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The Factors Causing Consumer Behavior: Asymmetric Causality And Cluster Analysis For EU Countries Through Consumer Confidence Index

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ABSTRACT

The main purpose of this study is to identify the variables that cause consumer behavior in 27 European Union (EU) countries and to analyze which countries have consumers with similar behavior patterns. The dataset covers the period from January 2012 to December 2019. First, we examined the causal relationship between the consumer confidence index and the variables believed to cause it. For this purpose, we used asymmetric causality tests, which consider the effect of asymmetric information by assuming that the response of units to positive and negative shocks may differ. In this way, asymmetric tests can reveal confidential information that may not be detected through symmetric tests. Second, we applied cluster analysis to the outputs of the asymmetric causality tests. We found that stock market indices are the primary indicator, causing the consumer confidence index. Also, the unemployment rate, consumer price index, and election periods also cause the consumer confidence index in various countries. Because of the cluster analysis, we identified the existence of five different country groups, some of which included countries with similar geographical conditions and cultures.

Keywords: Consumer Confidence Index, Economic Indicators, Asymmetrical Causality Analysis, Cluster Analysis, EU Counties.

JEL Classification Codes: D12, C32, C38, O52

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INTRODUCTION

Consumer behavior is of vital importance to decision-makers and those involved in economic forecasting. It is influenced by various factors. Some of these factors are direct, such as income, prices, and the political environment, while others are based on expectations about the future and the level of confidence among economic agents. Positive developments in expectations and confidence positively affect consumer behavior. Although it is not possible to fully measure consumer behavior, it is possible to assess the level of consumer confidence through consumer confidence indices (Ozsagir, 2017). An increase in consumer confidence leads to greater spending and a higher tendency to borrow, whereas pessimism causes consumers to reduce their expenditure and reassess their financial situation (Arisoy, 2012).

It is possible to infer whether a country's economy is performing well by analyzing the consumer confidence index. Consumer confidence indices largely indicate the state of national economies, providing a regular assessment of consumer satisfaction with the economy. Consequently, the index has become a crucial indicator for many stakeholders, especially policymakers and politicians. An important question is what factors cause the consumer confidence index, given its significance. Identifying the key developments that shape households' perceptions of confidence will also offer valuable insights into how their confidence can be enhanced. Formulating economic policy based on this information will be a step toward increasing consumer confidence, which, in turn, will positively impact the economy.

Many factors cause the consumer confidence index. These factors may relate to the effects observable through macroeconomic indicators, as well as the political and sociological conditions experienced in the relevant country. Therefore, examining the factors that cause the consumer confidence index would help to understand how households' behavior is shaped, what issues they care about, and how their hopes and fears are determined.

This study is based on the PhD dissertation titled as "AB Ülkeleri ve Türkiye'de Tüketici ve Üretici Güven Endeksinin Belirleyicileri: Asimetrik Nedensellik Testi ve Kümeleme Analizi / Determinants of Consumer and Producer Confidence Index at EU Countries and Turkey: Asymmetric Causality Test and Cluster Analysis" written by Özgür Engeloğlu and supervised by Funda Yurdakul in Ankara Hacı Bayram Veli University Institute of Social Sciences

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The main purpose of this study is to determine the factors causing consumer behavior across all EU countries and to analyze which countries have consumers with similar behavior patterns. We used the consumer confidence index as an indicator to represent consumer behavior. Hatemi-J's (2012) asymmetric causality test was employed to analyze the causal relationship between the consumer confidence index and various variables (inflation, unemployment, exchange rate, growth, stock market index, elections, and terrorist attacks). Asymmetric causality tests consider the effect of asymmetric information, assuming that the response of units to positive and negative shocks may differ. In this way, causality can be detected between different components of some series that might not exhibit a causal relationship under symmetric conditions. Therefore, some information that cannot be detected through symmetric tests may be uncovered by asymmetric tests. Additionally, we performed cluster analysis using Ward's linkage method based on the findings obtained through the asymmetric analysis. This approach allowed us to determine how many classes EU countries are divided into according to consumer behavior and to identify which countries belong to each cluster. Our main motivation in this study is to observe how countries differ according to consumer behavior. We believe that this study will contribute to the literature in this respect.

The study covers 27 EU member countries as of 2022. The dataset spans the period from January 2012 to December 2019. We excluded the post-COVID-19 period, which significantly impacted countries' economies and consumer behavior, because our focus is on examining the effects of persistent and ongoing factors on consumer behavior, rather than new external shocks.

The following sections of the study include literature review, theoretical background, data set and methodology, empirical results, and evaluations.

LITERATURE

In the literature, Beltran & Duree (2003) examined the effect of stock market fluctuations on consumer confidence in the United States and Belgium, while Sartell (2014) also analysed the effect of the average consumer's view of the national debt with some macro variables on consumer confidence for the United States. Paradiso et al. (2014) for Italy, Lahiri and Zhao (2016) for the United States analyzed the major determinants of the consumer confidence index and their role in business cycles. Tobback et al. (2018), Klopocka (2017), Karasoy Can & Yüncüler (2017), and Bildirici & Badur (2019) analyzed the consumer confidence index together with economic policy uncertainty index for Belgium, household savings and borrowing for Poland, private consumption growth rate for Turkey and oil and gasoline prices for Turkey and the United States, respectively. In the literature, not only the relationship of the consumer confidence index with economic indicators is examined, but also its relationship with political and sociological indicators. For example, the announcement of elections, election results, and government changes for Belgium in Vuchelen (1995) and economic news published in newspapers for the Netherlands by Alsem et al. (2008) are analyzed with the consumer confidence index. Also, Ramalho et al. (2011) evaluated the Eurozone entry and election conditions for Portugal, Neisingh & Stokman (2013) estimated the impact of financial stability, price stability, and political stability for the Netherlands. Apart from these, Svensson et al. (2017) analyzed economic news and consumer confidence in Denmark.

In the studies for country groups, Celik et al. (2010) analyzed the relationship between consumer confidence and growth for six developing country economies, Kim (2016) analyzed whether consumer confidence is a leading, incidental, or lagging measure of economic activity for ten OECD member countries. In addition, Kim (2016) discussed in his study whether the relationship between the confidence indicator and economic activities differs between countries. Finally, Vanlaer et al. (2020) examined the relationship between household saving behavior and the consumer confidence index in eighteen European Union countries.

In previous studies, researchers have preferred many methods to analyze the relationship between consumer confidence index and various indicators. Beltran & Duree (2003) used ARDL and the Error Correction Model (ECM), Paradiso et al. (2014) preferred the Asymmetric Error Correction model with ARDL, and Neisingh & Stokman (2013) applied only the Error Correction model. Neisingh & Stokman (2013) and Kim (2016) used the Granger causality test, and Bildirici & Badur (2019) used the Markov Switching-Granger causality test to examine the short-term relationship. Alsem et al. (2008) utilized the Johansen cointegration test to examine the long-term relationship. Vuchelen (1995), Neisingh & Stokman (2013), Sartell (2014), Lahiri & Zhao (2016), Svensson et al. (2017), Klopocka (2017) and Karasoy & Yüncüler (2017) used the Ordinary Least Squares (OLS) method. When viewed the other methods for benefited; Alsem et al. (2008), Paradiso et al. (2014), and Vanlaer et al. (2020) used VAR models, TAR models, and panel data analysis, respectively. Last, Tobback et al. (2018) used data mining analysis.

Table 1 provides a summary of the studies analyzing the relationship between consumer confidence index and other variables in the literature.

Table 1. Summary of literature

Author(s)	Country(s) analyzed	Topics analyzed with the consumer confidence index	Method	Conclusions
Vuchelen (1995)	Belgium	Election results and changes in government	OLS	Unexpected elections and new governments affect consumer confidence, while ideology has no effect on consumer confidence.
Beltran and Duree (2003)	United States and Belgium	Stock market fluctuations	ARDL and ECM	Stock market fluctuations have an explanatory power in the development of consumer confidence in the United States, especially since the early nineties.
Alsem et al. (2008)	Netherlands	Economic news in newspapers	Johansen Cointegration and VAR	Consumer confidence is influenced not only by economic fundamentals but also by the way these fundamentals are communicated. However, this effect is short-lived.
Çelik et al. (2010)	6 developing countries	Industrial production and stock market index	Panel Cointegration	In emerging economies, there is a long-run relationship between consumer confidence and industrial production and stock market index. Moreover, consumers in emerging and developed markets exhibit similar behavior.
Ramalho et al. (2011)	Portugal	Unemployment, inflation, interest rates, entry into the euro area and election conditions	OLS	In Portugal, consumer confidence is mainly influenced by economic performance, entry into the euro area and electoral conditions.
Neisingh and Stokman (2013)	Netherlands	Price stability and political stability	ECM and Granger Causality	The decline in confidence during the Great Recession was exacerbated by the decline in public confidence in the financial sector and in Europe. Besides financial stability, price stability and political stability are also crucial for consumer confidence.
Sartell (2014)	United States	National debt, budget deficit, unemployment, inflation and stock market index	OLS	Unemployment is the most important variable to explaining consumer confidence. This is followed by national debt level, inflation rate, federal budget deficit and finally stock market performance.
Paradiso et al. (2014)	Italy	Macro indicators	ARDL, Asymmetric ECM and TAR	Good impressions on consumers are restored in 6 months and bad impressions in 3 months.
Kim (2016)	10 OECD member countries	Economic activities	Granger Causality	Consumer confidence is driven by both economic factors such as wealth and interest rates and non-economic factors such as emotional state. The causal relationship between consumer confidence and economic activity varies across countries.
Lahiri and Zhao (2016)	United States	Business cycles	OLS	Consumer confidence is significantly affected by variation in the assimilation of news from local network sources. Different interpretations of current macroeconomic conditions are more common during periods of low confidence before the peaks of business cycles.
Tobback et al. (2018)	Belgium	Economic policy uncertainty index	Data Mining	Changes in the level of policy uncertainty, especially during turbulent periods of high uncertainty and risk, predict changes in consumer confidence.
Svensson et al. (2017)	Denmark	Economic news	OLS	Exposure to ambiguous news influences changes in consumer confidence through economic uncertainty.
Karasoy Can and Yüncüler (2017)	Turkey	Private consumption growth rate	OLS	Lagged values of consumer confidence have explanatory power on consumption growth.
Klopocka (2017)	Poland	Household savings and borrowing	OLS	The consumer confidence index contains information on households' future savings and borrowing rates.
Bildirici and Badur (2019)	Turkey and the United States	Oil and petrol prices	Markov Switching - Granger Causality	While there is a bidirectional causality between oil price and confidence index in all regimes in the United States, there is a unidirectional relationship from oil price to confidence index in Turkey. In both countries, stock returns of energy companies interact with changes in the confidence index and oil prices.
Vanlaer et al.. (2020)	18 EU countries	Household saving behaviour and various macro indicators	Panel Data Analysis	Households' confidence in their own financial situation has a much larger impact on household savings than confidence in the general economic situation. Moreover, the effect of consumer confidence on household savings has increased after the crisis

In the literature on indicators related to the consumer confidence index, time series analyses for individual countries or panel data analyses for multiple countries are generally used. In this study, we conducted time series analyses separately for 27 EU Member States. This approach allowed us to determine whether the variables considered for each country are causal factors of consumer confidence. Moreover, unlike other studies in the literature, we employed the Hatemi-J (2012) asymmetric causality test, which accounts for the effect of asymmetric information and separates the series into positive and negative shocks. Apart from Kim (2016), we did not find any studies that address cross-country differentiation according to variables related to the consumer confidence index. In this study, we grouped the countries using cluster analysis, which enabled us to identify which countries' consumers exhibit similar behavior and which differ. We believe that this study will contribute to the literature through the distinctions outlined above.

THEORETICAL BACKGROUND

Consumer Behaviors

Economists were the first group to propose a specific theory of consumer behavior. This theory is based on the premise that purchasing behaviors are primarily the result of rational and conscious economic evaluations. Consumers seek to spend their income on goods that will provide the most utility, consistent with their tastes and relative prices. This perspective has its origins in the views of Adam Smith and Jeremy Bentham. Smith introduced the concept of economic growth with the principle that humans act according to their interests in all their actions, while Bentham expanded on this idea, arguing that people carefully calculate and weigh the pleasures and pains they anticipate from every planned action. However, Bentham's philosophical analysis of consumer behavior was not applied until the late 19th century. Later, the marginal utility theory was independently and almost simultaneously formulated by Jevons and Marshall in England, Menger in Austria, and Walras in Switzerland (Kotler, 1965).

Alfred Marshall is regarded as the greatest unifier of the classical and neoclassical traditions in economics, and his synthesis of supply and demand analysis is the main foundation of modern microeconomic thought worldwide. Although Marshall aimed for realism in his theory, he begins his method by simplifying assumptions, and analyzing the effect of a change in a single variable while holding all other variables constant. His model proposes behavioral hypotheses such as: (i) the lower the price of the product, the higher the sales, (ii) the lower the prices of substitute products, the lower the sales of the relevant product, (iii) the higher the real income, the higher the sales of the relevant product (unless it is an inferior good), and (iv) the higher the promotional expenses, the higher the sales of the relevant product (Kotler, 1965). In summary, according to Marshall's economic model explaining consumer behavior, consumers tend to purchase the product that provides them with the greatest benefit, based solely on economic calculations. This suggests that the economic analyses conducted by the consumer have a significant impact on their behavior (Papatya, 2005). In contrast, Freud's psychoanalytic model posits that psychological effects are the basis of consumer buying behavior and that the factors leading consumers to make different choices stem from psychological dissatisfaction (Kaynas, 2012). Freudian psychology has provided the tools for an in-depth study of consumer behavior, enabling researchers to uncover the reasons and symbols behind the buying process (Zaichkowsky, 1991). Other dimensions adapted from human behavior to consumer behavior are attributed to Pavlov and Veblen. Pavlov's theory of "conditioned learning," which includes the stages of stimulus, demand, response, and reinforcement, is used in advertising to understand consumer perceptions. Veblen's socio-psychological model argues that individuals shape their desires and behaviors according to the social groups to which they belong or aspire to belong.

In addition to these pioneering studies that infer consumer behavior from basic human behavior, different theories have been proposed to explain consumer behavior directly. One such theory was developed in 1966 by Francesco Nicosia, who specialized in consumer behavior. In his model, consumer behavior is explained through the relationship between the firm and the potential consumer. The model suggests that messages from the firm primarily influence the consumer's inclination toward the product or service, leading the consumer to adopt an attitude toward the product. If this process, which prompts the consumer to search for or evaluate the product, satisfies the consumer, the product is purchased. This process consists of four areas: company and consumer characteristics, evaluating the product and considering alternative options, purchasing action, and feedback (Jisana, 2014).

Based on the 1968 study by Engel, Kollat, and Blackwell, the consumer decision-making model suggests that the consumer decision-making process consists of

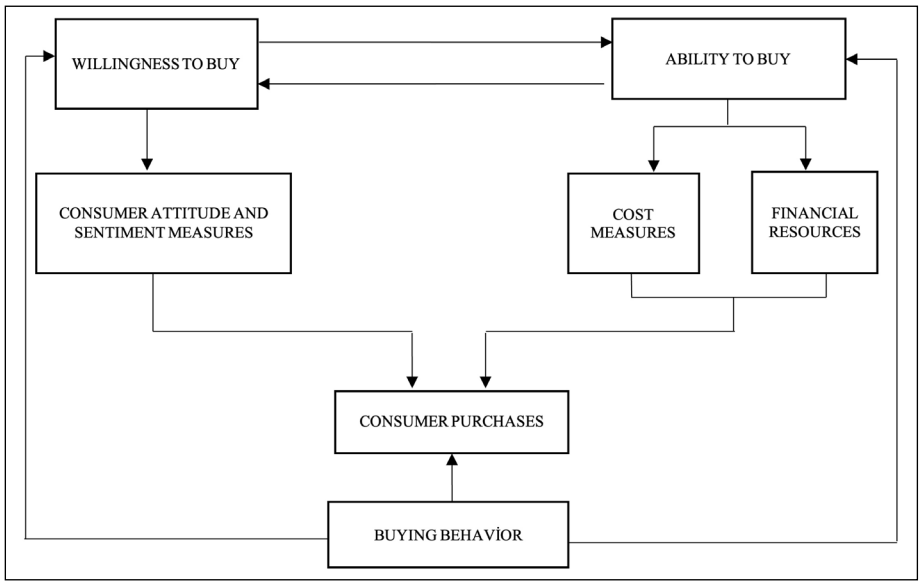

Figure 1. Operationalization of Katona's framework (Kumar et al., 1995)

environmental influences (culture, social class, personal influences), individual differences (consumer resources, motivation, and involvement, knowledge, personal values), and psychological processes (information processing, learning, attitude, and behavior) (Rodrigues, 2006). The Howard-Sheth (1969) theory of buyer behavior proposed that various social, psychological, and marketing elements influencing consumer choices integrate into a coherent information-processing process. The model aims to explain consumer behavior in terms of cognitive functioning, while also providing an empirically testable description of these behaviors and their consequences. The theory includes four groups of variables: inputs, perceptual structures, learning structures, and outputs (Foxall, 1990). Unlike the Howard-Sheth and Engel-Blackwell models, Bettman's (1970) information processing approach does not involve constructing a comprehensive model of consumer behavior but rather focuses on how consumers acquire and use information. This approach is based on three basic elements: a memory consisting of a group of signs, some simple processes that work with these signs, and a network representing the rules that link the signs together. Accordingly, the decision process involves the sequential use of this group of signs, which are categorized into three basic groups: selection-oriented features, environmental features, and cognitive variables (Albayrak & Aksoy, 2008).

The importance of consumer behavior has led to the development of many theoretical approaches aiming to explain it. However, another important aspect is measuring consumer satisfaction with the overall state of the economy.

According to the psychological economics theory put forward by George Katona, the founder and one of the most important advocates of behavioral economics, "ability to buy," an objective factor, and "willingness to buy," a subjective factor should be considered for understanding consumer behavior. According to Katona, the decisions that determine the purchasing behavior of consumers depend on the "ability to buy," which is determined according to cost criteria and financial resources, and the "willingness to buy," which is determined according to the psychological state of the consumer during the decision-making period. Emotions and thoughts shape consumers' psychological state, which is critical for understanding consumer behavior (Kumar et al., 1995).

To better understand consumer behavior, it is essential to recognize that the willingness to buy is a subjective element influenced by factors such as feelings and thoughts, whereas the ability to buy is determined by more objective factors like cost criteria and financial resources. As illustrated in Figure 1, these subjective and objective factors play crucial roles in the purchase decision-making process. To effectively analyze consumer behavior, confidence indices can be utilized to provide valuable information on the consumer's propensity to buy, which is a crucial but often unobservable aspect of the purchasing process.

Consumer Confidence Index

The chief problem in the domain of behavioral economics is the elucidation of the "willingness to buy" element, a subjective and hard-to-observe factor. To quantify this element, in 1952, under Katona's

guidance, the University of Michigan Survey Research Center conducted research on consumer behavior and expectations. By using findings obtained from consumers via questionnaires, the groundwork for the discipline known as behavioral or psychological economics was established. These investigations demonstrate that modifications in household saving and spending practices are influenced by the assumption that changes in economic factors, such as incomes, taxes, and prices, as well as future incomes and employment security, may also depend on the household's perception of the economy, that is, consumer behavior (Zagórski & McDonnell, 1995).

Katona (1968) rejected the notion that consumer behavior is solely based on rational decision-making, with the theory of consumer behavior that he proposed. According to Katona, while realistic decisions made after carefully calculated alternatives are the exception rather than the rule, this does not imply that consumer behavior is irrational. Katona's theory posits that changes in tastes should not be viewed as external factors and that a dynamic theory aimed at explaining changes in behavior should include changes in tastes, preferences, and attitudes. Additionally, the theory argues that rather than assuming that consumers will maximize their future satisfaction or constantly do what they believe is best for them in the present, the key consideration should be what has changed from the past to the present when determining the best options. Finally, Katona's proposition that permanent income is the primary determinant of households' consumer spending rejects the determinant role of current income. This proposition is particularly applicable in societies where people's status is determined by birth and class, and where people believe they have the power to create change in their environment. However, in a dynamic society where significant changes can occur frequently and individuals have more control over their lives, Katona's approach may not be entirely suitable (Katona, 1968).

The question of whether spending reflects positive emotions in consumers or whether increased spending generates positive emotions in consumers is critical to understanding and predicting consumer decision-making dynamics (Kumar et al., 1995). Measuring consumer confidence can help to understand this, as well as give important information about the current state and future direction of the economy. Hence, policymakers and economists closely monitor consumer confidence, which they see as a useful economic forecasting tool, and both economic analysts and the news media prominently report the increases and decreases in confidence (Merkle et al., 2004). On the one hand, developments related to economic confidence take place in the media, on the other hand, economic developments that people follow from the media and daily life also affect economic confidence.

Natural and reassuring economic evaluations are based on economic realities, and there are many arguments to support this claim. Generally, people are more optimistic about the current period and the future when the present situation looks good, and vice versa. For example, if inflation is climbing or unemployment is reaching double digits, views on the economy will become more pessimistic. However, when the leading economic indicators give positive signals for the future, households' expectations for the economic future will improve. Again, an increase in interest rates will raise concerns about the current situation of the economy and doubts about the future. Many variations like this can be mentioned, but the result will remain the same: economic conditions are the basis for economic realities (De Boef & Kellstedt, 2004).

The main question of our study is based on this idea. Namely, which economic indicators cause the consumer confidence index, which is an important measurement that shows the situation of the economy and reflects the consumer's perception of confidence?

DATA AND METHOD

Data

In the study, we used the Consumer Confidence Indicator (CCI) as a confidence index variable. CCI shows the results of the surveys conducted with the cooperation of the European Statistical Office (Eurostat) and the statistical institutions of the relevant countries. CCI data was generated with the difference between positive (+) and negative (-) answers given to the questions in this survey as a balanced index. If the index result is positive (+), it is possible to say that the consumer's perspective on the economy in the relevant country is positive. If the result is negative, the opposite can be argued.

In this study, we have analyzed seven different indicators that could be the cause of consumer confidence. In selecting these variables, we have given priority to the most basic macroeconomic indicators of national economies. These basic macroeconomic indicators are undoubtedly the variables whose impact is most readily felt by consumers in their daily lives and whose changes are most easily tracked through the media. Therefore, we

believe that there is a significant relationship between changes in these variables and changes in consumer perceptions of confidence.

The first of these basic indicators is inflation, which is also used by Ramalho et al. (2011), Neisingh and Stokman (2013), Sartell (2014), and Kim (2016). Unemployment, our second preferred macroeconomic indicator, is also used to explain the consumer confidence index in Sartell (2014), Kim (2016), Vanlaer et al. (2020). We believe that economic growth is an important variable in driving consumer confidence. Therefore, we used the industrial production index variable to represent growth in this study as in Çelik et al. (2010), Ramalho et al. (2011), and Paradiso et al. (2014). The last macroeconomic indicator that we think may cause consumer confidence is the exchange rate variable used in Ramalho et al. (2011) and Oduh et al. (2012).

Again, many studies in the literature have used the stock market (Beltran and Duree, 2003; Çelik et al., 2010; Sartell, 2014; Kim, 2016) to examine the relationship between the financial market and the consumer confidence index. For these reasons, we have included the stock market index variable in the study. We believe that developments in the financial market are an important reason for consumers' perceptions of confidence, as many consumers are actually involved in it or are directly affected by it. One of the non-economic indicators we use in the study is the election period variable, which is also preferred in the literature (Vuchelen, 1995; Ramalho et al., 2011). We therefore believe that consumer-oriented government policies, which are likely to be implemented in the periods leading up to the elections, may be the reason for the changes in consumer confidence. The last non-economic variable we include in the study is the terrorist attacks variable. We believe that the security concerns experienced by households during periods of intense terrorist attacks in EU countries also cause changes in consumer confidence. To use this variable, we are inspired by the work of Graeff (2002) and Garner (2004), who examine the impact of the 11 September attacks in the United States on consumer confidence, and Brodeur (2017), who looks at a more recent period.

We used the rate of the Harmonized Index of Consumer Price (HICP) whose base period is 2015=100, for the inflation indicator. For the unemployment indicator, we used the unemployment rate according to the ILO definition, which is formed by dividing the number of unemployed in a certain period by the total labor force in the same period. For the exchange rate variable, we used the dollar value of the currencies used in the countries. Since 19 of the 27 countries examined in the study use the Euro currency, the USD/EUR rate was used as the exchange rate variable for these countries.

Maybe the most popular macroeconomic indicator calculated for countries is the Gross Domestic Product (GDP), which also shows economic growth. But this variable is calculated for quarterly data. In the literature, usually Industrial Production Index (IPI) variable is usually used as a proxy variable instead of GDP, for monthly data. Therefore, we used the Volume Index of Production in Industry value (2015=100) as a variable. Another variable that we included in the study is the Stock Exchange Index. These indices are calculated with the prices of stocks and the number of stocks in circulation and reflect the changes in the stock market of the relevant country. In the study, we used the leading index of each country's stock market. The base periods of the indices in each country differ from each other and have been determined by the stock exchange institutions of the relevant countries.

Table 2. Data and sources

Data	Code	UNIT	Sources
Consumer Confidence Indicator	*CONF*	Balance (-100, +100, seasonally adjusted)	Statistical office of the European Union (EUROSTAT) https://ec.europa.eu/eurostat
Harmonized Index of Consumer Price	*CPI*	Index (2015=100)	Statistical office of the European Union (EUROSTAT) https://ec.europa.eu/eurostat
Unemployment Rate	*UNEMP*	% of Labor Force (seasonally adjusted)	Statistical office of the European Union (EUROSTAT) https://ec.europa.eu/eurostat
Exchange Rate	*EXC*	Per USD (monthly average)	OECD.Stat (Eurozone, CZE, DNK, HUN, POL, SWE) https://stats.oecd.org/ X-RATES™ (BGR, ROU and HRV), https://www.x-rates.com/ Exchange Rates UK (LVA, LTU) https://www.exchangerates.org.uk/
Industrial Production Index	*IPI*	Index (2015=100, seasonally and calendar adjusted)	Statistical office of the European Union (EUROSTAT) https://ec.europa.eu/eurostat
Stock Exchange Index	*STOCK*	Index (determined by relevant countries stock market)	Nasdaq Baltic (EST, LVA, LTU), https://nasdaqbaltic.com/ Koyfin (LUX), https://app.koyfin.com/ Investing.com (for others) https://www.investing.com/
Election Period	*ELECT*	Dummy variable (0 to 10)	Generated by authors according the election dates.
Death as a Result of Terrorist Attacks	*TERR*	Number (total)	National Consortium for the Study of Terrorism and Responses to Terrorism (START), the Global Terrorism Database™ https://www.start.umd.edu/gtd/

The study at hand delves into the subject of political election periods and their impact on the consumer confidence index. In choosing the independent variable, we opted for a method suggested by De Boef and Kellsstedt (2004), in which the value increases from 1 to 10 month by month during the election periods and then decreases to 1 during the post-election period due to the honeymoon effect. This approach is deemed suitable for the asymmetric causality method employed in the study, which takes into account cumulative increases and decreases. Moreover, if an early election is called, we assign the value to the election variable from the date of the early election announcement. The specific election periods examined for each country are detailed in Appendix A.

Another important indicator that is thought to influence consumers is terrorist attacks. In this context, we used a common observation for all countries. This fixed variable shows the sum of the civilians who died as a result of terrorist attacks in all EU countries in the month.

We summarize all datasets and sources in Table 2[1].

In summary, we have eight variables. One of them, *CONF*, is our fixed dependent variable. Also, the other seven variables are our independent variables and we analyzed all of them with CONF variables as a binary, separately.

Method

First, we investigated which variables influence consumer behavior in which countries. For this, we used the asymmetric causality analysis, which was developed by Hatemi-J (2012). Second, we classified the analyzed countries according to their similarities, using with the findings obtained in the first stage. We used hierarchical clustering methods for classification.

Asymmetric Causality

It is important to test whether one variable is the leading determinant of another variable. This situation is causality in the meaning of Granger (1969). There are many studies about Granger causality, theoretical and empirical. Frequently, the VAR models are applied to find a relationship of causality. Most of the causality studies in the literature assumed that they have the same effect, both positive and negative shocks. However, this is a very limiting assumption because, in various circumstances, a potentially asymmetrical nature of causal effects may exist. The presence of an asymmetric information concept may be another cause of a potential causality relationship. According to the pioneering studies by Akerlof (1970) and following works by Spence (1973) and Stiglitz (1974), some markets have asymmetric information. Based on this, it can be asserted that it is crucial to use an asymmetrical structure for causality tests (Hatemi-J, 2012).

It is a dominant view in the literature that consumers have asymmetric information. In this study, in which we want to identify the determinants of consumer behavior, we preferred this method because it allows us to include asymmetric information in the analysis.

The idea of transforming data into cumulative positive and negative components is based on Granger & Yoon (2002). However, Granger & Yoon (2002) used this approach for the cointegration test, which they call hidden cointegration. Asymmetric causality extends this idea toward causality analysis. The asymmetric causality approach is based on the following stages:

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^{t} \varepsilon_{1i} \quad (1)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^{t} \varepsilon_{2i} \quad (2)$$

where t=1, 2,…,T and constant y_{10}, y_{20} are the initial values. ε_{1i} and ε_{2i} series are white noise process. Positive and negative shocks are defined as follows, respectively: $\max(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^{+} = \max(\varepsilon_{2i}, 0)$, $\varepsilon_{1i}^{-} = \min(\varepsilon_{1i}, 0)$ and $\varepsilon_{2i}^{-} = \min(\varepsilon_{2i}, 0)$. So, it can be represented as $\varepsilon_{1i} = \varepsilon_{1i}^{+} + \varepsilon_{1i}^{-}$ and $\varepsilon_{2i} = \varepsilon_{2i}^{+} + \varepsilon_{2i}^{-}$. Thus:

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-} \quad (3)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-} \quad (4)$$

representations can be reached. Finally, the positive and negative shocks for each variable can be shown cumulatively as follows: $y_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+}$, $y_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-}$, $y_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+}$ and $y_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}$. In the next step, the causal relationship between these components is tested. Considering the causal relationship on positive shocks, causality test can be applied using the VAR (p) model with assuming $y_t^{+} = y_{1t}^{+} + y_{2t}^{+}$ (and assuming $y_t^{-} = y_{1t}^{-} + y_{2t}^{-}$ for negative shocks):

$$y_t^{+} = v + A_1 y_{t-1}^{+} + \ldots + A_p y_{t-1}^{+} + u_t^{+} \quad (5)$$

where y_t^{+} is a $2\text{x}1$ a vector of variables, v is a 2x1 vector of constant term, and u_t^{+} is $\text{a}2\text{x}1$vector of error term. A is a $2\text{x}2$ parameter vector with r ($\text{r} = 1,\ldots,\text{p}$) (Hatemi-J, 2012).

[1] The business and consumer survey data consists of opinions that may be influenced by events that occur at the same time each year (e.g. certain public holidays such as Christmas or the receipt of extraordinary wage bills at a certain time of the year) and the responses often show seasonal patterns. For this purpose, seasonal adjustment is used in the data (Eurostat, Business and consumer surveys, https://ec.europa.eu/eurostat/cache/metadata/en/ei_bcs_esms.htm , Access on 14.09.2023)

Wald statistics are used to test the null hypothesis that there is no Granger causality between the series. For this, the previous VAR model is defined as follows:

$$Y = DZ + \delta \tag{6}$$

where:

$$\text{y} : = (y_1^+ , \dots , y_T^+) \, [n \times T] \tag{7}$$

$$D : = (v, A_1, \dots , A_p)[n \times (1 + np)] \tag{8}$$

$$D : = (v, A_1, \dots , A_p)[n \times (1 + np)] \tag{9}$$

$$Z_t : = \begin{bmatrix} 1 \\ y_t^+ \\ y_{t-1}^+ \\ \vdots \\ y_{t-p+1}^+ \end{bmatrix} [(1 + np) \times 1] t = 1, \dots , T \tag{10}$$

$$\delta : = \left(u_1^+, \dots , u_T^+\right) \left[n \times T\right] \tag{11}$$

and $H_0 : C\beta = 0$ hypothesis, which shows that there is no Granger causality, can be tested with Wald statistics:

$$W = (C\beta)^{'} \left[C\left(\left(Z^{'}Z\right)^{-1} \otimes S_u\right)C^{'}\right]^{-1} \left(C\beta\right) \tag{12}$$

in here $\otimes$ is the Kronecker product, and C shows the indicator function, which includes restrictions. $\beta = vec(D)$ and vec defines the column stacking operator. S_u, shows the variance-covariance matrix calculated for the unrestricted VAR model on $\left(\hat{\delta}_U^{'}\hat{\delta}_U\right)/(T - q)$ form, and q is the number of lags in each VAR equation. In the Granger causality test, if the series are not stationary, the cointegration relationship between them is tested first, and if there is a long-term relationship between the series, a causality analysis based on the error correction model is performed. If there is no long-term relationship, the causality test based on the VAR model is applied by taking the difference of the series up to the integration level. However, taking the difference in the series may cause a loss of information. Toda and Yamamoto (1995) suggested adding lag to the VAR model as much as the maximum degree of integration of the relevant series to solve these problems (Yılancı & Bozoklu, 2014). Hatemi-J (2012)'s asymmetric causality test is based on the Toda & Yamamoto procedure (Çevik et al., 2017).

Cluster Analysis

Cluster analysis represents a set of methods aimed at classifying the investigated objects into clusters (Dostál & Pokorný, 2009). Cluster analysis provides summarized information with its classification and categorization feature.

There are two types of clustering methods used: hierarchical and non-hierarchical methods. We obtained the data used in cluster analysis through asymmetric causality analysis. Since the obtained data types are "there is causality" or "there is no causality", the dataset is in the form of a binary consisting of "1" and "0". Therefore, we preferred Ward's method for clustering, which has one of the best clustering performances for binary data (Tamasauskas et al., 2012).

Similarity and distance measures in binary data are critical in cluster analysis. The Jaccard distance allows the measurement of asymmetric information on binary variables and the comparison of vector components (Salleh et al., 2012). If the binary variable has the "male" and "female" states, both of which are equally weighted, such as gender, and there is no preference as to which outcome should be coded as 0 and which as 1, such variables are said to be symmetrical. However, if there are situations where the results are not equally important, namely if the presence of one of the binary variables indicates a more important situation, then these variables are asymmetrical. If asymmetrical variables exist, the Jaccard Distance should be used (Kaufman& Rousseeuw, 1990). We used the Jaccard Distance to analyze Ward's linkage techniques because our data type has an asymmetrical structure. The Jaccard Similarity and Jaccard Distance presented in equation 13 and 14, respectively.

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} = \frac{|A \cap B|}{|A| + |B| - |A \cap B|} \tag{13}$$

$$d_J(A, B) = 1 - J(A, B) = \frac{|A \cup B| - |A \cap B|}{|A \cup B|} \tag{14}$$

In this section, we summarized the datasets and methods which we used and applied on Empirical Results section.

EMPIRICAL RESULTS

Results of Asymmetrical Causality Tests

Hatemi-J (2012)'s asymmetric causality test applied is as follows: First, we generated two different same-length series, which represent cumulative positive and cumulative negative shocks using the original series, as Granger and Yoon (2002) suggested. After that, we applied the Hacker and Hatemi-J (2010) symmetrical causality test to variable pairs using these generated variables. This test is applied four each time for each variable pairs. As a result, we obtained four following different asymmetric causality results: The positive component of the X variable and the positive component of the Y variable, the negative component of the X variable

Table 3. Asymmetric causality tests results for CPI, UNEMP, EXC → CONF

	CPI				UNEMP				EXC			
	+/+	-/-	+/-	-/+	+/+	-/-	+/-	-/+	+/+	-/-	+/-	-/+
Belgium	1.010	1.777	0.116	0.341	1.324	0.921	0.788	0.148	0.207	0.442	0.085	0.446
Bulgaria	4.986**	0.302	5.906**	0.149	0.967	1.695	5.832*	0.001	2.051	0.278	0.377	0.052
Czechia	2.837*	1.756	3.115*	1.088	16.224***	0.765	3.927**	2.046	0.584	2.022	0.202	5.381**
Denmark	0.461	0.474	0.012	0.525	0.073	1.881	0.157	0.006	0.123	3.942*	2.156	2.658
Germany	0.573	3.503*	0.267	0.517	0.981	0.162	0.014	1.023	0.175	1.085	0.778	0.000
Estonia	0.346	1.302	6.133**	0.731	4.685**	0.608	0.003	0.038	0.920	0.160	2.319	0.075
Ireland	2.157	0.075	0.000	1.803	0.295	0.511	0.605	9.984**	0.405	0.049	0.015	1.523
Greece	1.797	0.623	1.618	0.028	0.331	2.873*	0.064	3.061	11.608**	0.070	0.173	0.891
Spain	0.000	0.043	0.291	0.180	3.962	3.420	2.042	6.656	2.563	0.082	0.028	0.112
France	0.124	0.028	0.010	0.307	2.523	1.828	1.215	0.360	0.007	0.985	1.960	0.251
Croatia	0.138	0.548	2.074	3.263*	4.676**	2.143	1.785	2.131	0.541	0.009	0.360	0.004
Italy	1.363	6.570***	0.618	1.925	1.354	0.002	0.017	5.321**	1.529	0.054	0.581	1.992
Cyprus	0.001	0.584	1.868	0.743	4.642**	0.662	6.698**	4.203*	0.928	0.384	0.393	5.961**
Latvia	4.632**	0.000	0.972	0.002	8.410*	3.764	12.612***	1.629	0.599	1.607	0.003	0.006
Lithuania	0.922	0.594	0.311	0.917	0.188	0.609	0.217	0.509	1.440	0.412	0.053	1.318
Luxembourg	0.012	0.063	2.003	0.693	0.589	0.313	0.100	0.001	3.515	3.671*	0.040	1.449
Hungary	0.624	0.095	0.001	0.600	0.428	1.460	2.586	0.119	0.125	0.015	0.006	0.000
Malta	5.255	0.537	0.778	2.354	1.848	0.009	3.044*	2.080	1.226	3.208*	2.514	0.001
Netherlands	0.000	0.048	0.121	1.220	2.675	0.204	0.004	0.511	0.837	0.067	0.044	0.650
Austria	2.324	0.134	0.695	0.062	0.430	0.041	0.123	0.004	0.131	0.929	0.833	0.219
Poland	0.266	0.011	0.205	1.673	0.153	2.178	0.256	0.313	1.019	0.667	1.492	0.936
Portugal	0.306	5.779**	1.517	2.940*	0.005	0.163	0.046	6.858**	0.030	0.299	0.132	0.058
Romania	1.399	0.028	0.372	0.635	2.451	0.484	5.805*	0.098	0.118	1.337	0.176	1.329
Slovenia	6.115*	0.020	1.309	1.256	1.089	1.298	0.703	8.283*	4.136	0.096	0.058	2.253
Slovakia	2.16	5.091*	1.091	0.037	14.156***	2.395	0.093	0.869	2.489	0.011	0.001	0.345
Finland	0.161	0.512	0.188	1.695	1.799	5.439**	1.579	0.133	0.39	0.787	1.021	1.986
Sweden	5.426*	0.379	0.103	0.141	0.041	2.472	3.636	3.148	0.012	0.001	0.138	0.241

Numbers show Wald stats and *, **, and *** indicate significance at the 10%, 5%, and 1% level respectively.
In + and – signs, the first sign represents CONF and the second sign represents the other variables.

and the negative component of the Y variable, the positive component of the X variable and the negative component of the Y variable, the negative component of the X variable and the positive component of the Y variable.

We applied the asymmetric causality tests unidirectionally. In other words, we only examined whether there was causality from the Y variable to the X variable, where X represents the CONF variable and Y represents the CPI, UNEMP, EXC, IPI, STOCK, ELECT, and TERR variables. The null hypotheses of causality tests are as follows:

$H_0 : Y^+ \neq> X^+$ There is no causality from the Y^+ variable to X^+ variable. (15)

$H_0 : Y^- \neq> X^-$ There is no causality from the Y^- variable to X^- variable. (16)

$H_0 : Y^- \neq> X^+$ There is no causality from the Y^- variable to X^+variable. (17)

$H_0 : Y^+ \neq> X^-$ There is no causality from the Y^+ variable to X^+variable. (18)

If the Wald statistic obtained through the tests exceeds the critical value of 10%, the null hypotheses are rejected, and it can be argued that there is a causal relationship between the series.

We presented the asymmetrical causality test results in the tables. In the table, the row section shows the 27 EU Countries while the column section shows the test types (+/+, -/-, +/- and -/+). For the test types, the first sign represented the component of the CONF variable, and the second sign represented the component of the other seven variables. Namely column of +/- is shown, from Y^- to X^+ causality results (Eq. 17). In Table 3, we presented the asymmetrical causality test results of from *CPI*, *UNEMP*, and *EXC* to *CONF*.

According to Table 3, there is an asymmetric causality relationship for at least one situation, from inflation indicator to consumer confidence index (CPI → CONF) for eleven countries. These countries are Bulgaria, Czechia, Germany,

Estonia, Croatia, Italy, Latvia, Portugal, Slovenia, Slovakia and Sweden. CPI+ → CONF+ is the most observed relationship type. It does not point out that if the consumer price index increases, the consumer confidence index will increase too. Causality tests answer only the question of whether there is any relationship between X and Y variables or not. If there is a relationship, we cannot learn the direction of the relationship. The direction of the relationship can be positive or negative. Hence CPI+ → CONF+ situation only shows there is a relationship between to positive shocks of CPI and the positive shocks of CONF. Based on our basic economic knowledge, we expect higher inflation rates to worsen consumer confidence. Therefore, our only comment on this situation is that we expect positive shocks in inflation to reduce positive shocks in the consumer confidence index. The other observed relationship types are CPI- → CONF- for four countries, CPI- → CONF+ for three countries, and CPI+ → CONF- for one country. Bulgaria, Czechia, and Portugal consumers are influenced by inflation in two different causality types (Bulgaria and Czechia: CPI+ → CONF+, CPI- → CONF- Portugal: CPI- → CONF-, CPI+ → CONF-).

Table 3 shows consumers in 15 out of 27 countries are influenced by unemployment rates, at least for one situation. Both UNEMP+ → CONF+ and UNEMP- → CONF+ are the most observed situations. Generally, positive shocks in unemployment affected positive shocks in the consumer confidence index, and negative shocks in unemployment affected positive shocks in the consumer confidence index. Also, UNEMP+ → CONF+ and UNEMP+ → CONF- situations observed for 5 and 2 countries, respectively. Cyprus consumers are influenced by three types of causality for unemployment, except UNEMP- → CONF-.

In light of the variables considered, we found that the indicator by which EU consumers are least influenced is exchange rates. Only Czechia, Denmark, Greece, Cyprus, Luxembourg, and Malta consumers are influenced by exchange rates. EXC- → CONF- type was observed for three countries and EXC+ → CONF- was observed for two countries. We presented the asymmetrical causality test results from IPI and STOCK to CONF in Table 4.

Table 4. Asymmetric causality tests results for IPI, STOCK → CONF

	IPI				STOCK			
	+/+	-/-	+/-	-/+	+/+	-/-	+/-	-/+
Belgium	0.036	0.087	1.636	1.948	65.694***	66.116***	0.020	27.751***
Bulgaria	0.798	0.675	0.045	0.882	2.018	0.074	5.871**	1.287
Czechia	2.554	0.264	0.242	0.089	0.476	0.356	0.249	53.024***
Denmark	0.802	0.052	0.484	2.161	0.294	0.298	14.637***	43.731***
Germany	0.720	1.328	0.280	0.152	15.173***	14.007**	0.152	107.995***
Estonia	0.065	0.173	0.100	1.807	28.181***	185.746***	0.211	60.272***
Ireland	0.246	0.101	0.396	0.005	11.078**	11.058**	0.758	8.351*
Greece	0.169	0.000	1.398	0.220	22.437***	17.910***	0.066	15.309***
Spain	0.064	3.493*	2.000	2.817*	32.534***	31.967***	0.006	15.217***
France	3.334*	0.134	0.182	0.339	57.167***	56.560***	0.644	31.497***
Croatia	0.448	0.098	0.541	5.808**	31.507***	32.375***	0.493	15.520**
Italy	0.134	1.500	0.037	2.159	54.344***	54.029***	0.300	171.308***
Cyprus	2.946*	0.002	4.895**	0.825	0.060	0.146	1.517	1.314
Latvia	11.358**	0.053	0.199	0.682	0.353	0.113	1.986	98.429***
Lithuania	0.400	0.187	0.531	2.336	0.869	0.093	1.140	2.825*
Luxembourg	0.800	0.093	0.317	2.182	106.524***	107.100***	7.173**	3.238
Hungary	0.885	6.222***	0.881	0.034	23.897***	23.288***	1.173	66.924***
Malta	1.184	0.001	1.108	0.850	57.199***	28.637***	0.898	29.408***
Netherlands	0.042	0.200	0.079	0.155	2.761*	4.068**	0.086	0.473
Austria	0.445	0.163	3.275*	2.676	87.186***	85.884***	0.057	142.779***
Poland	8.866**	0.278	3.766	0.378	12.174***	12.611***	2.108	3.961
Portugal	0.081	0.678	0.215	0.427	27.602***	26.575***	0.302	24.067***
Romania	0.501	0.224	0.062	0.001	12.456**	10.948**	0.936	14.844***
Slovenia	0.338	0.046	0.002	0.797	5.140**	1.853	2.989*	1325.918***
Slovakia	0.299	0.179	0.723	0.070	0.181	0.688	1.893	0.009
Finland	6.244*	0.966	0.765	5.424*	11.062**	11.049**	1.167	6.566**
Sweden	0.242	1.968	1.358	0.024	66.719**	13.725**	1.068	34.106***

Numbers show Wald stats and *, **, and *** indicate significance at the 10%, 5%, and 1% level respectively.
In + and – signs, the first sign represents CONF and the second sign represents the other variables.

Table 5. Asymmetric causality tests results for ELECT, TERR → CONF

	ELECT				TERR			
	+/+	-/-	+/-	-/+	+/+	-/-	+/-	-/+
Belgium	0.976	0.077	0.553	1.379	3.082*	0.508	1.290	1.174
Bulgaria	5.451**	8.551**	4.878	0.799	1.311	0.382	0.575	0.000
Czechia	2.166	2.097	1.832	0.620	0.608	1.065	2.191	0.283
Denmark	2.400	0.059	5.592*	1.681	0.080	1.259	0.381	2.328
Germany	5.181	0.019	1.234	2.493	6.472**	0.696	0.201	1.391
Estonia	1.190	15.138***	2.223	2.925	0.884	0.871	3.262*	1.245
Ireland	0.775	0.367	1.635	0.135	0.001	0.194	0.626	0.709
Greece	17.454***	6.017*	6.193*	1.662	1.264	0.205	0.056	2.863*
Spain	3.575*	4.204	3.756	0.642	4.812**	6.624**	1.422	0.218
France	3.800	5.331*	3.608	6.744*	0.367	0.611	1.224	0.032
Croatia	1.175	2.572	1.977	1.764	1.079	0.021	1.359	0.458
Italy	1.567	1.018	2.823	1.653	0.773	1.667	0.640	1.737
Cyprus	0.499	0.681	2.306	0.229	1.007	0.043	0.317	0.001
Latvia	0.455	0.191	1.686	1.651	0.499	0.040	0.183	0.338
Lithuania	2.105	0.288	2.729	2.491	0.113	0.171	0.701	0.407
Luxembourg	6.765**	0.506	5.323*	0.225	0.473	0.078	0.027	0.096
Hungary	2.345	2.368	3.914	4.823	0.755	0.140	0.138	0.448
Malta	18.465***	0.955	0.469	0.314	0.248	0.005	0.335	0.139
Netherlands	0.889	23.442***	0.716	1.172	0.697	0.189	0.458	0.325
Austria	0.214	2.384	14.928***	3.106*	0.026	1.300	0.234	0.832
Poland	0.682	0.686	4.322	1.432	0.588	0.230	0.393	0.435
Portugal	1.373	1.882	0.254	0.471	0.010	0.161	0.114	0.024
Romania	1.160	3.146	2.107	0.998	0.035	0.085	0.104	0.242
Slovenia	0.645	1.536	1.506	0.637	0.236	7.698**	1.025	0.007
Slovakia	0.051	2.138	0.219	2.239	0.075	0.670	0.812	0.007
Finland	3.157	3.759	0.795	0.013	3.922**	1.231	2.342	0.117
Sweden	4.062	2.329	0.339	1.334	2.119	0.171	2.502*	0.706

Numbers show Wald stats and *, **, and *** indicate significance at the 10%, 5%, and 1% level respectively.
In + and – signs, the first sign represents CONF and the second sign represents the other variables.

We used the industrial production index indicator as a proxy variable for economic growth. Our results show that nine countries' consumers are influenced by the IPI indicator. The most frequently observed asymmetric causality type is IPI+ → CONF+. IPI+ → CONF- observed for three countries, while the other two types were observed for two countries. Cyprus, Poland, and Finland consumers are influenced by two types of causality, according to Table 4.

We found that the stock exchange indicator is the most influencing indicator for consumers. Except for Cyprus and Slovakia, the other twenty-five countries consumer influenced by stock exchange shocks. We found an asymmetrical causality relationship from positive shocks of STOCK to negative shocks of CONF for almost a whole of twenty-one countries. Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Luxembourg, Hungary, Malta, Austria, Portugal, Romania, Slovenia, Finland, and Sweden consumers are more sensitive to the shock of the stock exchange index. The results are valid for three types of causality in these countries.

Table 5 displays the asymmetrical causality test results from *ELECT* and *TERR* to *CONF*.

As can be seen from Table 5, we found that ten countries' consumers are influenced by election periods. The most observed situations are ELECT+ → CONF+ and ELECT- → CONF-. Positive shocks of the election period represent upcoming election periods and negative shocks of the election period represent exit from the election period. We can argue that, generally, approaching the election period is more effective for positive shocks of consumers, and exit from the election period is more effective for negative shocks of consumers. Greek consumers, who experienced five different election periods between 2012 and 2015, are the most affected consumers by the election periods according to the test results.

Finally, we tested terrorist attacks effects on consumer confidence index. We used fixed variables for all countries as terrorist attack indicators. We found that eight countries' consumers were influenced by terrorist attacks at least on one causality type, while Spain, one

of them, consumers were affected by terrorist attacks on two different causality types.

In summary, it has been observed that the most influential indicator on the consumer confidence index is stock market indices, and the least affecting indicator is exchange rates. The ranking according to the number of countries affected by at least one causality situation for each indicator is as follows: STOCK (25), UNEMP (15), CPI (11), ELECT (10), IPI (9), TERR (8) and EXC (6). The STOCK variable is found to be the cause of consumer confidence in almost all EU countries.

These results are consistent with the findings of Beltran and Duree (2003), Çelik et al. (2010), Sartell (2014), and Kim (2016). Kim (2016), who analyzed different countries as in this study, found a relationship between the stock market and consumer confidence in all ten countries studied. We found the UNEMP indicator to be the cause of consumer confidence in many countries. In addition to Sartell (2014), who found that the unemployment rate is the most important variable explaining consumer confidence, Vanlaer et al. (2020) also confirm this finding. Again, the CPI was the variable that we found to be the source of consumer confidence in most countries. This is in line with Ramalho (2011), Neisingh and Stokman (2013), and Sartell (2014), who found similar results. However, these results on ENEMP and CPI differ from those of Kim (2016), who finds unemployment and inflation as causes of consumer confidence in only two out of ten countries.

In the study, we found the ELECT variable in ten countries and the IPI variable in nine countries as having caused consumer confidence. The ELECT results for these countries are similar to Vuchelen (1995) and Ramalho et al. (2011), and the IPI results are similar to Çelik et al. (2010), Ramalho et al. (2011) and Paradiso et al. (2014). The results show that the TERR and EXC variables are not a source of consumer confidence in too many countries. Garner (2004) concludes that consumers in the United States are resilient to terrorist attacks and their confidence in the economy is not affected. However, Brodeur (2017) argues that successful terrorist attacks have an impact on consumer confidence. The results of our study are in support of Garner (2004) for nineteen countries and Brodeur (2017) for eight countries. Finally, in only six countries was the exchange rate the cause of consumer confidence, similar to Ramalho et al. (2011) and Oduh et al. (2012). In most countries, the results are different from these studies.

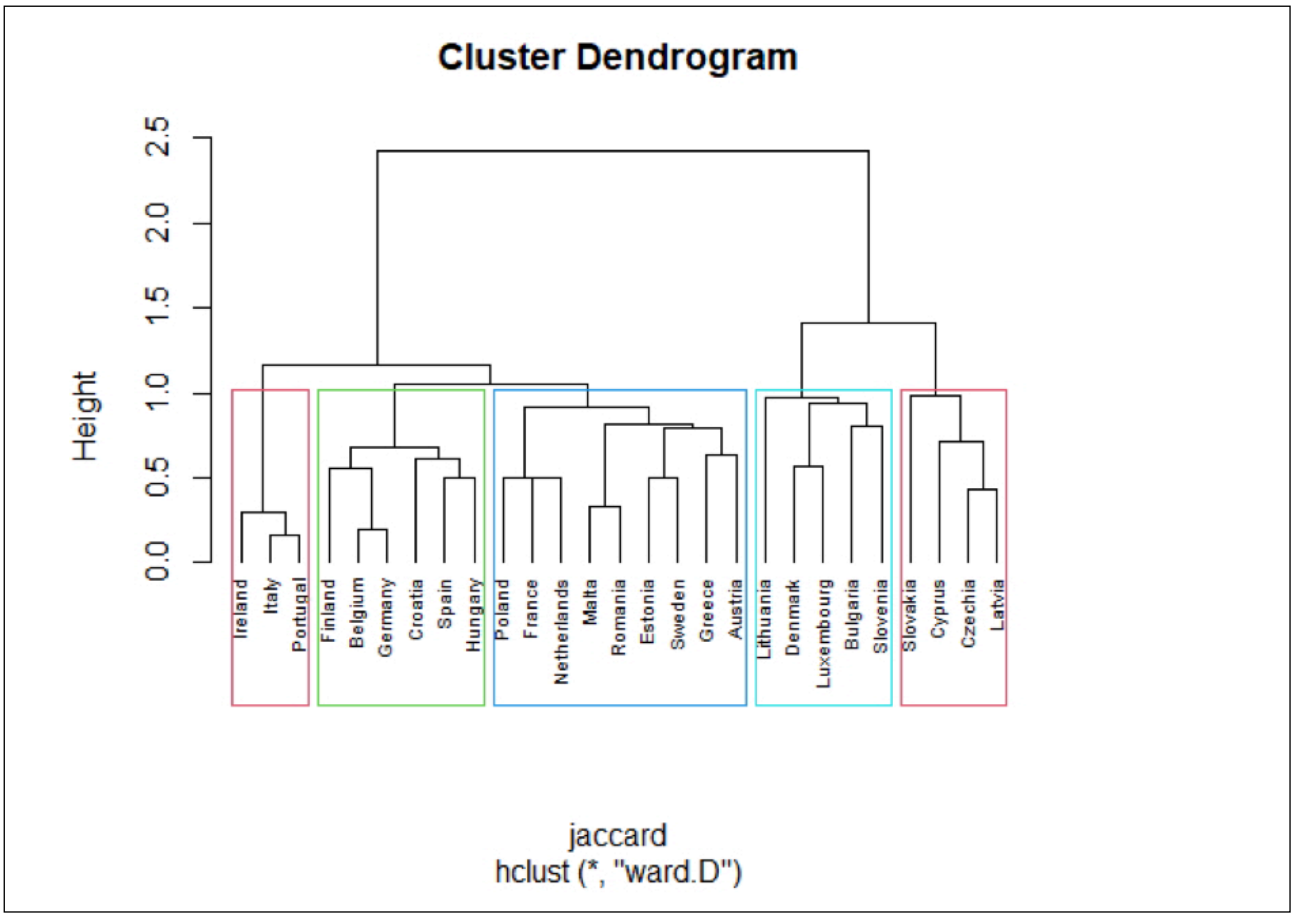

Figure 2: Dendrogram of Ward's linkage cluster analysis according to Jaccard distance

Table 6. Classification of countries

Clusters	Countries
Cluster 1	Ireland, Italy, Portugal,
Cluster 2	Finland, Belgium, Germany, Croatia, Spain, Hungary
Cluster 3	Poland, France, Netherlands, Malta, Romania, Estonia, Sweden, Greece, Austria
Cluster 4	Lithuania, Denmark, Luxembourg, Bulgaria, Slovenia
Cluster 5	Slovakia, Cyprus, Czechia, Latvia

If we look at the results in terms of countries, we found that the countries most affected by the indicators are Estonia and Greece (with five different indicators). In addition, consumers in eight countries are affected by four indicators (Bulgaria, Czechia, Spain, Croatia, Malta, Slovenia, Finland). Among the countries included in the study, just consumers of Lithuania were affected only by one indicator. Also, consumers in Belgium, Ireland, Hungary, Netherlands, Poland, Romania, and Slovakia are affected by only two indicators.

Results of Cluster Analysis

In this section, we used asymmetric test outputs for cluster analysis. Outputs have binary data structure with or without asymmetric causality (1,0). We used seven different variables for testing of asymmetric causality relationship with the consumer confidence index. For all variables, we tested four different situations (+/+, -/-, +/-, and -/+). Therefore, we have 28 observations and 27 countries for cluster analysis.

We preferred a hierarchical cluster analysis method Ward's linkage technique, which is fit for work with binary datasets. Also, we used the Jaccard Similarity measure to distance. In Figure 2 we presented a Dendrogram of clustering and in Appendix B, we presented a distance matrix for Jaccard distance.

As seen in Figure 2, all countries belong to the different clusters at the first stage while they belong to the same cluster at the last stage. For classification, we considered a scale between the first stage and the last stage. Each colored area in Figure 2 shows a different cluster. Peak points of area are the same height degree and below the peak point shows the same cluster countries. We found five clusters for twenty-seven

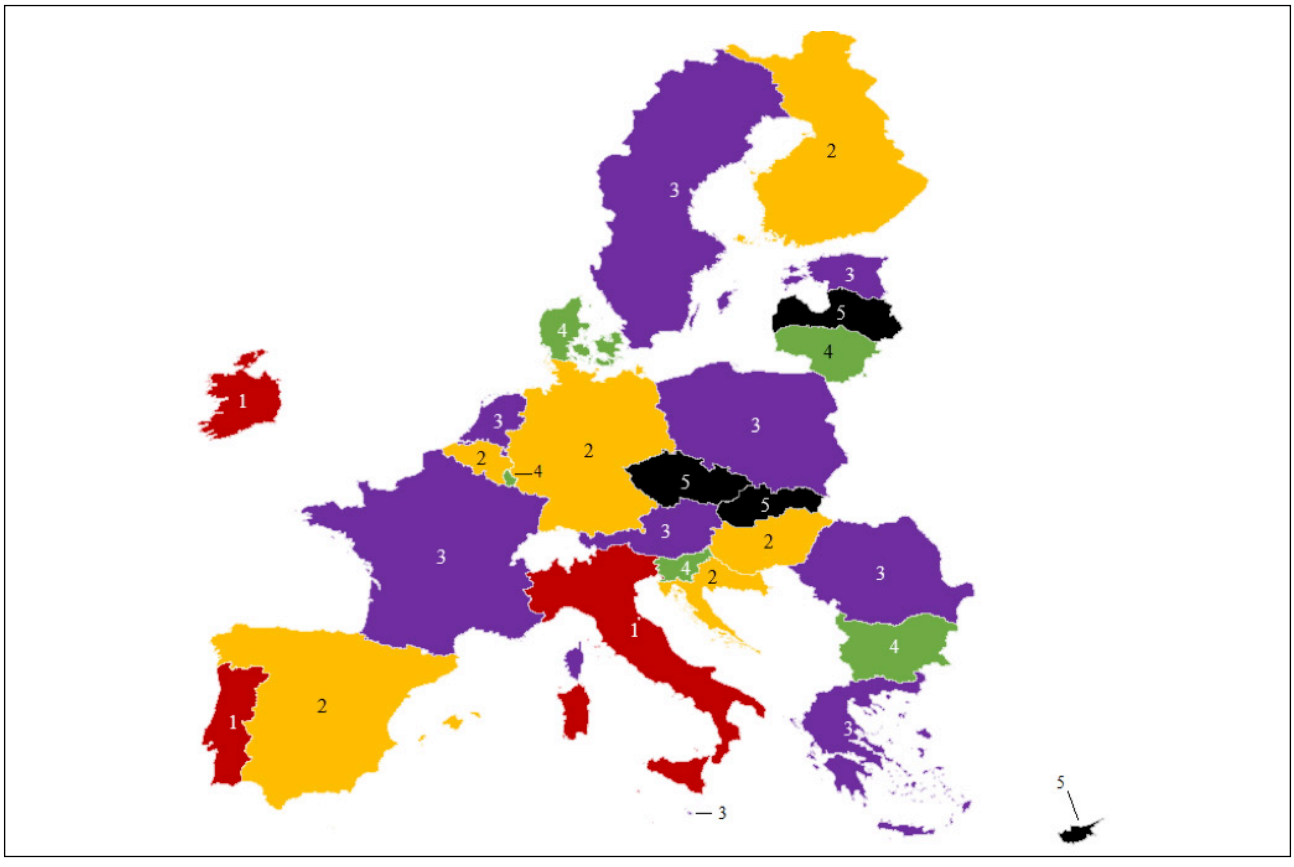

Figure 3: EU countries by clusters in consumer confidence index

countries. A listing of clustering countries can be seen in Table 6.

Cluster 3 has nine countries, Cluster 2 has six countries, Cluster 4 has five countries, Cluster 5 has four countries, and Cluster 1 has three countries. Cluster member countries are shown in the map in Figure 3 according to their clusters.

As it can be observed from the map, it is possible to assert certain regions where the countries in the same clusters gather geographically, albeit partially. For example, Cluster 1 countries are in South Europe mostly, all Cluster 5 countries are in East Europe, and all Balkan countries are clustered in Cluster 2, 3, and 4. In addition, Cluster 2 countries Belgium with Germany and Croatia with Hungary have a land border. Also, In Cluster 5, Czechia and Slovakia have a land border (they were founded after the dissolution of Czechoslovakia in 1993). Though Cluster 1, 3, and 4 countries are within the same clusters, but cluster countries haven't any land border. Previous section, we mentioned that the countries most affected by the indicators are Estonia and Greece. Also, these countries are in the same cluster. Last, most of the countries, that have the least influencing indicator on the consumer confidence index, clustered in the first three clusters.

CONCLUSION

In the study, we investigated the factors that determine the consumer confidence index in EU countries through 7 variables that are thought to influence consumer confidence. For this, we first applied asymmetric causality tests to the data between 2012M01-2019M12. Then, we performed a clustering analysis using the outputs obtained from there. Thus, in the first stage, we determined which variables are effective on consumer behavior in which countries. In the second stage, we classified countries according to similarities and differences in consumer behavior.

According to the asymmetric causality results, the variables that most influence consumer confidence in the country are stock market indices, unemployment, and inflation. The stock market is a primary avenue for consumer investments, while employment status is a key determinant of consumer income. Additionally, inflation significantly impacts the proportion of consumers' income that is spent. Consequently, changes in consumer confidence are expected to be driven primarily by these variables, which directly affect income, investments, and spending. We believe that consumers' initial reactions to the state of the economy are shaped by these indicators, which they frequently encounter in their daily lives.

According to our findings, the other variables analyzed in the study (election periods, industrial production index, terrorist attacks, and exchange rate) are not as important as the other three variables for consumer confidence in EU countries. The common feature of these four variables is that they are indicators of a more general situation, rather than the situations that consumers immediately encounter in their daily lives. We find it interesting that terrorist attacks and exchange rate variables in particular cause consumer confidence in very few countries. This is because while we calculated the terrorist attacks variable jointly for all EU countries, we calculated the exchange rate variable jointly for nineteen Euro area countries. In other words, consumers are more likely to react to developments that directly affect their own country than to situations that affect several countries at the same time. We also found it remarkable that consumers react less to variables that do not directly affect their financial situation, such as the election period and the industrial production index, than to variables that affect their daily economic life. As a result, it can be said that EU consumers' perceptions of confidence more react to individual rather than collective developments. This is consistent with the finding by Vanlaer et al. (2020) that consumers' confidence in their financial situation has a much greater impact on their savings than their confidence in the general economic situation. We believe that these findings make an important contribution to the literature and will shed light for other researchers to research the cause of the individuality/collectivity difference.

Hatemi-J (2012) Asymmetric Causality Test considers the importance of asymmetric information. Also, it detects causality between different components of the series, which symmetric is a test that can't detect. Thus, it was possible to examine the factors determining consumer confidence in more detail. Also, in this way, the data used in cluster analysis included information between different components. We believe this situation adds the unique characteristics of the consumers to the analysis at the classification stage.

As a result of the cluster analysis, we detected the existence of five different country groups. Some of these groups include countries with similar geography and culture. This is illustrated by the fact that all the countries in Cluster 5 are in Eastern Europe. We also found that two of the three countries in Cluster 1 are

in Southern Europe. Especially for the countries in these two clusters, it can be said that consumption patterns are similar within the cluster. However, it is not yet possible to say that there is a sharp distinction between all countries. This is because we have found that some countries that are culturally and geographically distant from each other are in the same clusters. Accordingly, we believe that the most important factor determining the classification results is the current economic structures of the countries. In other words, some countries are geographically and culturally different, but similar in terms of consumer behavior. Therefore, we believe that successful policies to boost consumer confidence in one of the countries in the same cluster, which at first sight appear to be in different circumstances, can be implemented in other countries. Unlike other studies, we believe that this study will contribute to the consumer confidence index literature by grouping countries according to consumer behavior.

The most important limitation of the study is that it does not address the COVID-19 period. We believe that the epidemic situation, which developed suddenly and affected the entire world, has radically affected the emotions and thoughts of consumers. Therefore, we limited the dataset period in this study to analyze the pure effect of economic, social, and political indicators. In future studies, we suggest researchers analyze how the pandemic period affects consumer behavior. In addition, it can be studied what changes have occurred in the effects of analyzed indicators on consumer confidence after the pandemic period. Moreover, researchers who want to examine the factors affecting the behavior of consumers living in different countries according to changes in periodic periods instead of an asymmetric approach can conduct a similar analysis with the frequency-domain causality test method proposed by Breitung & Candelon (2006).

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Appendix A

Table A. Election Periods

Countries	Election Type	Election Dates	Explanation
Belgium	Federal Elections	25.05.2014 26.05.2019	
Bulgaria	Parliamentary Elections	12.05.2013* 05.10.2014** 26.03.2017***	* Early Election (Election Announce: 28.03.2013). Normal election time was 2013/July. Hence, we added dummy variables since 2012/October (from 1 to 10). But with the early election announcement dummy variable increased from 5 to 8. Since, election month dummy variables must be 10. ** Early Election (Election Announce: 10.06.2014). *** Early Election (Election Announce: 14.11.2016)
Czechia	Legislative Elections	26.10.2013* 21.10.2017	* Early Election (Election Announce: 26.08.2013). Normal election time was 2014/May. Hence, we added dummy variables since 2013/August. But with the early election announcement at the end of August, dummy variable increased from 1 to 9 with the 2013/September. Since, election month dummy variables must be 10.
Denmark	General Elections	15.09.2011 18.06.2015* 06.06.2019	* Early Election (Election Announce: 18.06.2015). Normal election time was 2015/September. Hence, we added dummy variables since 2014/December. But with the early election announcement at the end of May, dummy variable increased from 6 to 10 with the 2015/June.
Germany	Federal Elections	22.09.2013 24.09.2017	
Estonia	Parliamentary Elections	01.03.2015 03.03.2019	
Ireland	General Elections	26.02.2016	
Greece	Legislative Election	06.05.2012* 17.06.2012** 25.01.2015*** 20.09.2015**** 07.07.2019*****	* Early Election (Election Announce: 04.11.2011). ** After the 2012/May election, a government could not be formed. A month later, the election was held again. *** Early Election (Election Announce: 31.12.2014). **** Early Election (Election Announce: 20.08.2015). ***** Early Election (Election Announce: 26.05.2019). Normal election time was 2019/September. Hence, we added dummy variables since 2018/December. But with the early election announcement at the end of May, dummy variable increased from 6 to 9 with the 2015/June.
Spain	General Elections	20.11.2011 20.12.2015 26.06.2016* 28.04.2019** 10.11.2019***	* Early Election (Election Announce: 06.04.2016). ** Early Election (Election Announce: 13.02.2019). ** Early Election (Election Announce: 17.09.2019).
France	Presidential Elections	06.05.2012 07.05.2017	
Croatia	Parliamentary Elections	04.12.2011 08.11.2015 11.09.2016*	* Early Election (Election Announce: 15.07.2016).
Italy	General Elections	25.02.2013 04.03.2018	
Cyprus	Legislative Elections	22.05.2011 22.05.2016	

Latvia	General Elections	17.09.2011 04.10.2014 06.10.2018	
Lithuania	Parliamentary Elections	28.10.2012 23.10.2016	
Luxembourg	General Elections	20.10.2013* 14.10.2018	* Early Election (Election Announce: 10.07.2013).
Hungary	Parliamentary Elections	06.04.2014 08.04.2018	
Malta	General Elections	09.03.2013 03.06.2017*	* Early Election (Election Announce: 01.05.2017).
Netherlands	General Elections	12.09.2012* 15.03.2017	* Early Election (Election Announce: 23.04.2012).
Austria	Legislative Elections	29.09.2013 15.10.2017* 29.09.2019**	* Early Election (Election Announce: 10.05.2017). ** Early Election (Election Announce: 18.05.2019).
Poland	Parliamentary Elections	09.10.2011 25.10.2015 13.10.2019	
Portugal	Legislative Elections	05.06.2011 04.10.2015 06.10.2019	
Romania	Legislative Elections	09.12.2012 11.12.2016	
Slovenia	Parliamentary Elections	04.12.2011 13.07.2014* 03.06.2018	* Early Election (Election Announce: 05.05.2014).
Slovakia	Parliamentary Elections	10.03.2012 05.03.2016 29.02.2020	
Finland	Parliamentary Elections	17.04.2011 19.04.2015 14.04.2019	
Sweden	General Elections	14.09.2014 09.09.2018	

Appendix B

Table B. Distance Matrix for Jaccard Distance

	BEL	BGR	CZE	DNK	DEU	EST	IRL	GRC	ESP	FRA	HRV	ITA	CYP	LVA	LTU	LUX	HUN	MLT	NLD	AUT	POL	PRT	ROU	SVN	SVK	FIN	SWE
BEL	1.000																										
BGR	1.000	1.000																									
CZE	0.833	0.625	1.000																								
DNK	0.800	0.889	0.875	1.000																							
DEU	0.333	1.000	0.857	0.833	1.000																						
EST	0.800	0.889	0.714	0.857	0.833	1.000																					
IRL	0.667	1.000	0.833	0.800	0.750	0.800	1.000																				
GRC	0.857	0.800	0.900	0.750	0.875	0.889	0.857	1.000																			
ESP	0.667	0.909	0.900	0.889	0.714	0.889	0.667	0.800	1.000																		
FRA	0.833	0.900	0.889	0.875	0.857	0.875	0.833	0.778	0.900	1.000																	
HRV	0.800	1.000	0.875	0.857	0.833	0.667	0.800	0.889	0.889	0.875	1.000																
ITA	0.800	1.000	0.875	0.667	0.600	0.857	0.500	0.750	0.750	0.875	0.857	1.000															
CYP	1.000	0.909	0.778	1.000	1.000	0.889	0.857	1.000	0.909	0.900	0.889	0.889	1.000														
LVA	0.800	0.750	0.500	0.857	0.833	0.667	0.800	0.889	0.889	0.875	0.667	0.857	0.750	1.000													
LTU	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000												
LUX	0.857	0.800	0.900	0.333	0.875	0.889	0.857	0.667	0.800	0.900	0.889	0.750	1.000	0.889	1.000	1.000											
HUN	0.750	1.000	0.857	0.833	0.800	0.833	0.750	0.875	0.714	0.667	0.833	0.833	1.000	0.833	1.000	0.875	1.000										
MLT	0.857	0.800	0.778	0.750	0.875	0.889	0.857	0.800	0.800	0.778	0.889	0.889	0.909	0.750	1.000	0.500	0.875	1.000									
NLD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.833	1.000	1.000	1.000	1.000	1.000	0.857	1.000	0.667	1.000								
AUT	0.800	1.000	0.875	0.667	0.833	0.857	0.800	0.750	0.889	0.714	0.857	0.667	0.889	0.857	1.000	0.750	0.833	0.750	0.800	1.000							
POL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.833	1.000	1.000	0.667	1.000	1.000	1.000	1.000	1.000	1.000	0.800	1.000						
PRT	0.800	1.000	0.875	0.857	0.600	0.857	0.500	0.889	0.750	0.875	0.667	0.400	0.889	0.857	1.000	0.889	0.833	0.889	1.000	0.857	1.000	1.000					
ROU	0.667	0.857	0.600	0.800	0.750	0.800	0.667	0.857	0.857	0.833	0.800	0.800	0.857	0.500	1.000	0.857	0.750	0.667	1.000	0.800	1.000	0.800	1.000				
SVN	0.857	0.800	0.778	0.750	0.875	0.889	0.667	0.909	0.667	0.778	0.889	0.750	0.909	0.750	1.000	0.800	0.875	0.800	0.857	0.750	1.000	0.750	0.857	1.000			
SVK	1.000	1.000	1.000	1.000	0.667	1.000	1.000	1.000	1.000	1.000	1.000	0.750	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.750	1.000	1.000	1.000		
FIN	0.600	1.000	0.889	0.875	0.667	0.875	0.833	0.778	0.778	0.750	0.714	0.875	0.900	0.875	1.000	0.900	0.857	0.900	1.000	0.875	0.833	0.875	0.833	0.900	1.000	1.000	
SWE	0.800	0.750	0.500	0.857	0.833	0.857	0.500	0.889	0.750	0.875	0.857	0.667	0.750	0.400	1.000	0.889	0.833	0.750	1.000	0.857	1.000	0.667	0.500	0.571	1.000	0.875	1.000

i ILO: International Labor Organization (United Nations)

ii The rates used for the other 8 countries are as follows: USD/DKK for Denmark, USD/SEK for Sweden, USD/BGN for Bulgaria, USD/HRK for Croatia, USD/CZK for Czechia, USD/HUF for Hungary, USD/PLN for Poland, USD/RON for Romania. Since Latvia started to use the Euro currency in 2014, USD/LVL rates were used in this country until 2014, and USD/EUR rates after 2014. Lithuania started to use the Euro currency as of 2015. Therefore USD/LTL rate was used for Lithuania until 2015, and USD/EUR since 2015.

iii These indices are as follows; Belgium: BEL20, Bulgaria: BSE SOFIX, Czechia: PX, Denmark: OMXC20, Germany: DAX, Estonia: OMXTGI, Ireland: ISEQ, Greece: ATG, Spain: IBEX35, France: CAC40, Croatia: CROBEX, Italy: IT40, Cyprus: CSE, Latvia: OMXRGI, Lithuania: OMXVGI, Luxembourg: LUXXX, Hungary: BUX, Malta: MSE, Netherlands: AEX, Austria: ATX, Poland: WIG20, Portugal: PSI20, Romania: BET, Slovenia: SBITOP, Slovakia: SAX, Finland: OMXH25, Sweden: OMXS30.