

The topic of impact on the FDI has a great potential to be analysed deeper, the research could be broadened in future research, taking into consideration different time periods, new statistic elements, their impact, and moreover by using the prognoses techniques and methodology. This could effectively contribute to the current topic's state of the art and even could provide some prognoses for the decision-makers.

5. Conclusion

The theory of this research was prepared by analysing scientific literature on economic indicators affecting foreign direct investment. It was found that gross domestic product is a main economic performance and growth indicator impacting foreign direct investment. The second indicator inflation rate was selected, as the authors found it affecting the FDI due to its importance to economic uncertainty and impact on the growth of an economy. Furthermore, the unemployment rate was found as an economic condition and development indicator making an impact on the FDI. The imports were selected, as various authors mentioned their relationship to the FDI. In the last place, the exchange rate was chosen, as the authors found its direct impact on foreign direct investment. From the presented arguments, it was decided to analyse the relationship between the Lithuanian FDI and the above-mentioned economic indicators.

The methodology was prepared to find the best methods for analysing the impact that economic indicators make on foreign direct investment. Firstly, the descriptive statistics were selected due to their effectiveness and simple use to understand the dataset.

Secondly, the correlation analysis was chosen, as it explains the relationship between selected variables. Finally, simple and multiple linear regressions were chosen because they will help to see how much the FDI depends on the selected economic indicators.

The most important part of the research, the analysis, was prepared with the help of the relevant methodology. Descriptive statistics summarised the data set, in this way, helping to understand it better. After that, the correlation analysis was used, and it showed that all the variables are significantly correlated to foreign direct investment. As the correlation calculations were significant, it allowed using the simple linear regression which indicated a significant relationship between the FDI and imports. A similar multiple linear regression revealed that Lithuania's inward foreign direct investment is impacted by the GDP and previous years' same quarter GDP. Imports were reasoned as a factor to think before investing due to the capacity to measure market demand while the GDP as a measure of the economy's strength.

Recommendations for future works analysing the same issue: more economic factors could be included in the research, for instance trade openness,. This was excluded, as there was no data on this statistics for Lithuania; graphical analysis could be added to make statistical data easier to understand; or more countries could be added to the investigation to make descriptive statistics comparable.

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