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The emotional intelligence behind and beyond meat advertising

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Abstract

Promoting food products is a tough challenge in a competitive market. Promoting meat products is even more so in a society in which opinions are divided between those who support vegetarian or vegan diets and those who still believe in the nutritional benefits of meat. The present study is an attempt to find out how emotional intelligence strategies can be identified in the stylistics and semiotics of meat or meat alternative commercials from different countries and the emotional impact they may have on customers. Special attention has been therefore given to the frequency of words referring to emotions and to the emotionally laden imagery accompanying the commercials. Since each commercial is a subtle interplay of personal awareness and awareness of the others projected on the strongly emerging background of promoting sustainability, it may subsequently lead to changes in perspectives on meat products, food attitudes and food consumption practices.

Keywords: meat commercials, emotional intelligence strategies, advertising stylistics, advertising semiotics

Introduction

Promoting food products has become a sensitive issue especially when it comes to types of food whose production and consumption go against the efforts of promoting sustainability. Promoting meat products is therefore even more challenging since consumers are encouraged to opt for other healthier, more sustainable alternatives, such as plant-based animal product alternatives or white meat instead of red meat (Bryant, 2022; Nelson et al., 2016; Willett et al., 2019).

In the preface of the Greenpeace report *Dissected. The 7 Myths of Big Meat's Marketing*, Alex Bogusky contends that "As America's factory farming system exported the philosophy and technology of maximum animal protein per square foot, the consumer was going to have to step up to the plate and eat more meat." (Delliston, 2021, p. 4) However, this "new factory farm wasn't as humane, healthy or safe as the traditional farming it was replacing" (Delliston, 2021, p. 4) and there is a surprising upsurge in meat consumption: "Overall meat consumption has continued to rise in the U.S., European Union, and developed world. Despite a shift toward higher poultry consumption, red

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meat still represents the largest proportion of meat consumed in the U.S (58%)." (Daniel *et al.*, 2011, p.1)

According to a report published on the site of the Food and Agriculture Organization of the United Nations, the consumption of meat is disproportionately concentrated in the developed countries – 88 kg compared with 25 kg in developing countries (World Agriculture). The increasing demand for meat is directly correlated to a dramatic increase in the level of pollution as well:

> The world food economy is being increasingly driven by the shift of diets and food consumption patterns towards livestock products. […] On the negative side, and in association with policy distortions or market failures, there are environmental implications associated with the expansion of livestock production. For example, through the expansion of land for livestock development, livestock sector growth has been a prime force in deforestation in some countries such as Brazil, and in overgrazing in other countries. Intensive livestock operations on an industrial scale, mostly in the industrial countries but increasingly in the developing ones, are a major source of environmental problems through the production of point-source pollution (effluents, etc.) (World Agriculture)

On this background, the efforts to balance meat consumption with the impact on the environment and the trends in various countries, alternatives such as Impossible Foods in the US have been put forward. The American commercial launched in May 2024 "speaks directly to America's meat-eaters in a tongue-in-cheek style, opening with a 'call-to-action' for them to solve the 'meat problem.' It takes the environmental imperative for people to eat less meat and turns it on its head." (Hamlett, 2024) On the other hand, there is a marked tendency to encourage people to embrace the practice of consuming locally produced meat. Thinking of all the factors contributing to the carbon footprint of meat production – from production and distribution of animal feed to distribution of meat cuts or meat based products – "animal based products are different because their production also represents a well-documented existential threat to humanity itself thanks to a runaway carbon footprint that already represents 19% of all greenhouse gas emissions" (Delliston, 2021, p. 5). It seems like the ideal enterprise would be to cover all the stages locally and thus really come under the umbrella of sustainability as the Greenpeace document authors stipulate "Factory meat's contribution to greenhouse gas emissions and global warming are a scientific fact and watching any industry delay and derail our progress is unacceptable." (Delliston, 2021, p. 5) At European level there are also great

concerns regarding the production of meat products and the impact of the entire chain of production on animals' health and consequently on consumers' health:

> The livestock sector, like much of agriculture, plays a complex economic, social and environmental role. Society expects the sector to continue to meet rising world demand for animal products cheaply, quickly and safely. It must do so in an environmentally sustainable way, while managing the incidence and consequences of animal diseases and providing opportunities for rural development, poverty reduction and food security. (Food and Agriculture Organization, 2009, p. 6)

The present study has therefore been pursued on the background of pervasively emerging policies meant to promote sustainability and has taken into consideration the special focus on encouraging local communities towards sustainable practices of meat production and consumption. It is an attempt to find out how emotional intelligence strategies can be identified in the stylistics and semiotics of meat or meat alternative commercials from Romania, Great Britain and the US and if the discourse aligns with the intention of consolidating the sustainable consumption practices. The commercials were taken from these three different geographical areas since they all entail references to the local, social and cultural context and may shed light on how the consumption of meat or meat substitutes is reflected in social attitudes: Romania as part of the EU and a significant producer of meat products, Britain as a former EU country with a renewed perspective on local production but with an extensively cosmopolitan population, and the US with the most diverse population and acting as a global influencer in the field of heavy meat consumption practices. The aim was to observe how different countries encourage meat consumption while assuring the audience that the meat is produced with the utmost care and sourced locally. On the other hand, the US commercial was chosen to reflect how the reality of consuming too much meat has determined companies to produce plant-based meat, and to highlight the strategies of advertising these products in such a way as to raise the awareness of consumers to the urgent necessity of taking action. Special attention has been given to the frequency of words referring to emotions and to the emotionally laden imagery since the impact is stronger due to all the elements involved: characters and their gestures or facial expressions, and the music that may also contain lyrics that trigger various emotions or emotional memories. The conclusions are meant to raise the awareness of the self of each consumer in the reception process of this type of commercials as well as of the messages delivered to possible consumers on the background of promoting healthy and sustainable eating habits.

1. Emotional intelligence and advertising

Since the launching of the term Emotional Intelligence in the 1990s (Salovey & Mayer, 1990; Goleman, 1995, 1998), many fields – especially those of psychology, pedagogy, leadership and marketing – have focused on the centrality of emotions in people's behaviour and interactions. In their groundbreaking article *Emotional Intelligence* Peter Salovey and John D. Mayer define emotions as:

> … organized responses, crossing the boundaries of many psychological subsystems, including the physiological, cognitive, motivational and experiential systems. Emotions typically arise in response to an event, either internal or external, that has a positively or negatively valenced meaning for the individual. Emotions can be distinguished from the closely related concept of mood in that emotions are shorter and generally more intense. (Salovey & Mayer, 1990, p. 186)

The Four-Branch Ability Model of Emotional Intelligence proposed by John D. Mayer and Peter Salovey in the chapter *What is Emotional Intelligence?* (1997) offers a ranking of abilities from those perceived by the authors as "simple" (Mayer & Salovey, 1997, p. 10) to those that involve higher mental processes. This ability model has been selected as a benchmark in view of its inner complexity since it covers all the areas that have to do with an appropriate grasp of the emotion meaning and meaningfulness in various life contexts. The most basic branch comprising abilities such as Perception, Appraisal, and Expression of Emotion has two very important components, among the four ones suggested by the authors, which can be directly linked to the field of advertising: the "ability to identify emotions in designs, artwork etc." – commercials could easily be included here as a form of art relying on a type of creative, persuasive discourse – through "language, sound, appearance, and behavior" (Mayer & Salovey, 1997, p. 11). Aside from this, there is also the core ability in this model referring to the ability "to discriminate between accurate and inaccurate, or honest versus dishonest expressions of feeling" (Mayer & Salovey, 1997, p. 11). Commercials are such compounds relying on all the elements that wrap the persuasive message in a more complex construct by resorting to everything that appeals to viewers' senses: carefully selected words making up a concise message that can be perceived and processed by the possible consumers in a very short span of time, attentively selected sounds or soundtracks - which may be familiar to a certain targeted group age, and people (characters playing in the commercial) chosen based on certain appearance characteristics and prepared to display the intended behaviour in order to convince the audience.

The second branch of the framework is entitled Emotional Facilitation of Thinking and similarly includes areas that can be easily connected to the world of advertising. Thus, the statement: "Emotions prioritize thinking by directing attention to important information." (Mayer & Salovey, 1997, p. 11) can be taken as a valid strategy behind the design and the making of commercials, the intention being the appeal to emotions in viewers in order to steer their thinking abilities and future decisions in the direction of purchasing the advertised goods. Food commercials – and in this case meat or meat alternative commercials – rely heavily on basic feelings erupting from the need to feed the bodies with aliments that satisfy the necessary protein intake as well as even the most pretentious of tastes. This generating of emotions "on demand" as the authors suggest (Mayer & Salovey, 1997, p. 12) may be perceived from a triple point of view: of the business that aims a certain emotional response in the viewer, the mediation of emotions by means of a certain emotional manifestation in the character playing in the commercial, and the emotions experienced by the viewers while watching the commercial – emotions that may steer their attention to things or aspects that spark their personal interest.

The third branch Understanding and Analyzing Emotions - Employing Emotional Knowledge takes us to an even finer understanding of the mechanisms involved in comprehending the meaning of emotions due to the context in which they appear, the connections between the words used, and the connotations they carry. Moreover, an emotionally literate viewer and consumer will be able to detect nuances of meaning, link facial expressions presented in the commercial to the feelings the protagonists experience and want to express, as well as label those particular feelings accurately. The skill of commercial producers is at its best if they can manage to use emotions in the right context, with the right intensity and appropriate transitions, in order to be convincing enough so that viewers will turn into customers. A very subtle transition named by the authors here is the one from "anger to satisfaction" (Mayer & Salovey, 1997, p. 11) which is clearly the focus of the American commercial analysed in this paper, a commercial that likewise summons the audience to an accurate interpretation of the emotions going counter to the message delivered. According to the authors, the adult or the growing person is able to "recognize the existence of complex, contradictory emotions in certain circumstances" (Mayer & Salovey, 1997, p. 13) which is therefore a skill expected to be displayed effectively especially in circumstances related to contexts or information that will later impact their behaviour as consumers.

The last branch in this spectrum of Emotional Intelligence – Reflective Regulation of Emotions to Promote Emotional and Intellectual Growth – is the one related to more refined abilities, two of which are of particular significance when it comes to the world of perceiving and comprehending

commercials: "Ability to reflectively engage or detach from an emotion depending upon its judged informativeness or utility." and "Ability to manage emotion in oneself and others by […] enhancing pleasant ones (*i.e.* emotions) without […] exaggerating information they may convey." (Mayer & Salovey, 1997, p. 11) While the first one may refer chiefly to the consumer who has to discriminate between the truthfulness of the message, the emotions meant to be triggered and the behavioural intention intended to materialise after watching a commercial, the second one is especially true with respect to the creators of commercials who intend to trigger only pleasant emotions in viewers with the aim of attracting them and winning them as possible consumers and customers. While this may be the case for most commercials and consequently for the Romanian and the British ones in this study, the reverse is also possible as will be seen in the American commercial which may be a reliable testimony to the impact of reversed psychology.

In his book *Emotional Intelligence. Why it can matter more than IQ*, Daniel Goleman, who popularised the concept of Emotional Intelligence, identifies the following positive emotions, each of which can assume various shades of manifestation: love, enjoyment, surprise, hope, and empathy (Goleman, 1995, p. 331–332). These positive emotions may be accompanied or overshadowed by some rather negative ones: anger, fear, sadness, disgust and shame.

The psychologist Paul Ekman also testifies to the universality of several emotions in his book *Emotions Revealed. Recognizing Faces and Feelings to Improve Communication and Emotional Life* and states that "seven emotions each have a distinct, universal, facial expression: sadness, anger, surprise, fear, disgust, contempt, and happiness" (Ekman, 2003, p. 43) which means that these emotions can be easily decoded by anyone: "Each of these emotion terms—sadness, anger, surprise, fear, disgust, contempt, and happiness—stands for a family of related emotions." (Ekman, 2003, p. 75) The author then adds that: "The variations in intensity within each emotion family are clearly marked on the face" (Ekman, 2003, p. 75). What is problematic however, is the specificity of each emotional episode since positive emotions (happiness for example) may have a negative impact on the viewer (happiness perceived as spite, mockery etc.) and negative emotions may elicit positive feelings in the viewers (sadness may give rise to empathy). Probably more relevant for the area of advertising is that "The different types of happiness may be revealed in the timing of this facial expression, but the primary signal system for happy emotions is the voice, not the face" (Ekman, 2003, p. 76). Therefore, the viewer must be aware of how genuine the feeling of happiness manifested by the characters performing in commercials is and if the tone of voice matches the facial expression and thus turns the message into a more convincing one. Furthermore, since "the face more often than the voice gives false emotional messages" (Ekman, 2003, p. 77), it takes the skill of an emotionally

literate person to read the true intentions beyond the faces of people acting in commercials. The speed with which emotions are expressed impacts the decoding time significantly. In the commercials with an external voice, the people in the video material are meant to keep a positive facial expression for the length of the material, as can be seen in the Romanian and the British commercials analysed in this study, whereas in the commercials where the people as such directly address the audience – as will be the case of the American commercial – the viewer has to infer whether there is sincere correspondence between the facial expression and the message conveyed verbally. "Emotion signals emerge almost instantly when an emotion begins. […] As long as an emotion is on, it will color the voice" (Ekman, 2003, p. 73) which is exactly what happens when the message in a commercial is verbalised by the person performing in it. The American commercial sticks to a sort of cultural tradition of acting out, of being there and having one's voice heard while conveying the message with complete emotional involvement, even if the correspondence between what is said and what is meant seems to be a tricky one.

In the commercials in which the message is being transmitted by an impersonal voice – like that of an external narrator – the viewer has to decode the visual input and attach meaning to the facial expressions of people in the commercial. Due to this fact, the facial expression may be perceived as unnatural but perfect for the message it wants to convey – that of the perfect experience the consumers may experience if they purchase or try the specific product being advertised. One way of establishing the truthfulness of the feeling of happiness expressed in all earnestness is by recognizing the Duchenne smile whose genuineness consists in the appearance of the eye wrinkles and the raised cheeks. As Ekman points out: "Our research confirmed Duchenne's assertion that no one can voluntarily contract the orbicularis oculi muscle (it 'does not obey the will'), although it is only part of that muscle that is hard to contract voluntarily." (Ekman, 2003, p. 223) which means that it either takes a very good actor to really express this emotion in relation to what is being advertised or a person who is truly convinced of the quality of the product he or she is advertising and becomes thus a truthful messenger for the specific company or enterprise.

What needs to be added here are the two dimensions identified by Daniel Goleman in his book *Working with Emotional Intelligence* (1998): the Personal Competence which is revealed in abilities such as self-awareness, self-regulation and motivation (commitment and initiative) and the Social Competence which impacts the way we handle relationships. The Personal Competence abilities in discussing the impact of commercials refer mainly to those possessed by the viewers that need this stable knowledge of their preferences and their reaction to something which is being promoted.

Furthermore, knowing what is good for oneself will not only regulate the attitude towards the commercial and its message but also towards the buying impulse that is being targeted.

The Social Competence relies on two broad competencies, one of which is empathy which may be manifested in service orientation and leveraging diversity. From the perspective of advertising, "service orientation: anticipating, recognizing, and meeting customers' needs" and "leveraging diversity: cultivating opportunities through different kinds of people" (Goleman, 1998, p. 33) are the engine beyond any good commercial that strives to have the desired impact on the prospective customers. Having the first step taken by means of advertising the product, further emotionally intelligent interactions with the customers will result in "customers' positive attitudes and behaviours such as satisfaction, product purchase, referral, and loyalty." (Prentice, 2019, p. 6) Prentice sees emotions as the key to "marketing efficiency and financial performance" (Prentice, 2019, p. 8) since advertising relying on emotions "can nurture a strong and lasting attitude and behavioural change in the exposed audience." (Yaseen et al., 2022, p. 273). Seen as a persuasive factor which enhances the effectiveness of advertising (Poels & Dewitte, 2019) emotions may facilitate the rapid recollection of messages as well as the impact these messages will have.

2. Semiotics and stylistics in meat advertising

Semiotics as the study of signs and symbols, in particular of the way meaning is constructed and shared between people through codes, is of particular relevance for the field of advertising. Having an individual as well as a social side, speech can only be conceived in this "bilateral mediation of information" (Saussure, 2011, p. 8). The linguistic unit is a double entity formed by associating two terms which are "psychological and united in the brain by an associative bond" (Saussure, 2011, p. 65-66). The linguistic sign unites a concept and a sound image, therefore the impression it makes on our senses is dependent on the concept both the advertiser and the receiver of the commercial have as well as on the force of the sound modulation based on the intention behind the message. The idea of arbitrariness does not refer only to the relation between the signifier and the signified, but also to the impact of the message comprising the signifiers since the personal experience of people may determine the actual meaning of the message.

In the field of advertising semiotics is closely intertwined with rhetoric even if they "offer a very different approach to consumption phenomena, in focusing their differentiation efforts away from the consumer, and on to the sign systems of ads that the consumer confronts" (McQuarrie & Mick, 2003, p. 193) From the point of view of semiotics, messages are made of signs and delivered

through codes which are sign systems understood by all members of a certain community (Saussure, 2011). In rhetoric, meanings tend to acquire a certain degree of flexibility depending on the communicator, the values it represents and the intention ascribed to the message, as well as on the audience and the level of responsiveness to the message delivered. As Keith Kenney and Linda M. Scott observe:

> …in late 20th-century terms, rhetoric is more clearly aligned with reader response theory and poststructuralism rather than with New Criticism or structuralism or any other essentialist (or formalist) view.
>
> What this "antifoundationalist" theory of communication means for consumer response is extremely important. First, the provisional view of signs (or text) means that no one word or image will be consistently more "effective" than any other—it would depend entirely on the audience and the situation. (2003, p. 22)

Commercials – and in this case meat commercials – as concrete representations of emotional experiences will likely depend on the foreknowledge and previous experience of consumers and rely on their preferences and proneness to respond in a certain individual way. Relying on "elaborated imagery and discursive (verbal) processing" which are "dynamic tools of thought" (Goossens, 2003, p. 134), commercials target a high involvement state with the presented object on the part of the audience. If the represented emotional experience triggers a positive association in someone's mind, then the whole message of the commercial may be welcomed.

The cultural embedding of the commercials plays a significant role as well. The commercials shed light on the trends in a specific society and rely on the communal understanding of certain symbols due to their presence in the daily lives of consumers. Moreover, focusing on the way colours are used in meat advertising, these can be linked with the type of emotions they trigger in the prospective consumers: red and pink trigger positive reactions such as happiness and excitement, red and orange used by certain brands create more excitement, while red affects the metabolism and increases appetite (Khattak, 2021).

> Semiotic analysis looks for cultural 'codes' that are present in a shared understanding of a sector, idea, object, identity or brand. It starts from a principle that everything (colour, music, shape, form, casting, tone-of-voice, etc.) carries meaning – meaning so deeply embedded and culturally accepted that it is often invisible to us unless pointed out. One of the more recognised

> models of applied semiotics is the classification of codes into 'residual, dominant and emergent codes': with dominant codes being the primary point of reference for the subject area – a tacitly agreed 'norm'. 'Red meat = masculinity' would be an example of a dominant semiotic code that is culturally reinforced by brands in the meat industry. It is not a fact, it is a cultural idea. (Delliston, 2021, p. 10)

While in semiotics the sign stands for something limited by the delineation traced by the signified (concept), in stylistics a sign can stand for something else and the receiver needs to decode and co-create the meaning. The stylistic devices also called rhetorical devices are often part and parcel of advertising due to the imagery they deliver and the emotional content they carry. The most frequently occurring stylistic devices in ads and commercials are the metaphors and antithesis (Mihalache & Velescu, 2023, p. 92) as well as rhyme, puns, irony, alliteration, and metonymy. The intention beyond the use of such devices is that of indirectly steering viewers' thoughts in the direction intended by the advertiser as well as finding the links between or bridging the experience of the viewer to the imagined reality presented in the commercial. The expected effects of the use of such devices are those of stirring pleasure, persuading, or reinforcing certain consumer convictions. Along with these cognitive stimulants, the vivid imagery in commercials "relies heavily on nonverbal cues to represent the sensory pleasure, cognitive stimulation, and emotional payoffs derived from consuming the product." (Mulvey & Medina, 2003, p. 225)

The whole construct of a successful commercial relies on the characters' artfulness of persuading through speech, tonality, facial expressions, and gestures. The omnipresent drama in the mass media revealed in commercials (Esslin, 1979) plays a crucial role in the reception of the commercial if it has a convincing plot, characters and a message that triggers emotions in the audience. As will be seen, the Romanian and the British commercials follow a certain story line around some characters that seem to share in a certain experience or life-style, whereas the American one seems to transcend the boundaries of the circles of friends and family and make the advertised attitude towards the advertised product a matter of national interest. The gradual intensification of emotions from the exposition to the rising action and then the denouement which culminates in full satisfaction with the meat or meat substitute product is meant to exercise a convincing force on the viewer. The emotions that can be seen or inferred fall largely in the category of the basic emotions, usually gravitating either around happiness or sadness turned into happiness due to the product, or surprise or anger at something quasi-imposed by the current trends in meat production and consumption. Not to forget the moral lesson or the moralizing principle that can be drawn, especially

from the commercials that display a certain militant attitude, in this case the one pleading for the consumption of meat substitute products.

The setting – as a significant part of the storyline – acts as emotional trigger since it displays the familiar or the otherness that may become part of the knowledgeable context of the viewers. Some furnishings should be there, like the normal things in a kitchen or at a barbeque, supporting the feeling of expectancy, while others emerge as symbols that need decoding such as the insertion of some cultural or social symbols that carry a particular meaning for the present generation: family life, career, community events or involvement etc. The characters' appearance comprising all the elements from clothing to grooming, their gestures – either minimalistic or exaggeratingly obvious, together with the setting of the action and the visual and sound cues "contribute to the characterization to produce a persuasive communication designed to elicit a particular response from an audience" (Mulvey & Medina, 2003, p. 223).

Last but not least, the messages that accompany the visuals and the characters' acting are the core element that challenges the viewer both cognitively and emotionally. The reliance on puns and rhyming lines makes the commercial more memorable especially when the catchphrases refer to previously experienced feelings or states or a desired emotional fulfillment within a similar context as the depicted relationship.

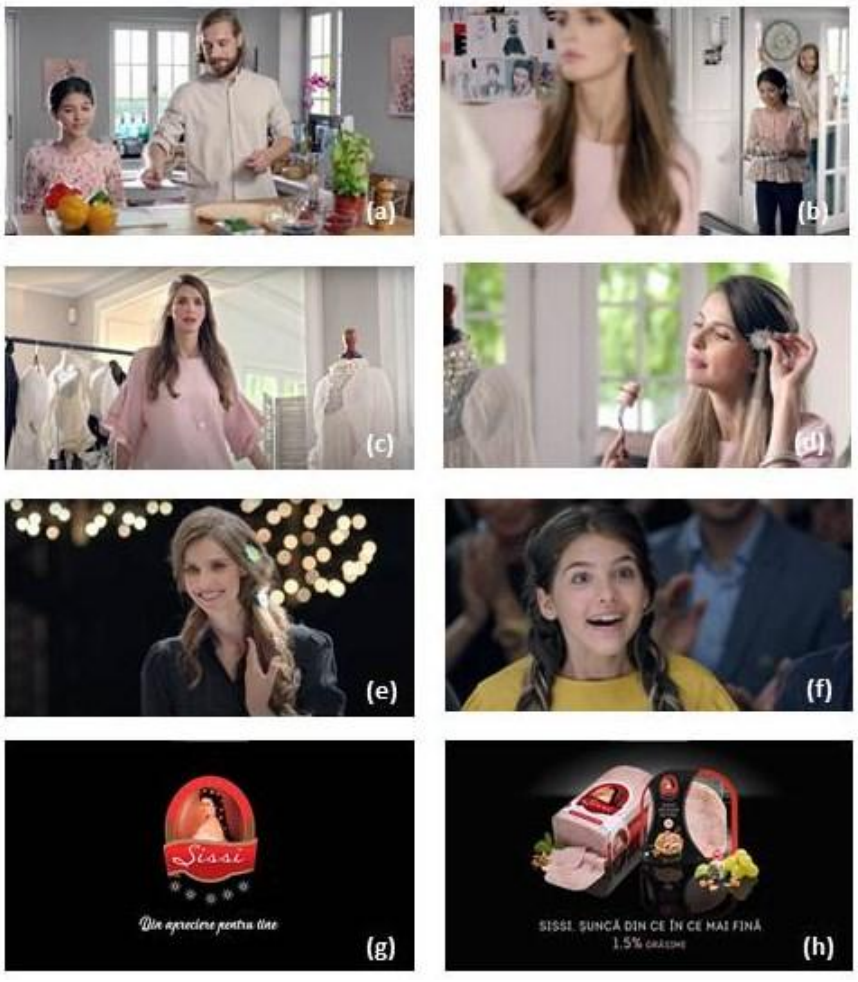
3. A comparative perspective on the emotional and semiotic elements in meat and meat substitute commercials

In order to highlight the correspondence between emotional and semiotic elements in advertising, five commercials, three from Romania, one from the UK and one from the US have been chosen for analysis. All five of them have as the central aim the advertising of meat or meat alternatives. The symbols occurring and the stylistic devices used have been analysed from the perspective of Emotional Intelligence. Special attention has been given to emotions revealed by the characters' facial expressions, the truthfulness in the rendering of emotions and the way facial expressions are consistent with the words used to advertise for the product. Images from the commercials have been elicited in order to supplant the hypotheses with proofs and raise awareness regarding the subtleties involved.

The first Romanian commercial analysed was Sissi – Gestul tau de apreciere (Sissi – Your gesture of appreciation)/ TV commercial (Caroli Foods Group, 2017). The commercial revolves around a young family in which the mother is a busy fashion designer preparing the clothes for a fashion show, while the

daughter is drawing and cutting some paper flowers for her. The daughter will later offer these flowers to her mother together with the sandwiches with ham – the product advertised – which the father is preparing for her. Such a life situation will normally trigger feelings ranging from stress experienced in the preparation of a big event, the joy of offering and receiving as well as the satisfaction one experiences when one's efforts are appreciated. There is an implied feeling of love and appreciation for the work and the needs of others and a coming to meet them in the most refined way. This intermingling of awareness of the Self and of the Other, this mirroring of tastes and the common ground on which complete harmony of taste is achieved is the epitome of an emotionally intelligent commercial.

Figure 1. Images from the commercial Sissi – Gestul tau de apreciere (Sissi – Your gesture of appreciation) / TV commercial



Source: Caroli Foods Group, 2017

The characters in the commercial are silent actors expressing their emotions (joy, surprise, satisfaction) in a very balanced way, while the background song explains in a nutshell the feelings

the family members experience which are intended to convey another message, *i.e.* the one from the producers of the Sissi ham to the consumers, in an attempt to project them in a sort of similar, close relationship like the one of a family. There is – behind the imagery – a promotion of the notion of happy family, with all members looking great, feeling great and doing great things. Not to mention the fact that eating meat will not affect their perfectly slim figure in any way. The images selected from the commercial and included in Figure 1 aim to pinpoint the basic emotions discussed previously: happiness (a, b, e, f), surprise (c, f), satisfaction (d) - which are displayed by the acting people. The verbal messages concluding the commercial Figure 1 (g, h): 'Out of appreciation for you' and 'An ever finer ham.' provide short, memorable input that viewers will carry away and act upon if the entire commercial has managed to be persuasive enough.

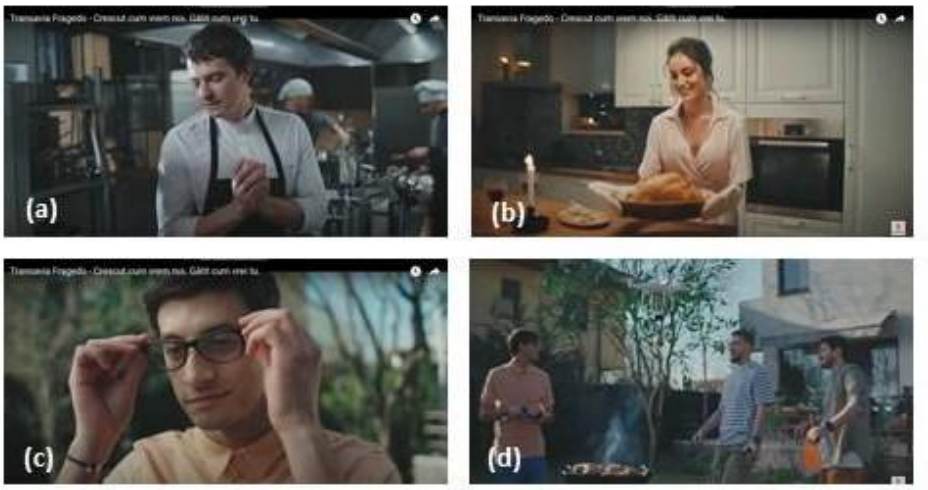
The text of the song sung as the background tune is imbued with words referring to emotions ranging from the deep interpersonal ones to the ones related to the bodily craving for food of superior quality. The love, care and appreciation in the family are also promised by the producers of this ham. Choosing the chanting rhymes will probably have a far lasting effect on the consumers, as they may remember parts of the chant and hum the melody. Everything in the ad aims to keep a kind of high standard of eating practice:

Nu ți-am spus îndeajuns cât	I haven't told you enough how much
te iubesc	I love you
Cât apreciez.	How I appreciate.
Ce e fin, prețuim.	What is fine, we value.
Ce-i sublim, iubim.	What's sublime, we love.
Când simți și crezi, apreciezi.	When you feel and believe, you appreciate.
Ce ți-e drag, mi-e drag.	What is dear to you is dear to me, too.
Mă atragi, te atrag.	You lure me, I lure you.
E real, nu visez, apreciez.	It's real, I'm not dreaming, I appreciate.
Sissi – șunca cu 1% grăsime.	Sissi – ham with 1% fat.
Sissi – din apreciere pentru tine.	Sissi – out of appreciation for you.
Șuncă din ce în ce mai fină.	An ever finer ham.

The fact that the image used on the product is that of the famous Empress of Austria – Elisabeth nicknamed Sisi or Sissi – is meant to trigger new cognitive additions in the viewers with a bit of history knowledge as well as an appeal to the tastes of the more sophisticated consumers. The semiotics is also supportive of the high-class context – a neat, elegant kitchen, a room where elegance

rules in all aspects, and manners that excel in the very preparation of the ham snacks and the gestures of the fashion designer whose taste in this respect is being completely satisfied.

Figure 2. Images from the commercial Transavia Fragedo - Crescut cum vrem noi. Gătit cum vrei tu (Raised as we wish. Cooked as you wish.)



Source: Transavia Romania, 2021

The second Romanian commercial chosen for exemplification is Transavia Fragedo - Crescut cum vrem noi. Gătit cum vrei tu (Raised as we wish. Cooked as you wish.) (Transavia Romania, 2021). Bearing the motto 'Raised as we wish. Cooked as you wish' the commercial appeals to various segments of population in order to highlight the fact that even if the animals are raised and the meat presented as the producer pleases, the meat may be cooked in various ways by various people. Here the characters act as typologies for different categories (Figure 2) who are either very intent on preparing and presenting the best plate in a restaurant (a), indulge in preparing a romantic dinner (b), or enjoy barbeques and outings with very creative friends (c, d). The verbal message is short and offering the warranty of acquired expertise and quality in the field together with the promise that the chicken has been raised by respecting certain norms that comply with expected standards and align with the consumers' previous knowledge and expectations: "For 30 years we have been making the chicken exactly as it should be so that you may do whatever you wish with it. Fragedo chicken - raised as we wish, cooked as you wish."

The emotions on the faces of the characters can be easily discerned in Figure 2: pleasure (a), happiness (b, d), mild satisfaction (a, c) – all of them expressed in an honest way. Concentration can be seen on all faces in the process of cooking and a final feeling of satisfaction with the outcome. The freedom in choosing how to prepare the meat is obvious.

Another commercial from Romania: Dacă faci un lucru, fă-l cum trebuie (If you do one thing, do it right.) - Fragedo (Transavia Romania, 2021) makes use of a well-known tune, *i.e.* Figaro's Aria from The Barber of Seville, sung by a female soprano in which the brand name Fragedo has replaced the original Figaro. It culminates with the slogan: "If you do one thing, do it right." which will resonate with those who know and frequently use the idiom 'if a thing is worth doing, it's worth doing well'. The dominating emotion expressed is that of joy in singing, cooking and presenting the plate in a very appealing way (Figure 3 a, b).

Figure 3. Images from the commercial Dacă faci un lucru, fă-l cum trebuie (If you do one thing, do it right.) - Fragedo

Source: Transavia Romania, 2021

The British commercial Feed your Family for Less with British Pork (LovePorkUK, 2024), apart from pleading for the sustainable consumption of locally produced pork, masterfully anchors the practice of cooking in the present reality: use of gadgets and the promise of immersive virtual reality through various culinary cultures: Chinese or Caribbean. The message beyond it is that man's imagination can be richly triggered by all the ingredients which finally lead to a successful cooking experience.

The verbal input seems carefully chosen to stay with the potential customers. Unlike the accepted cliché, dad is doing the cooking, being projected on the background of a silent family in which the mother is helping the young son do the homework and the older, very neat looking earnest daughter is minding her own phone and homework or study. The monotony of a rather boring evening is pierced by the exotic cooking experience only dad is living, particularly due to his vivid imagination. The lines point to a kind of paternal pride or mastery of the situation, while the slightly changed rhyming reduplication: "easy peasy lime squeezy" supports the idea that this particular challenge is easy to be handled:

> Pork medallions tonight and dad's trying something new.
> Sticky Pork Noodles

Or maybe Caribbean Pork

Now we're talking

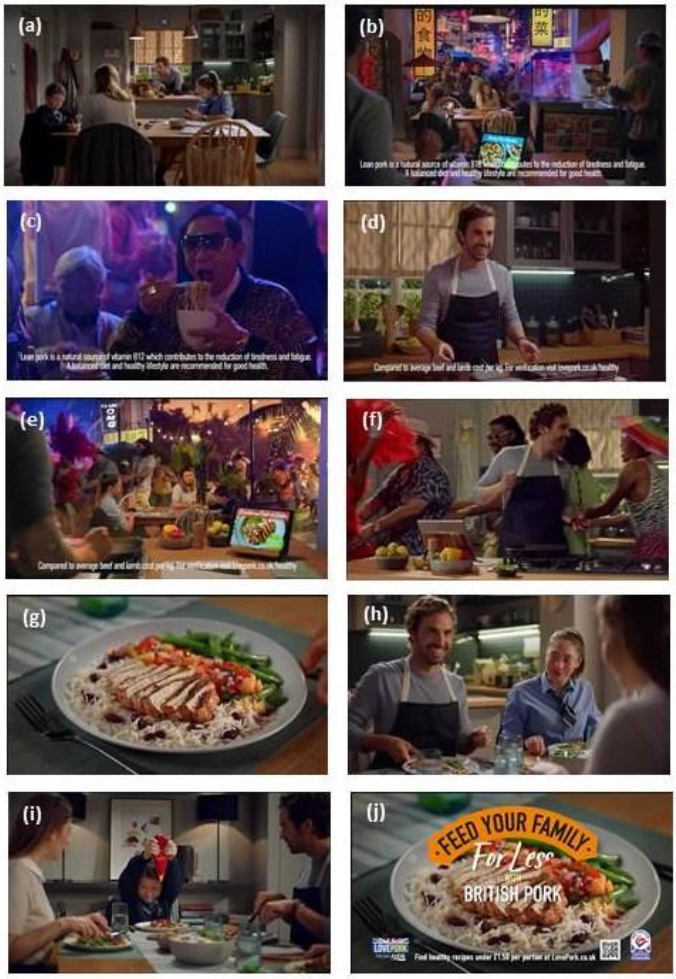
Easy peasy lime squeezy

Who's the Daddy?

Feed your family for less with British pork!

The virtually mediated wishes pierce the cruel reality of the indifferent members of the family (Figure 4 a).

Figure 4. Images from the commercial Feed your Family for Less with British Pork



Source: LovePorkUK, 2024

What is particularly striking in this commercial is the lack of emotional expression on the faces of the family members at the beginning of the commercial. Only the father as the main protagonist seems to be inclined to capture all the feelings on his own face and experience emotional changes whenever the culinary imaginings take him to a different cultural space (Figure 4 b, c, d, e, f). In the end the daughter and the son seem to relish approaching the dish that dad has prepared (Figure 4 h, i, g).

On the other hand, the two dives into the mediated realities bring into the clip people from those particular cultural contexts in an effervescence of moves and sounds, all displaying honest, real joy (Figure 4 f) or rather fake emotional states like the satisfaction of consuming that particular dish by an Asian rich person (Figure 4 c). What the consumers will discover in their own reality is that all the culturally mediated experiences of cooking are intangible and need to be virtually mediated. Besides, what is left when all the glamorous impressions vanish is masterfully rendered by the sound of the ketchup bottle handled by the happy, satisfied boy at the end of the commercial (Figure 4i).

The commercial is intensively appealing to the cognitive abilities of the viewers who will probably remember snippets from it: Who's the Daddy? –overused in the media with various connotations of dominance depending on the context, the phrase easy peasy lime squeezy or even the assonance 'feed your family for (less)' focusing on two essential elements: feed and family (Figure 4j). The written messages accompanying the images in the video are consistent and providing valuable nutritious information: "Lean pork is a natural source of vitamin B12 which contributes to the reduction of tiredness and fatigue. A balanced diet and healthy lifestyle are recommended for good health." and "Compared to average beef and lamb cost per kg. For verification visit lovepork.co.uk/healthy" (LovePorkUK, 2024). What may surprise is the juxtaposition of the two contrasting concepts: British Pork in Chinese or Caribbean dishes, a kind of national production of a product for the sake of sustainably supporting the local economy with an exotic, outside intrusion – although socially very present in the British context – for the sake of taste enhancement.

The American commercial Impossible Foods - We can have our meat and eat it, too (Talihita, 2024) creates a new kind of advertising story by completely reversing the eating practices deeply ingrained in the American culture. The text sounds like a national appeal to a general mobilization in order to find solutions for the problems meat is facing. It sounds like a hilarious turning of tables and although it is meant to steer the perspective towards more sustainable views, it may just have the effect of reversed psychology.

> Listen up America! Meat has problems and it's going to take us meat eaters to solve them. So when the world says: 'Too much meat is bad and we should eat less of it!', we say: 'No, world! We should eat more because now we can turn plants into burgers and hot dogs, even meatballs. Now plants can be meat. Come on, people! Let's punch cholesterol in the face! We're solving the meat problem with more meat. Impossible! Meat from plants! (Talihita, 2024)

Figure 5. Images from the commercial Impossible Foods - We can have our meat and eat it, too

Source: Talihita, 2024

The pace is fast. There is a sort of mild aggressiveness and sarcasm in the verbally transmitted message and the gestures accompanying it (Figure 5 a, b, c, e, g, h). By appealing to the old idiom: 'have your cake and eat it (too)' and reversing it, the viewer may sense a general attempt to turn the tables upside down. The revolutionary way in which the character delivers the message is faithfully matched by the facial expressions (Figure 5 b, c, e, g, h), the emotional hues, and the emotional impact the pitch of the voice may have on the viewers. The personification of meat hints at what the meat

can stand for in the inferred metonymy: the animals are facing problems because of the intensive farming practices and consequently all living creatures suffer from them in the environmentally troubled context. The message is mainly woven around and may stir negative emotions such as: anger, annoyance and dissatisfaction or may be perceived as hilarious – despite its intended seriousness – and trigger unexpectedly mixed emotions: joy mixed with spite (Figure 5 d, f, i, j).

Bewildering are the messages that appear as written text accompanying the verbal input: "Impossible Beef, Hot Dogs and Meatballs are made from plants and contain 0mg cholesterol. Not low in saturated fat. See nutrition panel for fat and sodium content." and "Do not attempt." (Figure 5 g, h, j) The reliance on negatives may make the product seem more attractive, although 'not low in saturated fat' is not a promising incentive for health.

The mechanisms that lie at the core of commercials may ensure a lasting impact on the viewers. The memorable lyrics and images from the Romanian and the British commercials seem to be strongly counteracted by the novelty of the message which is exceptionally powerfully rendered in the American one. The foundation of successful advertising is built on the "six frequently repeated themes — salience, persuasion, likeability, symbolism, relationship, emotion. While none of these in isolation can fully explain how advertising works, collectively they do provide an understanding of the fundamental mechanisms of advertising." (Advertising Mechanisms) From this perspective each commercial presented seems to combine these pillars with a particular preference for those that seem relevant for the geographic and social context it addresses. While the Romanian ones rely more on likeability, symbolism, relationship and emotion, the British one favours salience, relationship and subtle persuasion, and the American one is strongly intent on persuasion and the salient recognition that something needs to be changed in order to reduce meat consumption in an area that tops the statistics in this respect. All of them are thus representative for the global trends in healthy and sustainable consumption practices.

Conclusions

The promotion of food products in general and of meat or meat alternative products in particular is a challenging issue nowadays since advertising has a double role: that of appealing to consumers' senses and emotions as well as to their cognitive abilities and that of aligning itself to the agricultural policies of supporting and promoting sustainability. As observed in the study, each commercial is a complex construct that aims to fulfill this double role by building a story around protagonists meant to act in a way that convinces the public to buy the product. The question that remains is whether

there is genuine correspondence between the intended message and its actual deliverance by the protagonist. The brevity of the commercial (30 to 50 seconds) means that the message has to be very concise and therefore have a stronger and more immediate emotional impact.

The analysis of the commercials presented revealed some of the emotional intelligence strategies employed in commercials. The emotions used have been carefully selected and usually pertain to the basic, easily recognizable ones, so that the audience may instantly feel emotionally and cognitively engaged. Furthermore, the audience may be ethically challenged depending on the type of emotions the creators of commercials choose their characters to display in relation to the things advertised and the life context in which they are placed. The process of engaging the audience starts with the focus on their needs and desires that act as triggers for further acting as consumers wishing to satisfy their own personal culinary desires and needs and those of others – be they the nuclear family (the Romanian and the British commercials) or the extended community (the American commercial in particular). These triggers appeal to senses such as taste since any satisfying gastronomic experience brings a certain feeling of happiness and relies on the interplay of awareness – of Self and Others – in the way food is approached. Being aware of one's needs makes eating a rewarding experience; consuming the right food in the right way with the right people enhances a community spirit of joyful sharing. The persuasive imagery coupled with the choice of words and songs (in the Romanian and the British commercials) and the tone of voice accompanied by direct eye contact (in the American commercial) are meant to appeal to viewers' former experience or projected ideals combined with their knowledge or even repressed emotions or attitudes. All commercials considered in this study inherently rely on mechanisms of motivating the audience to adopt healthy eating practices which either support the local economies or the global trends of sustainable consumption. The fine border between the personal and the social competence in viewing and perceiving a commercial may be obliterated by the force of the commercial to do away with all the personal convictions (regarding consumption, gender roles, cultural inputs etc.) and make the viewer adopt the make believe of the commercial. The suspension of discernment can only occur when the commercial aligns with all the expectations, the knowledge and the value system of the viewers. Regarding the semiotics in the analysed commercials, some occurring objects may summon up diverging associations (e.g. the jewelry of the Asian eater and the rainbow umbrella hat worn by the Caribbean partying lady in Figure 4).

Given the degree of artificiality of emotional display, the viewer has to master both the art of reading faces and making sense of the truthful intentions as well as the art of inferring the meaning behind the verbal message especially when this one relies on stylistic devices such as metaphor, irony,

and puns. According to Mihalache and Velescu "Both Romanian and British commercials are open and tight in the race for the customers' attention." (2023, p. 92) What is more, according to the same study, the British commercials are richer in stylistic devices compared to the Romanian ones, relying heavily on metaphors and antithesis (Mihalache & Velescu, 2023) a fact that has been observed in the present study as well.

Further studies regarding the perception of meat and meat alternative commercials by an audience consisting in students preparing to work in the field of food processing, food control and expertise, and students from the field of Animal Sciences will be performed in order to observe the impact of such commercials on them, their perception of the elements involved in the making of the commercial as well as the way in which they notice the visual, verbal and emotional subtleties. Moreover, for a diachronic perspective, commercials belonging to the same companies and various time frames will be studied in order to analyse the way in which emotions and emotional intelligence strategies are employed.

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The impact of institutional investments and net greenhouse gas emissions on government expenditure

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Abstract

The aim of ensuring to all citizens across the European Union (EU) Member States a quality life from social and economic perspectives became nowadays associated with the environmental aspects, public authorities assuming and targeting in this context more and more the objective of "green economies." In this context, public spending plays a vital role in relation to the quality of the environment and environmental sustainability, with government expenditure being able to influence the behavior of the involved agents. This paper aims to analyze the impact of institutional investments and net greenhouse gas on government expenditure. To evaluate the influence of public spending, we employed the ordinary least squares method and ARDL model (MG-mean group, PMD-pooled mean group estimator and DFE-the dynamic fixed effect model) and data regarding expenditures on education, science, and research and development (R&D) as describing the social side, the greenhouse gas emission variable as describing environmental sustainability and investments expenditures considering their beneficial effect on the economy, while controlling by real GDP per capita and foreign direct investment. Our panel includes data for the 27 member countries of the European Union, the period 2005-2020. The results of our study show that 61.5% of the variation of the general government expenditure variable is explained through the prism of the independent and control variables used in the model. The study demonstrates that the volume of government spending will depend on how government investors place their investments, but also on the amount of greenhouse gas emissions

Keywords: institutional investments, greenhouse gas emissions, government expenditure, European Union countries, ARDL model

Introduction

In today's context, environmental issues have become increasingly important, and the greenhouse effect is a real problem for all the states of the European Union. Thus, the member countries of the European Union act through their policies to reduce carbon dioxide emissions. However, the issue of climate change transcends national borders. Addressing climate change and its negative effects requires international cooperation. In this regard, world leaders concluded the Paris

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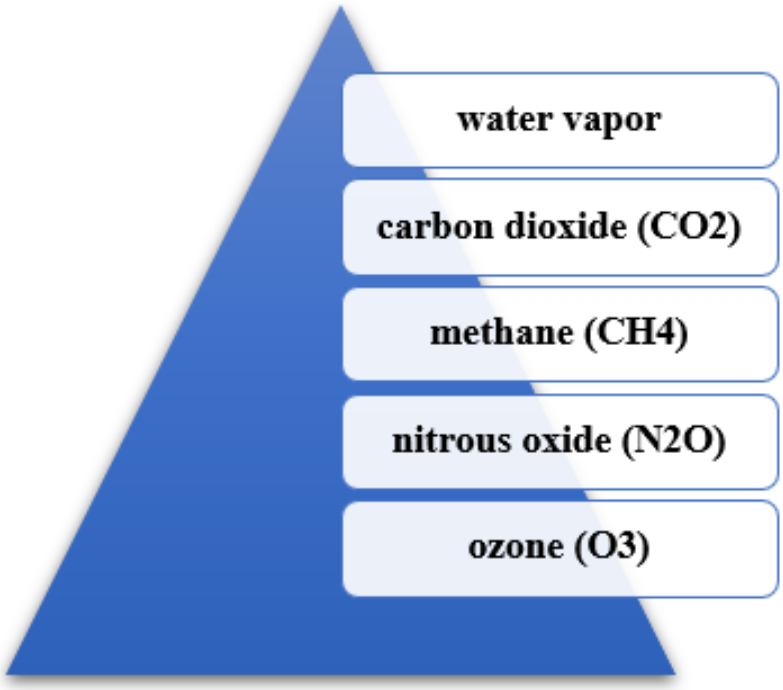
Agreement in 2015 at the UN Climate Change Conference (COP21). This international agreement "includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change and requires countries to strengthen their commitments over time" (Delbeke et al., 2019, p. 36).

The main greenhouse gases in the Earth's atmosphere are presented in Figure 1. The main evening-effect gases found in the Earth's atmosphere that contribute to global warming by absorbing and trapping infrared radiation are illustrated in Figure 1.

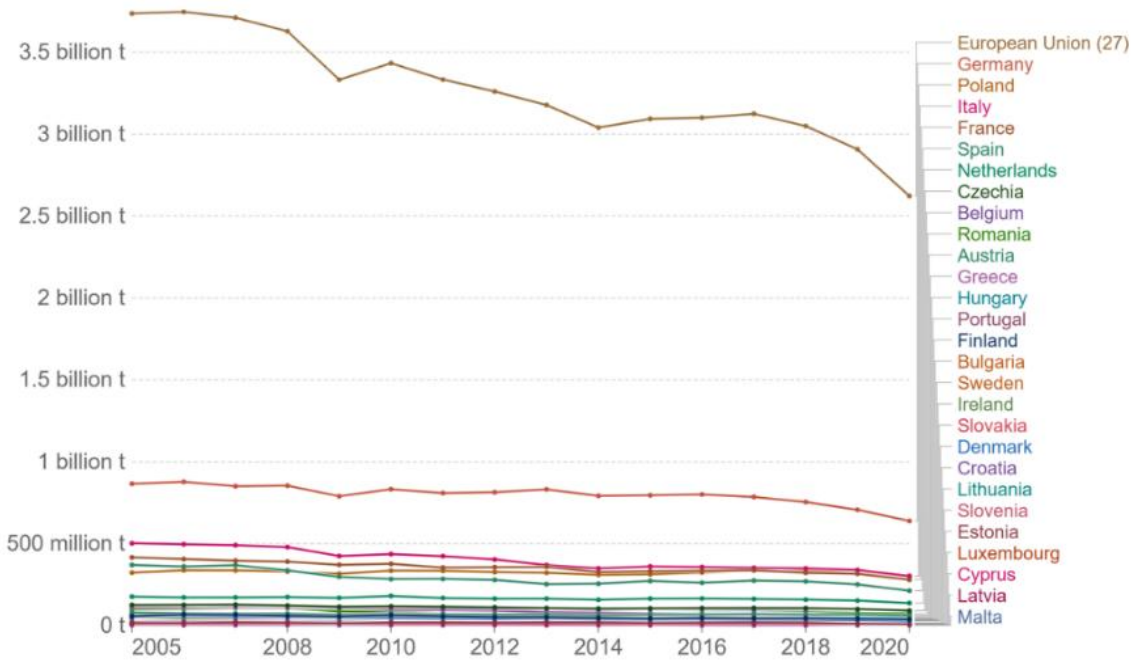
Figure 1. The main greenhouse gases



Source: Author owns work

In the traditional view, climate action has translated into measures taken by governments to reduce greenhouse gas emissions (Tosun, 2022, p. 1). However, economic literature (Boscarino, 2015, p. 5; Legagneux et al., 2018, pp. 3-4) has reached a point of convergence, namely that there are trade-offs in implementing climate action and achieving other parts of sustainable development. The public policy efforts made by the EU countries during recent years led to a decrease in CO2 emissions, as shown in Figure 2.

Figure 2. Annual CO_2 Emissions in the European Union over the period 2005-2020



Source: Ritchie, 2022

The graph above shows the evolution of annual CO_2 emissions from 2005-2020. Overall, according to the graph, a decreasing trend of CO_2 emissions can be observed in the EU member countries during the period analyzed. For example, in 2020 the EU had a total of 2.62 billion tons of CO2 emissions, and among the EU member states, the biggest producers of CO_2 are Germany (639.38 million tons), Poland (303.52 million tons) and Italy (302.28 million tons). In this context, the literature argues that investments are essential for firms to remain competitive or even viable in a carbon-constrained world (Jiang and Klabjan, 2012, p. 2). Despite public policy efforts, some studies exploring the connections between public spending and reduction of the CO_2 emissions (as Han, Farooq, Nadeem, and Noor, 2022, p. 1) are concluding that an increase in the GDP increases CO_2 emissions, while economic development significantly enhances environmental emissions. Anyway, it should be noted that the issue of environmental sustainability cannot be addressed only through (better) public spending, novel micro-policies intended to affect behaviors, technologies, and organizational practices being also needed (Guerrero and Castañeda, 2022, p.1).

Government expenditure is a fundamental pillar of economic policies, having a direct impact on economic growth, social development and financial sustainability of states. In this context, identifying the determinants of public spending is essential for understanding how governments allocate their resources. The economic literature suggests that institutional investment, greenhouse gas emissions, research and development (R&D) spending and foreign direct investment (FDI) can

significantly influence the structure and level of government spending. However, there is a limited number of studies that simultaneously analyze the impact of these variables on public spending, which is why this research contributes to filling this gap in the specialized literature.

The main purpose of this study is to investigate the relationship between institutional investment, net greenhouse gas emissions and general government expenditure by function. In addition, the analysis also includes the impact of research and development spending, as well as foreign direct investment, given that these variables can influence government decisions on resource allocation. The study provides an empirical perspective on how economic and environmental factors influence the fiscal policy of states. Methodologically, the research uses the ordinary least squares (OLS) model to estimate the relationships between the variables, along with the Dynamic Fixed Effects (DFE) model, an econometric framework derived from the Autoregressive Distributed Lag (ARDL) approach, which allows capturing dynamic effects in panel data. The choice of this method is justified by its ability to estimate short- and long-term relationships in a fixed-effects framework, which ensures a more rigorous control over heterogeneity between the analyzed states.

Through this analysis, the study contributes to the literature by providing empirical evidence on the interaction between institutional investment, greenhouse gas emissions and the structure of public spending. The results obtained may have significant implications for the formulation of fiscal and environmental policies, highlighting how economic and environmental factors influence government decisions on public spending.

This study explores the interaction between government spending, institutional investment and greenhouse gas emissions, highlighting their impact on economic competitiveness. Government investment in infrastructure and R&D contributes to improving a country's economic position, stimulating innovation and productivity growth. At the same time, regulations on greenhouse gas emissions and associated fiscal policies can influence production costs and, implicitly, the competitive advantage of the economy. By using an ARDL econometric model applied to panel data, this study analyzes the short- and long-run relationships between these variables, providing insight into how economic policies can influence sustainability and long-term competitiveness.

Literature review

Government expenditure is one of the government's intervention strategies to ensure continued economic growth. However, public administrations face a dilemma between economic development and environmental protection, given that financial resources are limited. Thus, it realizes the

efficiency of government spending for environmental protection is favorable to achieving the balance between economic growth and environmental protection.

Government spending focuses on providing services such as health, education, or electricity. We can say that in this form the role of the state is fulfilled in a vision that ensures the fulfillment of social objectives. However, nowadays it is necessary for a state to manage public funds more carefully. Society has evolved, and people's requirements are different compared to 30 years ago. Over the past 30 years, investment has evolved significantly, having a major impact on global economies. For example, during the 1990s, most investments were concentrated in traditional industries, such as manufacturing or infrastructure. Today, however, due to technological advances and digitalization, there is an increasing emphasis on investments in technology, innovation and digital infrastructure. This change has influenced people's demands, generating a greater need for skills in areas such as IT, artificial intelligence and the green economy. Also, the increase in investments in the field of sustainability and renewable energy has generated new economic opportunities, but also new challenges for governments and societies. Thus, the attention of decision-makers has turned to the way in which public money is used. Given these changes, it can be seen that the public sector depends to a large extent on private sector investments and initiatives to support sustainable development and meet current economic demands. This collaboration between the public and private sectors leads to increased productivity and stimulates the attraction of a greater volume of Foreign Direct Investment (FDI) (Othman et al., 2018). Investments of this type are directly linked to a boost in national income growth (Zhang et al., 2019), thus contributing to economic development.

Cities are blamed for most of the greenhouse gas (GHG) emissions (Hoornweg et al., 2011, p. 207). Dubeux and La Rovere (2007) state that the municipality can mitigate climate change by improving waste management systems. In this manuscript we can see the actions taken by which the citizens are obliged to sort out the waste. However, this small step must be taken more seriously. And the change should start right from each person's shopping cart. We are all tempted to buy large quantities of food that we can't eat and reach the expiration date. Thus, many of the purchased products will be transformed into food waste. And this waste will affect a family's budget in two ways. The change could start with our shopping habits. We often buy large quantities of food that we don't consume in a timely manner, which can lead to it expiring. As a result, some of the products we buy end up as food waste. This waste can impact a family's budget in two ways. The first direction and the easiest to observe is the one related to resupplying the pantry with the food necessary for living, food that was initially bought but which for reasons of validity ended up in the garbage, but which in the end a family needs in daily food. There is a need for people to plan their meals, as well

as their food needs. And the 2nd direction through which waste affects the personal budget is related to the increase in the level of sanitation fees. Municipalities are overwhelmed by the amount of waste, and this translates into higher taxes to purchase new technologies that help compost the waste. On the other hand, waste that is stored in landfills or on land near cities consumes large areas of land. In addition to this fact, this type of storage is not in line with the directions of sustainable development.

According to several studies (Wheeler, 2008; Gough et al., 2011; Guyadeen et al., 2019), government policies focus on increasing carbon prices. And this fact leads to an increase in domestic energy prices. For this reason, these studies mention the need for radical changes in the monitoring of flows of, as well as directing policies towards the modernization of houses, coupled with "social" tariffs for household energy.

The COVID-19 pandemic led to a severe economic recession that began with a health crisis. Thus, the EU member states had to develop large-scale action plans to overcome the demanding situation. Lahcen et al. (2020) quantify the potential of government investment in green building projects to stimulate the economy. Currently, it is not enough to implement a project that will generate certain returns. The current business practice is mainly focused on respecting the environment. Thus, the profits that can be obtained must be based on an activity that reduces energy consumption and does not generate high levels of pollution. We can say that public policy also had a difficult word to say in this equation. Often, any good idea must also be based on a secure foundation, which is ensured by the public factor.

It can be noticed at the European level that the population is concerned about climate change, which is increasingly present in everyday life. The major problem that changes daily life is the possibility that food can no longer be easily procured. A recent study (Laborde et al., 2021, p. 2-4) analyzed a specific part of agriculture, namely the polluting one. These authors consider that over the years government support has stimulated the development of high-emission agricultural systems. Government support has a minor impact in inducing additional global GHG emissions from agricultural production. This is attributed to the fact that support is not systematically targeted towards high-emitting products. Also, trade protection drives up consumer prices.

The balance of GHG emissions produced and those removed from the atmosphere. A key component of climate change policy and environmental sustainability. Investments in renewable energy, energy efficiency, and other mitigation strategies require substantial government funding. Adaptation measures to cope with climate change impacts (like infrastructure resilience, disaster management, and public health) also entail significant expenditures.

Government investment and spending policies have the ability to increase economic growth (Prasetyo, 2020, p. 471-472). For this reason, the allocation of financial resources to less environmentally efficient sectors should be discouraged, and resources should be allocated to more sustainable sectors. Also, according to Arfah (2021, p. 50-52), government investments have a positive impact on the industrial sector.

The results of another study (Shahbaz et al., 2020, p. 11-12) support the fact that spending on research and development is beneficial for the environment. Policy making to reduce carbon emissions is vital to focus on allocating resources to innovation. Private research and development expenses are not sufficient in the production of innovative solutions, thus, the need for public financial support appears (Wu et. al., 2021).

We are looking to investigate that government spending is influenced by greenhouse-green emissions and investments. So, we propose the following null hypothesis:

H_{0a}: Institutional investment has a negative influence on government expenditure.

H_{0b}: There is a negative association between greenhouse gas emissions and government expenditure.

Our hypothesis is substantiated by other studies (Barrett, 2009; Su and Moaniba, 2017; Basu, 2018) which consider that government investments do not always influence the development and patenting decisions of climate technologies. Likewise, other studies (Zhang et al., 2021, Kocak and Alnour, 2022, p. 1) demonstrate that there is a negative relationship between the green economy and public expenditure. In this order, we propose a 3rd null hypothesis:

H_{0c}: Government investments do not have a positive impact on public spending.

Data and Methodology

Data description

This study investigates the impact of institutional investments and net greenhouse gas on government expenditure across the 27 EU countries, during the period 2005-2020. The identified variables, and their description are presented below (Table 1).

Table 1. Variables definition

Variable name	Variable name type	Units	Source
Government_EXP	*General government expenditure by function*-dependent variable	% of GDP	Eurostat
Invest	*Investment share of GDP by institutional sectors*-independent variable	% of GDP	Eurostat

Variable name	Variable name type	Units	Source
GAS emissions	*Greenhouse gas emissions*-independent variable	% of GDP	Eurostat
R&D exp	*Gross domestic expenditures on research and development (R&D)*-control variable	% of GDP	Eurostat
GDPpc growth	Real GDP per capita growth-control variable	Chain-linked volume and as a percentage change from the previous period	Eurostat
FDI	*Foreign Direct investment in the reporting economy (stocks)*-control variable	% of GDP	

Source: Author's work

Table 2 contains a presentation of the descriptive statistics of the variables included in the analysis.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Government_EXP	432	45.18	6.77	24.20	64.90
Invest	432	22.08	4.49	10.69	53.59
Gas emissions	432	9.93	3.97	4.5-0	30.80
R&D exp	432	1.53	0.89	0.37	3.73
GDPpc growth	432	1.50	4.08	-14.60	23.20
FDI	432	404.51	1175.55	11.70	731.20

Source: author's work

The dataset contains 432 observations, with a time span of 16 years, between 2005 and 2020. On average, all countries recorded a level of General government expenditure of 45.18% of GDP in the period 2005-2020 which varies from this average by +/-6.77%. The majority of General government expenditure in these countries have values between 24.2-64.9%. On average, all countries recorded a level of Investment of 22.08% of GDP in the period 2005-2022, which varies from this average by +/-4.49%. The majority of Investment in these countries have values between 10.69-53-59%. On average, all countries recorded a level of Greenhouse gas emissions of 9.93% of GDP in the period 2005-2022, which varies from this average by +/-3.97%. The majority of Greenhouse gas emissions in these countries have values between 4,5-30.8%. On average, all countries recorded a level of Gross domestic expenditures on research and development of 1.54% of GDP in the period 2005-2022, which varies from this average by +/-0.89%. The majority of Gross domestic expenditures on research and development in these countries have values between 0.37-3.73%. On average, all countries recorded a level of Real GDP per capita of 1.50% of GDP in the

period 2005-2022, which varies from this average by +/-4.08%. The majority of Real GDP per capita in these countries have values between -14.60-23.20%.

On average, all countries recorded a level of foreign direct investment in the reporting economy (stocks) of 404.51% of GDP in the period 2005-2022, which varies from this average by +/-1175.56%. The majority of foreign direct investment in the reporting economy (stocks) in these countries have values between 11.70-731.20%. We noticed a too-high value of the maximum and used the Winsorize function, so the new maximum for this variable is 731.2.

Methodology

Our analysis is based on the use of ordinary least squares linear regression of panel data of the type:

$$y_{it} = f(X_{ij}, \beta) + \delta_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is the dependent variable, Xit is a k-vector of repressors and ε_{it} are the error terms for i−1, 2, …, M cross-sectional units observed for dated periods t−1,2, …, T. The α parameter represents the overall constant in the model while δi and yt represent cross-section or period specific effects.

The present research imposes a linear conditional mean specification of the form:

$$y_{it} = \alpha + X'_{it}\beta + \delta_i + \gamma_t + \varepsilon_{it} \quad (2)$$

To analyze the relationship between government spending and determinants, this study uses a re-parameterized Autoregressive Distributed Lag (ARDL) model as an error correction model (ECM) applied to panel data. Specifically, we estimate three alternative specifications: Mean Group (MG), Pooled Mean Group (PMG), and Dynamic and Dynamic Fixed Effects (DFE) to assess the robustness of the results.

The re-parameterized ARDL (p, q, q, …, q) error correction model is specified as:

$$\Delta y_i t = \theta_i \left[y_{i,t-1} - \lambda_i' X_{i,t} \right] + \sum_{j=1}^{p-1} \xi_{i,t} \, \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \beta'_{ij} \Delta X_{i,t-j} + \varphi_i + e_{it} \quad (3)$$

The following model specification was used:

$$\Delta \text{Governemnt}_{Exp_{it}} = \theta_i \left[Governement_{Exp_{i,t-1}} - \lambda_i' X_{i,t} \right] + \sum_{j=1}^{p-1} \xi_{ij} \, \Delta \text{Government}_{Exp_{i,t-j}} + \sum_{j=0}^{q-1} \beta'_{ij} \Delta X_{i,t-j} + \varphi_i + e_{it} \quad (4)$$

where $\boldsymbol{\Delta Governemnt\_Exp_{it}}$ is government expenditure by function for entity i at time t, $\boldsymbol{X_{i,t}}$ is vector of explanatory variables (Investment share of GDP by institutional sectors, Greenhouse gas

emissions, Gross domestic expenditures on research and development, Real GDP per capita growth and Foreign Direct investment in the reporting economy), $\boldsymbol{\theta_i}$ is balance adjustment coefficient $\boldsymbol{\lambda_i'}$ are conditions of the pulmonary term coefficients, $\boldsymbol{\xi_{ij}}$ and $\boldsymbol{\beta'_{ij}}$ are the coefficients of the dynamic terms of the dependent variable and the explanatory variables, $\boldsymbol{\varphi_i}$ captures fixed effects specific to each entity and $\boldsymbol{e_{it}}$ is the error term.

The Mean Group (MG) method allows the estimation of entity-specific coefficients without imposing homogeneity restrictions across countries, which allows for greater flexibility, but can introduce high variability in estimates. The Pooled Mean Group (PMG) imposes homogeneity on the long-term coefficients but allows heterogeneity in the short-term dynamics and interceptions. In contrast, the Dynamic Fixed Effects (DFE) model imposes stricter restrictions, assuming that both the long-term coefficients and the adjustment dynamics are identical for all entities analyzed, allowing only different intercepts through fixed effects.

Results

From the correlation matrix (see Table 3), we observe an inverse relationship between variables: Invest and Government_EXP, respectively Gas emissions and Government_EXP, as expected. The correlation coefficient between Government Expenditure (Government_Exp) and Investment (Invest) is -0.3675, which indicates a moderate negative relationship between the two variables. This means that, in general, an increase in government expenditure (Government_EXP) is associated with a decrease in investment (Invest), and vice versa. An increase in government expenditure can raise interest rates (by financing the public deficit), making borrowing for private investment more expensive, thereby reducing investment.

Table 3. The correlation matrix

	Government_EXP	Invest	Gas	R&D exp	GDPpc growth	FDI
Government_EXP	1.0000					
Invest	-0.3675	1.0000				
Gas emissions	-0.1294	0.0335	1.0000			
R&D exp	0.5892	-0.0004	0.1340	1.0000		
GDPpc growth	-0.5079	0.2937	0.0036	-0.1986	1.0000	
DI	-0.1665	-0.2034	0.5415	-0.1351	-0.0538	1.0000

Source: author's computations

The correlations obtained in our study are in accordance with other studies. We found a negative correlation between FDI and Government_EXP, respectively -0.1665. Wang (2005, p. 495) demonstrates through his research that public spending on capital and infrastructure has negative effects on private investment. The results of a study (Ercolano and Romano, 2018, p. 22) suggest that countries more developed in the industrial sector have a higher level of the greenhouse gas index.

There is a positive correlation between government expenditure (Government_EXP) and research and development (R&D) expenditure of 0.5892, suggesting that an increase in government investment in R&D can stimulate progress in innovation and technology. This, in turn, can contribute to economic growth. The study by Taiwo and Abayomi (2011, p. 2) supports this link, indicating that government investment in R&D can be an engine of economic growth, as innovation and technological advances foster productivity and development of various economic sectors.

Unit-root tests results

The results for unit root tests regarding the dependent variable – general government expenditure (Government_EXP) is presented in Table 4. The tests used are: 1-Levin-Lin-Chu, 2-Im-Pesaran-Shin, 3-Harris-Tzavalis, 4-Breitung, and 5-Hadri.

Table 4. The unit root tests

Variable	**Government_EXP**				
Tests	1	2	3	4	5
Level	-2.8348***	-1.6165**	0.6491***	-3.9482***	3.4088***
1-st difference	1.3978	-7.8235***	-0.1937***	-6.7255***	2.4276**
Variable	**Invest**				
Tests	1	2	3	4	5
Level	-6.0614 ***	-0.5893	9.7397**	-1.0184	6.4864***
1-st difference	-11.9594***	-7.3825***	6.5680***	-4.6801***	2.1430**
Variable	**Gas emissions**				
Tests	1	2	3	4	5
Level	-1.2772	2.3605	0.8443	5.7990	7.1169***
1-st difference	-6.7999***	-8.4656***	-0.0630***	-8.2314***	4.9859***
Variable	**R&D exp**				
Tests	1	2	3	4	5
Level	0.9359	2.9960	0.8843	5.1792	5.5576 ***
1-st difference	-4.6865 ***	-6.9915***	0.1420 ***	-7.3158***	2.1056**
Variable	**GDPpc growth**				
Tests	1	2	3	4	5
Level	-6.3713 ***	-5.1021 ***	0.3182***	-7.1399***	3.0654***
1-st difference	-8.3353***	-9.0554**	-0.2079***	-10.0622***	3.2475***
Variable	**FDI**				

Tests	1	2	3	4	5
Level	-4.8587***	-1.4322*	0.8880	4.3606	5.6801***
1-st difference	-9.2020***	-2.0710**	0.5899***	-5.9262***	2.0337**

Note: significance levels: *** p<0.01, ** p<0.05, * p<0.1
Source: author's computations

It is found that the considered variables are stationary according to table 3. The Government_EXP variable is stationary at the level in all 4 tests performed with a probability of 99%. The Invest variable is stationary at the level only through the Levin-Lin-Chu and Hadri tests with a probability of 99%, respectively 95% through the Harris-Tzavalis test. And in the first difference the Invest variable is stationary at the level in all 4 tests with a probability of 99%. The gas emissions and R&D exp variables are stationary at the level only through the Hadri test with a probability of 99%, and in the first difference they are stationary in all 4 tests with a probability of 99%; except for the Hadri test where the probability is 95%. The GDPpc growth variable is stationary at the level in all 4 tests with a probability of 99%. And the FDI variable is stationary at the level through 3 tests, with the mention that through the Levin-Lin-Chu and Hadri tests the probability is 99%, and through the Im-Pesaran-Shin test the probability is 90%. Through the prism of this we can go to the next step, namely, to perform the regression analysis to see the impact of institutional investments and net greenhouse gas on government expenditure, in the period 2005-2020. Below is the Panel Least Squares equation to illustrate public spending:

$$Government\_Exp = \beta_1 + \beta_2 * Invest + \beta_3 * Gas\ emissions + \beta_4 * R\&D\ exp + \beta_5 * GDPpc\ growth + \beta_6 * FDi + \varepsilon \quad (5)$$

The results of the estimate are presented in Table 5. The regression results indicate that government expenditure (Government_EXP) is significantly influenced by several economic factors, and the signs of the coefficients suggest certain relevant economic relationships.

First, there is a negative relationship between private investment (Invest) and government expenditure, with a coefficient of -0.432, which means that an increase in investment is associated with a decrease in government expenditure. This effect can be explained by the phenomenon of crowding out, where an increase in private investment reduces the need for government intervention, or by the fact that the government adjusts fiscal policies according to the dynamics of the private sector.

Similarly, the real GDP growth rate variable (GDPpc growth) has a coefficient of -0.537, indicating that as the economy grows, government expenditure tends to fall. This relationship

suggests a possible countercyclical fiscal policy, where the government spends more during recession and cuts spending when the economy is growing.

R&D exp also has a negative effect on government expenditure, with a coefficient of -0.236, indicating that an increase in this expenditure is associated with an overall decrease in government expenditure, possibly as a result of budget reallocation to compensate for higher energy costs.

One of the strongest factors influencing government spending is the R&D exp component, which has a coefficient of 3.997. This high coefficient suggests that there is a significant relationship between government spending on research and development and other categories of government spending. Basically, this value indicates that as the government allocates more funds to R&D, there is a tendency for government spending in general to increase. This could reflect a higher priority given to investment in research and innovation, which in turn can stimulate economic development and lead to an increase in the overall government budget.

In addition, the variable FDI, which could represent income distribution or another economic indicator, shows a very small negative coefficient (-0.000560), but statistically significant. Although its effect on government expenditure is minor, it could indicate an indirect influence on government policies.

Table 5. The relationship between government expenditure and Investment in the period 2005-2020 in the 27 EU member states

VARIABLES	(1) Government_EXP
Invest	-0.432***
	(0.0492)
Gas emissions	-0.236***
	(0.0641)
R&D exp	3.997***
	(0.245)
GDPpc growth	-0.537***
	(0.0535)
FDI	-0.000560**
	(0.000221)
Constant	52.01***
	(1.181)
Observations	429
R-squared	0.615

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Source: author's computations

The variables introduced in the model are statistically significant with a probability of over 99%, except for the variable FDI which is statistically significant with a probability of 95%. We

conclude that the model characteristics represented by the independent and control variables are able to account for 61.5% of the variation in the Government_EXP variable.

It is noted that there is a negative relationship between the dependent variable, Government_EXP, and the independent variable Gas emissions with a 95% probability. The results of the analysis show a negative relationship between the dependent variable, Government_EXP (government expenditure), and the independent variable, Emissions, suggesting that higher emissions are associated with a lower share of government expenditure in GDP. This trend may reflect the negative economic impact of climate change, which directly affects vulnerable economic sectors, such as agriculture. The reduction in government expenditure as a percentage of GDP could indicate that governments are less able to allocate resources for adaptation measures or to support economies affected by climate change. This suggests a decrease in the capacity of governments to invest in measures that would counteract the negative effects of emissions and climate change, such as decreased agricultural productivity and increased costs in vulnerable economic sectors. Therefore, this result reinforces the idea that climate change has negative economic effects, through its direct impact on economies and the allocation of government resources.

In the analyzed period, government expenditures have a negative relationship with GDP, a fact attributed to the fact that the source of these expenditures is GDP itself, and their level exceeds 50%. This trend is maintained in the long term, especially in the conditions where expenditure measures were taken to combat the effects determined by the Covid-19 pandemic. Thus, in the EU the level of expenses increased by 6.3% compared to 2019 (Government finance statistics, 2022).

Cointegration tests results

The co-integration test results between Government_EXP and Invest are presented in Table 6. A total of 432 observations, 27 panels and 14 periods are included in the analysis. The hypotheses of the 3 cointegration tests are:

H_0: No cointegration.

H_1: All panels are integrated.

Table 6. The co-integration tests results between general government expenditure and investment

Test	*Kao*
Test results	Statistic
Modified Dickey-Fuller t	-5.9666***
Dickey-Fuller t	-3.9907***

Augmented Dickey-Fuller t	-3.8421***
Unadjusted modified Dickey-Fuller	-6.533***
Unadjusted Dickey-Fuller t	-4.1819***
Test	*Pedroni*
Test results	Statistic
Modified Phillips-Perron t	-5.5085
Phillips-Perron t	-1.2847**
Augmented Dickey-Fuller t	-1.5593**
Test	*Westerlund*
Test results	Statistic
Variance ratio	-3.2774***

Note: significance levels: ***p<0.01, **p<0.05, *p<0.1
Source: author's computations

According to the results in table 6, we can conclude that the variables are cointegrated according to the 3 tests performed.

The co-integration tests' results between Government_EXP and GAS emissions are presented in Table 7. A total of 432 observations, 27 panels and 14 periods are included in the analysis. The hypotheses of the 3 cointegration tests are the same as above.

Table 7. The co-integration tests' results between general government expenditure and net greenhouse gas emissions

Test	*Kao*
Test results	Statistic
Modified Dickey-Fuller t	-3.2774***
Dickey-Fuller t	-2.6871***
Augmented Dickey-Fuller t	-2.9625***
Unadjusted modified Dickey-Fuller	-4.2773**
Unadjusted Dickey-Fuller t	-3.1230***
Test	*Pedroni*
Test results	Statistic
Modified Phillips-Perron t	-0.2330
Phillips-Perron t	-2.0648**
Augmented Dickey-Fuller t	-2.1665**
Test name	*Westerlund*
Test results	Statistic
Variance ratio	-2.5792***

Note: significance levels: ***p<0.01, **p<0.05, *p<0.1
Source: author's computations

According to the results in table 7, we can conclude that the variables are cointegrated according to the 3 tests performed.

ARDL model estimation results

In table 8 we presented the results of the DFE model. To analyze the relationship between government spending and selected explanatory variables, we used panel econometric models, including Mean Group (MG), Pooled Mean Group (PMG), and Dynamic Fixed Effects (DFE), to capture both the dynamics of short- and long-run relationships and the heterogeneity between entities, thus facilitating comparison between different estimation methods.

Table 8. The DFE Model

VARIABLES	(1) mg	(2) mg	(3) pmg	(4) pmg	(5) dfe	(6) dfe
Ec		0.486**		0.0198***		0.187***
		(0.206)		(0.00290)		(0.0429)
D.invest		0.360**		0.451***		0.187***
		(0.176)		(0.127)		(0.0429)
D.gas emissions		1.172		1.201**		-0.0846
		(0.872)		(0.590)		(0.252)
D.R&D exp		-1.383		7.233***		3.976***
		(5.067)		(2.212)		(1.264)
D.GDPpc growth		0.194**		0.00387		-0.0511
		(0.0899)		(0.0487)		(0.0417)
D.fdi		-0.0861		-0.0338		-0.000730
		(0.141)		(0.0695)		(0.000818)
Gas emissions	15.58		1.922		0.572	
	(11.90)		(3.293)		(0.704)	
R&D exp	-10.29		5.468		-5.921*	
	(9.954)		(17.64)		(3.365)	
GDPpc growth	-5.275		39.69		2.299***	
	(5.004)		(51.59)		(0.477)	
FDI	0.401		0.00664		-0.000251	
	(0.352)		(0.0116)		(0.00186)	
Constant		-27.96		-27.96		-3.991*
		(23.00)		(23.00)		(2.151)
Observations	402	402	402	402	402	402

Note: Standard errors in parentheses, significance levels: *** p<0.01, ** p<0.05, * p<0.1
Source: author's computations

MG model estimation results

In the **MG model**, we observe that in the long run, the R&D exp and GDPpc growth variables have a negative influence on the Government_EXP variable. In the short term, the variables R&D exp and FDI have a negative influence on the Government_EXP variable. The variables are

statistically significant with a probability of 5% (dependent variable - Government_EXP, and independent variables - Invest and GDPpc growth).

The results of the MG model suggest that the variables analyzed influence the economy differently in the short and long term, with significant effects especially in the immediate period. In the short run, private investment (D.invest) and real GDP growth (D.GDPpc growth) have a positive and significant impact on the dependent variable, indicating that an increase in these factors stimulates economic activity. In particular, the coefficient of private investments, of 0.360, suggests that their advance is associated with economic growth, which reflects the essential role of private capital in economic dynamics. Also, the real GDP shows a positive coefficient of 0.194, which confirms that short-term economic expansion favors the growth of the dependent variable.

On the other hand, although gas emissions (D.gas emission) have a relatively high positive coefficient (1.172), it is not statistically significant, which means that there is no clear evidence of its impact on the economy. Similarly, gross domestic expenditure on research and development (D.R&D exp) has a negative coefficient of -1.383 but insignificant, suggesting that in the short run this spending does not directly and clearly influence the dependent variable. Income distribution (D.fdi) also shows a negative coefficient, but without strong statistical significance, indicating that, at least in the short term, this factor is not an essential determinant of economic development.

Regarding the error correction term, its coefficient of 0.486 is significant at the 5% level, indicating the existence of an adjustment mechanism towards equilibrium. This result suggests that the economy does not adjust instantaneously to shocks, but there is a moderate tendency to return to equilibrium over time.

In the long run, none of the variables included in the model show a significant impact on the dependent variable, although the coefficients for gas emissions (15.58), R&D exp (-10.29), real GDP (-5.275) and income distribution (0.401) suggest potential directions of economic relationships.

PMG model estimation results

In the case of **PMG model**, the error correction coefficient has a value of 0.0198 and is significant at the 1% confidence level, which suggests an extremely slow adjustment speed towards the long-run equilibrium. This indicates that, in the event of an economic shock, the return to economic equilibrium is slow and the effects of the disturbances persist for a long period.

In the short term, private investment (D.invest) has a positive coefficient of 0.451 and is significant at a confidence level of 1%. This result indicates a positive and significant impact of investment on the economy in the short term, which confirms the essential role of private capital in

stimulating economic activity. An increase in investment thus determines an immediate economic expansion.

Gas emissions (D.gas emissions) have a coefficient of 1.201, significant at a 5% level. This result suggests a positive correlation between the increase in polluting emissions and the dependent variable, which may indicate that short-term economic expansion is associated with a higher level of pollution. This relationship could be explained by an increase in industrial activity during periods of economic advance.

Research and development expenditure (R&D exp) has a positive coefficient of 7.233, significant at the 1% level, suggesting that investment in innovation and technology exerts an immediate and considerable positive effect on the economy. This result confirms the importance of R&D expenditure in stimulating economic growth.

GDP per capita growth (D.GDPpc growth) has a coefficient of 0.00387, but this is not statistically significant. This result indicates that, in the short term, changes in GDP per capita do not have a significant impact on the dependent variable, suggesting that the effects of economic expansion are more evident in the long term.

Foreign direct investment (D.fdi) has a coefficient of -0.0338, but without statistical significance. This result suggests that FDI flows do not have a clear impact in the short term, which may indicate a delay in the manifestation of their effects on the economy or the need for complementary policies to maximize the benefits of this type of investment.

In the long run, gas emissions have a coefficient of 1.922, but this is not statistically significant. Thus, in the long run, a clear relationship cannot be established between the level of gas emissions and the dependent variable, which suggests that their effects on the economy are influenced by additional factors, such as environmental policies or structural changes in the economy.

Research and development expenditure (R&D exp) has a positive coefficient of 5.468, but this is not significant. This result indicates that, in the long run, the impact of R&D investments is not clearly defined within this model. The possibility that these expenditures generate sustainable economic effects may depend on contextual factors, such as the efficiency of innovation implementation or the institutional framework.

GDP per capita growth (GDPpc growth) has a coefficient of 39.69, but without statistical significance. This suggests that although the relationship between economic growth and the dependent variable may be positive, in this model there is not enough statistical evidence to confirm this link in the long run.

Foreign direct investment (FDI) has a coefficient of 0.00664, but it is statistically insignificant. In the long run, this result indicates that the effects of FDI on the economy are not significant, which may suggest that their impact depends on institutional factors, appropriate economic policies or the degree of integration of investments into the structure of the national economy.

DFE model estimation results

In the case of **DFE model**, we observe that error correction coefficient is 0.187 and is significant at the 1% confidence level. This value indicates a moderate speed of adjustment of the economy towards equilibrium *of the economy towards long-run equilibrium. Compared to the PMG model, where the coefficient Ec was 0.0198, the adjustment in the DFE model is considerably faster, which suggests that the economy manages to correct imbalances in a relatively short time frame.

In the short term, private investment (D.invest) has a positive coefficient of 0.187, significant at the 1% level. This result indicates that, in the short term, an increase in private investment directly stimulates the economy. The positive relationship highlights the importance of private capital in supporting economic activity and creating added value in a narrow time horizon.

Gas emissions (D.gas emissions) have a coefficient of -0.0846, but this is not statistically significant. Thus, there is no clear evidence that an increase in gas emissions directly influences the economy in the short term. Unlike the PMG model, where this variable was positively significant, in the DFE model the relationship is not statistically confirmed.

Research and development expenditure (D.R&D exp) has a coefficient of 3.976 and is significant at the 1% confidence level. This result suggests that investment in research and development has an immediate positive impact on the economy. Increased spending in this sector contributes to technological progress, increased efficiency, and sustainable economic growth.

GDP per capita growth (D.GDPpc growth) has a coefficient of -0.0511, but it is not statistically significant. This value indicates that the effects of GDP per capita growth are not clearly defined in the short term, which may suggest a delay in the transmission of economic benefits to general economic activity.

Foreign direct investment (D.fdi) has a coefficient of -0.000730, but this is not significant. This result indicates that FDI flows do not have an immediate impact on the economy, which may suggest that their effects are more visible in the long term and require appropriate structural conditions to generate sustainable economic growth.

In the long run, gas emissions (Gas emissions) have a coefficient of 0.572, but it is not statistically significant. Thus, a clear relationship cannot be established between the level of polluting emissions and the dependent variable in the long run. This result suggests that the impact of emissions on the economy can be influenced by environmental policies and the transition to more sustainable energy sources.

Research and development expenditure (R&D exp) has a coefficient of -5.921* and is significant at a confidence level of 10%. This surprising result indicates a negative long-term effect of R&D expenditure on the economy. This counterintuitive relationship can be explained by the high costs of innovation, delays in the application of new technologies or inefficient allocation of resources.

GDP per capita growth (GDPpc growth) has a coefficient of 2.299* and is significant at a confidence level of 1%. This result indicates that a sustained increase in GDP per capita is associated with long-term economic growth, which underlines the importance of economic development as an essential factor of progress.

Foreign direct investment (FDI) has a coefficient of -0.000251, but this is not statistically significant. In the long run, the result suggests that the effects of FDI on the economy are uncertain, and their impact depends on the quality of governance, fiscal policy and the level of economic integration of the host economy.

The results of the DFE model highlight notable differences between the short- and long-term effects of the variables analyzed. In the short run, private investment and R&D spending have a significant positive impact, indicating that these variables play an essential role in the immediate economic dynamics. In the long run, however, R&D spending seems to have a negative impact, which may suggest difficulties in effectively capitalizing on investments in this sector.

An important result is the error correction coefficient (0.187), which indicates a faster adjustment of the economy towards equilibrium compared to the PMG model. This suggests that economic shocks are absorbed in a shorter time, reflecting a more dynamic and adaptable economy.

In the long run, GDP per capita growth remains a key driver of economic development, confirming the importance of economic progress for sustainable growth. In contrast, the effects of FDI and greenhouse gas emissions are not significant, indicating the need for additional policies to maximize the benefits of these variables on the economy.

Conclusions

Gas emissions are continuously decreasing at the European level, although there are different trends from one country to another. Renewable energy and public investment in research and

development contribute to stimulating economic growth and alleviating poverty. Thus, through the present study, we confirm the importance of investments, as well as greenhouse gas emissions, on government expenditure.

Institutional investments and net GHG emissions significantly influence government expenditure. By leveraging institutional investments, governments can fund essential infrastructure and environmental projects while managing fiscal pressures. Conversely, addressing GHG emissions requires strategic government expenditure on mitigation and adaptation measures, which can have long-term economic benefits and cost savings. Balancing these aspects is critical for sustainable development and fiscal responsibility.

We believe that the achievement of healthy economic growth in the EU must also be achieved through investments in the idea of creating the conditions for people to acquire knowledge that will transform them into capable citizens of a country. And states should spend public money on developing both physical and human capital. And the creation of a partnership between public and private investments on at least these 2 levels, we consider to be a first step towards a more sustainable future. These priorities of the economy will be transposed into benefits that will be collected gradually on a constant flow.

The regression results from table no. 5 suggest that government expenditure is negatively influenced by private investment and economic growth, which may reflect a substitution effect between the public and private sectors, as well as possible countercyclical fiscal policy. At the same time, other government expenditures contribute significantly to the total level of public spending, and factors such as energy costs and income distribution play a secondary role in determining them.

This study offers new empirical evidence supporting the future shaping of fiscal and environmental policies. While a race to bigger budgets and increased expenditures/more large redistribution through public funds seem to be consecrated nowadays (instead of more rational or efficient spending), the fiscal policy should comprise new instruments targeted to limit greenhouse gas emissions. These instruments could include both specific taxes, as “penalties” for polluting activities, and targeted expenses conceived as “rewards” for those reducing their emissions. A sustainable reduction of greenhouse gas emissions (in the long term) depends also on the economic behavior of the agents, which is why public expenditures policy could be oriented to support better education in this respect.

Recently, public and political discourse has been increasingly focused on economic competitiveness, given the global economic challenges and the transition to a sustainable economy. In this context, many governments have started to reorient their government spending and emphasize

investments in infrastructure, education and research and development, in order to stimulate long-term competitiveness. Also, policies to reduce greenhouse gas emissions have been correlated not only with environmental measures, but also with economic opportunities for innovation, which can contribute to the development of new industries and improve the competitiveness of the global economy.

The results obtained through the dynamic fixed effects (DFE) model in Table 8, applied to the 27 Member States of the European Union for the period 2005–2020, provide valuable indications on the priority directions of economic policy, especially regarding the allocation of government spending in the context of the green transition, innovation and the consolidation of sustainable economic growth.

In this context, the present study highlighted the impact of government spending and gas emissions on economic competitiveness. The results suggest that an efficient allocation of government spending, especially in areas such as research and development and green technologies, can support not only the sustainability of economies, but also increase competitiveness in the long term. In this sense, economic policies must be carefully correlated to support not only environmental protection objectives, but also the development of an economic environment conducive to innovation and competitiveness.

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Stock market and economic growth in Kazakhstan: is there a mutual dependence?

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Abstract

The mutual codependence between stock market development and the economic growth is empirically investigated in Kazakhstan. The study employs the Vector Autoregression technique (VAR) to test the relationship between economic growth (Industrial Production Index) and the stock market development in Kazakhstan. KASE Index is employed as an indicator of stock market development in Kazakhstan. Money Supply is employed as an additional macroeconomic variable besides Industrial Production Index. The credit spread is employed because of its anticyclical nature. It grows during recessions and decreases during an economic boom. Besides the aggregate data, oil and gas sectors' sample data is also employed, as these are the most important economic sectors in Kazakhstan. The results indicate that there is no significant mutual dependence between the Industrial Production Index and the stock market development indicator in Kazakhstan over the period between 2006 and 2022.

Keywords: dependence, Vector Autoregression, stock market, economic growth, mutual causality

Introduction

Financial sphere's effect on the economy or an impact of the economy on the sphere of finance may include both direct and indirect finance. And, in this particular study, the effects of stock market (direct finance) on or from the economy are investigated in such a developing country as Kazakhstan. Although there are many papers discussing relations between economic and financial variables, few studies deal with post-Soviet, Commonwealth of Independent State (CIS) countries. Such reasons might be mentioned as an underdeveloped stock market, lack of data, dependent market structure. However, Kazakhstan has its own well-functioning stock market and well-functioning financial system. The paper will contribute further on the studies about CIS economies as well as to the development of the economy and equity market in developing post-Soviet countries. The mutual codependence between stock market development and economic growth was investigated in

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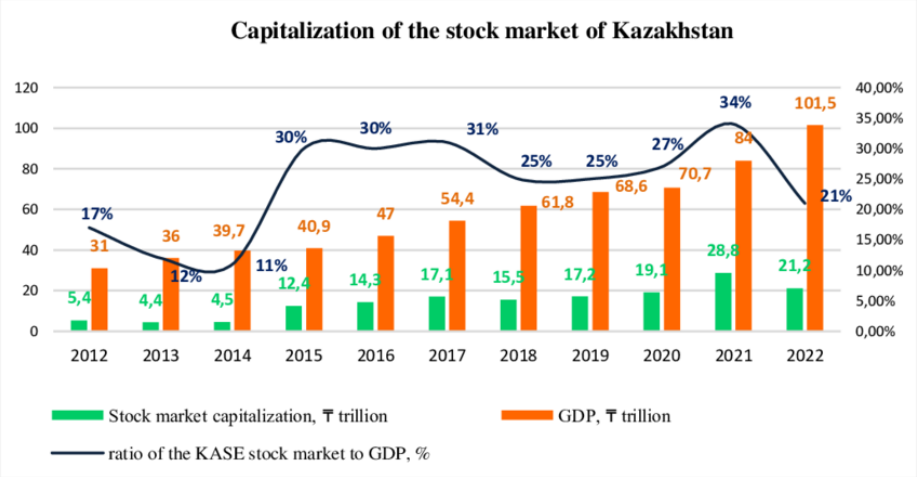
Kazakhstan. And, the results confirm the fact that there is no any mutual causality between economic growth and stock market development in Kazakhstan.

Evolution of Gross Domestic Product and stock market

A stock market Index is an indicator of industrialization in a particular country. In some countries, it may include 200-300 corporations' stock; in other countries, it may have fewer corporations. KASE Index includes stock of ten Kazakhstan's corporations. The figure 1 below presents the capitalization of stock market in Kazakhstan. Focusing on the stock market development for the country, it should be noted that the presence of a developed stock market promotes the inflow of foreign investments to the national economy, which is extremely important for developing countries (Arefiev and Kuznetsov 2015). A stock investment tends to be pro-cyclical. And pro-cyclical investment behavior may accelerate the development in an economy. However, if investors behave in a counter-cyclical way to exploit the low-price advantage during a recession, they may affect the economy in an opposite way, improving economic conditions. Therefore, the study attempts to discuss the effect of stock markets on and from the economy and to compare the magnitudes of those impacts.

How the economy is measured? Gross Domestic Product (GDP), a widely used indicator, refers to the total gross value added by all resident producers in the economy. Growth in the economy is measured by the change in GDP at constant price. Many World Developing Indicators use GDP or GDP per capita as a denominator to enable cross-country comparisons of socioeconomic and other data. (World Bank Development Indicators, 2024)

Figure 1. Stock market and GDP in Kazakhstan (2012-2022)



Source: Akanayeva (2024)

The dynamics of Kazakhstan's economy

When it comes to the economy of Kazakhstan; it should be noted that Kazakhstan's' Gross Domestic Product (GDP) rose dramatically in 2000-s because of oil export. The ratio of money supply (M2) to Gross Domestic Product also increased rapidly, from 13.3% in 1995 to 44.2% in 2007 International Monetary Fund Report (2012). We also have to mention that this article covers between 2006 and 2022. Kazakhstan's economy grew increasingly concentrated during the 2000s, in terms both of exports of natural resources and production development. Kazakhstan is an export-oriented country, which is mostly focused on natural resources. Between 2010 and 2014, the process of relative deindustrialization stopped and new major non-natural resource export products were discovered (OECD, 2017).

Kazakhstan has quickly achieved significant progress since 2000 towards realizing its long-term development ambitions. How it happened? Firstly, Gross domestic product (GDP) increased 3 times during 14-year period (between 2000 and 2014). Average monthly salaries rose between 2010 and 2015, pensions quadrupled, while the proportion of the population living on incomes below the subsistence level fell 11 times (OECD, 2017). That period of time (2000-2014) is known for an increase in domestic production, exports, and capital investment, which benefited from rising world prices for oil, minerals and metals (Kazakhstan's major exports) and the recovery in Kazakhstan. During a short period of time, the output of crude oil and gas condensate expanded by 15.1 percent, while output of gas rose by 25.5 percent to 5.7 billion cubic meters.

According to the National Bank Report (2017), since late 1999, the monetary policy has been designed and implemented to stimulate economic recovery while keeping inflation under control. National Bank of Kazakhstan worked hard to improve the situation. Four major policy measures were adopted by the central bank at that time.

- The refinancing rate was reduced three times in late 1999 and early 2000.
- The requirement that exporters must sell 50 percent of their export earnings to the central bank was abolished in November 1999.
- The reserve requirements for banks decreased from 10 to 8 percent of demand and time deposits. The monetary base has eased and growth of monetary aggregates has rapidly accelerated.
- Inflation slowed down because of three factors, which are: increased productivity, improved fiscal position, and the stable national currency.

It is universally accepted that any improvements in liquidity bring an enhanced economic boom. If we notice coincidental cyclical movements of financial variables connected to economic

development, such a phenomenon is referred to a procyclicality of financial variables (Landau 2009). When we notice greater procyclicality, it is treated as cyclical fluctuations with greater amplitude. Because of a high cost of procyclicality, which affects the economy, policy makers adopt and maintain countercyclical measures on financial variables to control business cycles (Athanasoglou et.al. 2013). The relationship between the economy and financial sector were actively studied by such authors as Rashid (2008), Dimitrova (2005), Hsing (2004), Ibragim and Aziz (2003), Abbasa et al. (2022), Wesiah et al. (2021) and Hondroyiannis and Papapetrou (2001). The results differ from each other. The current study adds value to literature by exploring a relationship between macroeconomic variables and stock market in Kazakhstan. The current study employed VAR technique as a main tool. The period of study is between 2006 and 2022 years.

Review of the literature

The relationship between financial sector and the economy were actively discussed in academia. Among them, Rashid (2008) discussed the idea of dynamic interaction between the economy and stock prices in such a developing/emerging country as Pakistan. The author used cointegration technique in his paper to test the long-term relationship between the economy and stock market indicators. The author reported the fact of cointegration between the stock prices and macroeconomic variables in Pakistan. Moreover, the author argued that well-functioning stock market facilitates economic growth. This is direct finance issue, which was popularized by other authors in academia as well. Dimitrova (2005), Hsing (2004), Ibragim and Aziz (2003), Abbasa et al. (2022), Wesiah et al. (2021) and Hondroyiannis and Papapetrou (2001) studied relationships between macroeconomic variables and stock market performance. The results those authors report differ from each other. Interestingly, Dimitrova (2005) discovered that stock prices and economic variables have negative relationships in the short run, but positive in the long run. Ibrahim and Aziz (2003) mentioned that stock market is playing a predictive role for macroeconomic variables. Hondroyiannis and Papapetrou (2001) presented an opposite view, which states that economic activity affects the performance of stock market (Hondroyiannis and Papapetrou 2001). Wesiah et al. (2021) proved empirically that there is a positive relationship between economic development and financial growth in Great Britain. Mutual causality between those variables was proved to work by authors in United Kingdom. Recently, Bhowmik and Wang (2020) mentioned that the stock market is a fundamental insulin in the economic activities today. It is a gauge meter employed to test the economy's well-being among a given calamity because it is the first market to send a signal of the growth of the

business trends to the policymakers. Therefore, the volatility of stock index returns is an important variable to measure adversity in an economy. In addition, Chaudhary et al. (2020) strengthened the claim that uncertainty in the markets is a view of the volatility of the stock markets, which has the highest bearing on investment and portfolio management analysis. Volatility usually indicates an economy's instability or uncertainty. Islam et al. (2023) investigated the impact of macroeconomic drivers, such as the gross domestic growth rate, inflation rate, and industrial production index, on the Dhaka stock exchange, i.e., through the usage of such techniques such as descriptive statistics, Pearson correlation analysis, and multiple regression analysis. They reported a significant and positive relationship between the Bangladesh Stock Market index and the GDP rate. It is confirmed that the GDP (Gross Domestic Product) is a key factor which affects the performance of the stock markets in such country as Bangladesh. Nichkasova (2022) confirmed the fact that world oil prices and total investment are the most powerful factors, which influence economic growth in Kazakhstan. The influence of the financial sector appears only after these two variables are employed in the regression. In addition, the main contribution to this study is the result, which shows that the direction of causation for Kazakhstan comes from economic growth towards the development of the local financial market. However, Akanayeva (2024) argue that there is the cause-and-effect relationship between the growth of real GDP and independent predictors. It indicates that the development of the stock market has a positive impact on the growth of the country's real GDP but is not the most important factor of Kazakhstan's economic growth.

The main idea in the literature is that developed and well-functioning financial systems facilitate economic growth. It is connected with reasoning of the new endogenous growth theorists. The causal relationship between financial depth and economic growth remains controversial despite the fact that it has been studied and saturated for a long period of time in literature. Such a difference might emanate from differences in methodological approaches and the data collection. Results differ greatly from study to study depending on different methods, tools, approaches and data collection techniques (Chukwu and Agu, 2009). Financial sector development is defined as the improvement in quantity, quality, and efficiency of financial markets and institutions' services (Calderon and Liu, 2002). Financial sector growth affects the growth of economic output in different ways: the volume of investment grows and the volume of savings grows as well (Goldsmith 1969). The finance and economic growth nexus have attracted global attention today in emerging and developing countries. There are different views related to the role of financial institutions and financial markets in promoting economic growth in the long-run.

Not only credits and lending (indirect finance), but an opportunity to raise funds in the capital

market is widely popular today. We refer it to direct finance. Levine and Zervos confirmed the fact that well-developed stock markets may be able to offer variety of financial services and also may facilitate an investment and growth. It may do it without an intervention of banks. (Levine and Zervos 1996). It was mentioned that increased stock market capitalization may improve an economy's ability to mobilize capital and diversify risk. They also mentioned that measures of stock market activity are positively correlated with measures of real activity and the correlation is stronger for developing and emerging countries. Those authors conclude that "stock market development explains future economic growth" (Alimpiev 2014).

Hessling and Paul (2006) mentioned that revolutionary changes in the sphere of financial markets, instruments, and institutions have stimulated further empirical investigations associated with the interaction of the financial and the "real" side of the economy. Authors primarily focused on updates and changes in financial markets and institutions. As it was mentioned, Bhowmik and Wang (2020) argued that the stock market serves as an insulin in the economic activities. According to those authors, it is the first market, which sends a signal of the growth or cycle of further business trends to policymakers. Thus, the volatility of stock index returns is a variable, which measures adversity in an economy. In addition, it should be mentioned that Chaudhary (2020) confirmed that uncertainty in the markets is a view of the volatility of the equity markets. Thus, volatility refers to an economy's instability and uncertainty.

Methodology and results

Following our review of literature, we assume that development of stock market affected the economy in Kazakhstan. We hypothesize the following three hypotheses:

- **Hypothesis 1:** There is a mutual causality between stock market and the economy (Gross Domestic Product)) in Kazakhstan.
- **Hypothesis 2:** There is a unidirectional causality so that stock market affects the economy in Kazakhstan.
- **Hypothesis 3:** There is a unidirectional causality so that the economy affects the stock market in Kazakhstan.

The development of the economy in Kazakhstan under the influence of negative external economic factors showed that the economic model that was created and improved in recent years proved unable to ensure the country's economic security in the face of sharp aggravation of the contradictions in the world financial system (Demeshev and Malakhovskaya, 2016).

This study employed two macroeconomic variables and one stock market development indicator, which is KASE Index. The data is of time series format. The macroeconomic factors include money supply in terms of M2 aggregate, Industrial Production Index (IPI). Besides three variables mentioned, the credit spread is employed as an indicator of economic conditions. It has anticyclical nature: credit spread increases during recessions and decreases during an economic boom.

The central model employed is VAR. As Bayramova (2010) mentioned, the vector autoregression (VAR) model is one of the most popular models, which were employed for the multivariate time series analysis due to its flexibility and successful forecast capability. All variables, which were employed in this model, are tested both on own lags and the lags of other variables. So, it is treated as a theoretical alternative to the structural models. VAR models were popularized in econometrics by Sims, who advocated a non-theoretical way of defining relationships between different time series (Sims, 1980).

Vector Autoregressive models and monetary transmission mechanism

When it comes to VAR (Vector autoregressive) model, it should be mentioned that Vector autoregressive (VAR) models were proposed initially by Sims (1980) and can be further employed to capture the dynamics and the interdependence of multivariate time series. It can be considered as a generalization of a system of autoregressive regression models. The employment of vector autoregressions by Christopher Sims was mainly aimed at analyzing the relationships between various macroeconomic variables. First of all, the author was interested in one of the most popular macroeconomic issues - the question of the impact of monetary policy on business activity. The main source of this discussion was the work of Milton Friedman and Anne Schwartz, in which they argued that the observed high correlation between the money supply (MS) and output indicates a unidirectional impact of monetary shocks on the real sector. It simply means that business fluctuations have a monetary nature. In addition, the shocks of monetary policy were considered as changes in monetary aggregates (Engle and Granger 2015). In the works of Christopher Sims, devoted to the analysis of monetary policy, change in his views on the issue was discussed. In the work of 1972, the existence of not only a high correlation of money supply and output, but also a unidirectional relationship characterizing the impact of monetary policy on business activity was revealed (Sims agreed with Friedman's and Schwartz's point of view). Conclusions were made on the basis of the main methodological innovation of this work - a direct test for the existence of a cause-effect relationship. But in his work of 1980, it was demonstrated that when the interest rate is

added to the number of regressors, the explanatory power of the money supply is significantly reduced. This conclusion contradicted the monetarist concept, according to which, monetary policy is responsible for exogenous shocks of the money supply, generating fluctuations in business activity (Lebedeva, 2015).

As it was mentioned, our study employed the VAR model as an estimator because the objective was to establish the causal effect of the stock market on economic growth and simulate the shocks to the system, and at the same time, to trace the effects of the shocks on the endogenous variables.

Results and discussion

The data is presented in table 1 below. The correlation matrix shows that the relationships among studied variables are insignificant. As it was mentioned, there are four main variables in the study. The data set covers seventeen years period from 2006 until 2022 on monthly basis. The more frequent the data, the more accurate results can be obtained from the model. This fact served as the motivation for taking monthly data. The study employed industrial production index as an economic variable and Index KASE as an indicator of stock market performance in Kazakhstan. Money Supply was employed as an additional economic parameter. Credit spread was employed as an indicator of economic conditions and it serves as an additional macroeconomic variable. Monthly data were collected in aggregate forms during January 2006 – December 2022 (204 observations) and also for the whole sample in levels, stock market index value, money supply and credit spread. In addition, the sample of oil and gas sector companies was studied. It is explained by the importance of oil and gas sector as a leading sector in Kazakhstan. The industrial production data were obtained from the National Bank of Kazakhstan. Index KASE data, as well as credit spread data were obtained from Bloomberg and LSEG respectively. The money supply data was obtained from LSEG as well. These monthly data were used for Vector Autoregressive (VAR) analysis to identify the direction of causality between the economic and financial variables. The level data are first transformed into logarithmic forms for the industrial production, and stock market index values. The first differenced data, and in some cases, monthly seasonal differenced data, are employed from the logarithmic data to assure stationarity of data sets in the VAR analysis.

The null hypothesis for ADF cannot be rejected both at a 1% and a 5% level of significance for IPI, Money Supply, KASE Index, and Credit spread. The log values of variables were taken. Only after this step was performed, all data showed stationarity at both significance levels. Both table 2 and table 3 below demonstrate unit root test results. Table 2 shows unit root for the raw data,

while table 3 shows the results of unit root test for logged data.

Table 1. Correlation matrix

	IPI	Money Supply	KASE Index	Credit spread
IPI	1			
Money supply	0.0723	1		
KASE Index	0.0827	0.0529	1	
Credit spread	0.0001	0.0003	-0.0001	1

Table 2. Unit Root Test

Unit root and stationarity	ADF (1%)	ADF (5%)	PP (1%)	PP (5%)
Critical values	-3.48	-2.88	-3.48	-2.88
IPI	1.26		1.02	
Money Supply	-1.10		1.08	
KASE Index	-1.66		1.01	
Credit spread	-1.89		-1.24	

Table 3. Unit Root Test

Unit root test	ADF (1%)	ADF (5%)	PP (1%)	PP (5%)
Critical values	- 3.48	-2.88	-3,48	-2,88
IPI	-4.98		-3.99	
Money Supply	-11.82		-11.62	
KASE Index	-10.96		-11.04	
Credit spread	-4.98		-4.79	

As mentioned earlier, the information criteria method is the best way to identify the proper lag length. LM test was employed according to Akaike (1974), Schwarz' Bayesian (1978) information criterion, and Hannan-Quinn information criterion as well. The results help to determine the optimal lag length by looking at the smallest information criterion. The best lag length for all regressions is the one in which AIC and SBC show the lowest numbers. The minimal value is obtained at lag 1. Information criteria method was employed also to test the best lag length for other regressions and it was confirmed that the minimal value is obtained at lag 1 for all regressions in this study. Table 4 below shows residuals' correlation for all four variables studied.

Table 4. Residuals' correlation (from VAR model)

	IPI	Lending	KASE Index	CSP
IPI	1			
Money Supply	0.07	1		
RTS Index	0.09	-0.08	1	
CSP	0.03	-0.05	0.01	1

There are 204 monthly observations, which cover a ten-year period of time starting in January 2006 and finishing in December 2022. First of all, overall IPI was employed with overall aggregate M2, (money supply), credit spread, and KASE Index. After that, industrial data was employed based on two separate sectors: the oil and gas sector and the service sector. The results of the industrial IPI based on the industrial KASE Index and the industrial credit spread are demonstrated below. From the results below (Table 5 and Table 6), it is obvious that all coefficients are largely insignificant for the whole sample as well as for oil and gas industry sample. Table 5 demonstrates the results of the whole sample while Table 6 show the results for a sample of oil and gas sector firms.

Table 5. VAR Estimation Output based on whole sample 2006-2022

	IPI	MS	KASE	Credit spread
IPI	-0.1055	0.0754	-0.0165	0.0299
	(0.0865*)	(0.0976**)	(0.0199*)	(0.0188*)
	{-1.1543}	{0.9876}	{1.0276}	{0.9099}
MS	0.1165	0.1128	-0.1145	-0.1377
	(0.0876**)	(0.1324**)	(0.1277**)	(0.1199**)
	{0.9906}	{1.011}	{-1.2543}	{-1.2235}
RTS	0.1342	-0.1118	-0.1029	0.0726
	(0.1287**)	(0.1102*)	(0.1028*)	(0.0827*)
	{0.9982}	{-1.0726}	{1.0006}	{0.9726}
Credit	-0.1009	-0.0827	-0.0827	0.0627
Spread	(0.1082**)	(0.0899**)	(0.0966**)	(0.0728**)
	{0.9092}	{0.9627}	{0.9625}	{0.9928}

Note: Dependent variables are listed in the left column and independent variables are listed in the top row. Standard errors in () and t-statistics in { }; *** p<0.01; **p<0.05; *p<0

Table 6. VAR Estimation Output oil and gas sector sample 2006-2022

	IPI	MS	KASE	Credit spread
IPI	-0.0685	0.0884	0.0445	0.0696
	(0.0633**)	(0.0803*)	(0.0326**)	(0.0544*)
	{-1.0088}	{1.0748}	{1.0938}	{1.0875}
MS	0.0555	0.0687	0.0787	0.0876
	(0.0512*)	(0.0666**)	(0.0754*)	(0.0899**)
	{1.0443}	{1.0087}	{0.9765}	{1.0732}
RTS	0.0897	0.0643	0.0585	0.0765
	(0.0885**)	(0.0685**)	(0.0563**)	(0.0899**)
	{0.9787}	{1.1328}	{1.0006}	{0.9645}
Credit	0.0669	-0.0732	0.0692	0.0687
Spread	(0.0666***)	(0.0723**)	(0.0685***)	(0.0618**)
	{0.9554}	{-0.9239}	{1.0008}	{1.0854}

Note: Dependent variables are listed in the left column and independent variables are listed in the top row. Standard errors in () and t-statistics in { }. *** p<0.01; **p<0.05; *p<0.1

A co-integration test as an additional tool

The error terms of the cointegration regressions were taken and checked on a unit root test. All of them turned out to be non-stationary at the first level. A unit root test was employed again to

check at the first difference. The results showed that it is nonstationary at the first level. The conclusion to be drawn from the test is that there are no long-term relationships among variables tested both at the first level data and at the first difference. The results truly confirm the fact that there is no any relationship between studied variables.

Table 7. The results of unit root test at the first level for error term

Residual of equation (1) Log_IPI = α 0 + α1Log_Lendingt-1 + α2 Log_RTS_ Index + α 3 Log_Credit Spread + ε it	1% 5% 10%	-1.095423 -2.112453 -2.096435
Residual of equation (2) Log_Lending = α 0 + α1 Log_IPI + α 2 Log_MS+ εit	1% 5% 10%	-2.115645 -3.012543 3.0376894

Conclusions and further recommendations

The results of the study reject all three hypotheses. Based on the results of the study, it can be concluded that stock market does not affect the economic growth in Kazakhstan. At the same time, the results support the evidence that the economy does not affect stock market in Kazakhstan. The view of causality is not supported in this particular study. The following limitations deserve particular attention. The study employed only seventeen-year period of time. VAR was employed as a central model in this study. The following theoretical implications can be taken into consideration. Some other models can be employed such as Ordinary Least Squares, Generalized Method of Moments (Sukhanova and Shirnaeva 2015). Such variables as exchange rate, Consumer Price Index can be added in further research. Also, it should be suggested that the empirical links between stock market development and economic growth warrant further investigation in emerging economies. Focusing on this particular issue and examining the impact of financial liberalization on stock market volatility and the effects of the latter on are presented below. By the methodology we employed, there does not seem to be a significant association between studied variables over a period between 2006 and 2022.The most important practical implication is that stock market does not promote economic growth in Kazakhstan and the economy does not affect the stock market. The limitation of the study is that the period covered is quite short, between 2006 and 2022. It can be explained by data availability and data accessibility. Another limitation is that only four variables are employed in this study.

The economic development of Kazakhstan is rapid and dynamic today. However, stock market does not significantly affect it. The results of the study partly agree with Nechkasova (2022) and disagree with Akanayeva (2024). According to expert estimates, foreign investment account for the bulk of turnover on shares of Kazakhstan's companies. In the conditions of full convertibility of the Kazakhstan's tenge and the increasing integration of Kazakhstan into the world economy, the

influence of foreign investors on Kazakhstan's market will intensify further. Foreign ownership might transfer some of its profit abroad and physical capital remains in the region, which will benefit Kazakhstan further. Domestic investments should be encouraged and foreign ownership might benefit the economy by providing some innovations in business as well as developing certain industries. But before talking about possible options for the development of Kazakhstan's financial system in the future, it is necessary to highlight the features and principles of the world financial centers' organization, which can serve as the basis for the formation of national financial institutions in Kazakhstan (OECD, 2017).

The key link in the financial market of any modern state is the stock market, which creates conditions for effective mutual organized trade in financial instruments between its participants. The purpose of the stock market functioning - as well as of all capital markets - is to provide a mechanism for attracting investments in the economy by establishing the necessary contacts between those who need money and those who would like to invest surplus income. The stock market is a free market, and it will fulfill its tasks of constant maintenance of economic growth only if there is complete freedom of investments' movement.

In the global economic community, global stock markets dominate. They are characterized by the largest capitalization, significant volumes of trading, the highest liquidity. Securities and derivatives are circulating, as well as depositary receipts and secondary placements of foreign companies in such markets. Obligatory participants in markets of this scale are stock exchanges - organizers of civil transactions with securities. The clients of the exchange are both national and foreign investors from all over the world. The study serves as a promising avenue for any further research in this area.

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EU Influence on Azerbaijan-Georgia relations after the Second Karabakh War: economic, political, and security perspectives

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Abstract

This research article inspired by Jan Zielonka (2006) book "Europe as Empire: The Nature of the Enlarged European Union" examines the dynamic relations between Azerbaijan and Georgia and contributions of the European Union to these relations. The period researched is after the Second Karabakh War (2020) with special focus on the European Union's facilitation of relations between the two republics. Both countries have specific linguistic, ethnic, and religious backgrounds which are one of the major considerations in the article. By analyzing the speeches of state leaders after the Second Karabakh War (2020) from both nations made in bilaterial meetings in official state visits, categorized into economic, political, and cultural themes the research indicates that Azerbaijan prioritizes economic relations, while Georgia emphasizes political solidarity, particularly mutual assertions of territorial integrity. Furthermore, the article suggests that the EU's contribution to Azerbaijan-Georgia relations encompasses political, economic, and security fields. The study concludes that the economic field is more actively integrated between Georgia and Azerbaijan, with the EU's impact being felt first in the economic sector, followed by political and security areas.

Keywords: EU-Azerbaijan-Georgia relations, post-Karabakh War dynamics, economic cooperation, political integration, security collaboration

Introduction

It seems difficult to find a region like the South Caucasus, characterized by its diversity rather than unity. The region comprises three major nations, each with distinct linguistic, cultural, and ethnic backgrounds. These nations-Armenia, Azerbaijan, and Georgia-speak different languages, utilize different alphabets, and have unique ethnic roots. Armenians have ties to Eastern Anatolia and the Middle East (Partizpanyan, 2023), Azerbaijan is a Turkic nation, and Georgians have a heritage unique to the Caucasus. Moreover, religious differences further contribute to the distinctiveness of these nations. Most Armenians adhere to the Armenian Apostolic Church (Martirosyan, 2023), a branch of Oriental Christianity. Georgians identify with Orthodox Christianity (Ghoghoberidze, 2023), while Azerbaijan is predominantly Shia Muslim (Nuruzade, 2016). These differences in

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language, culture, ethnicity, and religion have historically contributed to the distinct identities and separate trajectories of Armenia, Azerbaijan, and Georgia, making the concept of unity in the South Caucasus a complex and multifaceted challenge. Achieving unity in the diverse South Caucasus region necessitates a remarkable phenomenon capable of overshadowing the inherent differences among its peoples. After eight decades since Karl Marx's call, "Workers of the world, unite!" (Marx & Engels, 2008) reverberated in the South Caucasus, there was a belief that Marxist ideology could transcend the region's inherent differences. However, this ideology merely served to mask these differences for approximately 70 years. Following the dissolution of the USSR, these differences resurfaced with greater clarity and intensity.

However, there exists an additional phenomenon capable of mitigating these differences: economic interests, which necessitate cooperation and integration. The EU might be a good example of the role of economic interdependence in evading the arch grievance and hatred. Europe which harboured countless wars steamed from religious, ethnic and ideological mosaic only managed to come over them in 20th century after the devastating Second World War. Since 1950, Europe, previously marked by persistent battlefields and national animosities, succeeded in reconciling its differences. Regions such as Alsace and Lorraine, historically entrenched in Franco-German conflicts, have undergone a transformative shift, now serving as the cradle of the European Union. Robert Schuman, by emphasizing the potency of economic cooperation, stated, "The solidarity in production thus established will make it plain that any war between France and Germany becomes not merely unthinkable, but materially impossible" (Schuman, 1950). Ernst Haas (1961) and David Mitrany (1961) who made the Neofunctionalism theory famous to explain integration processes in the EU and beyond claims that growing economic interdependence between nations which later will lead to the decline of nationalism and evade national hatred finally result in understanding of importance of integration by newly formed technocrats. This economic integration, they claim that, will necessitate integration of other fields like political, educational, cultural and every detailed part of life. They name this phenomenon as “Spillover Effect”.

However, there might be a sceptic approach that there had already been a union between these three states during and after WWI period. It is better, notwithstanding, to understand that those unions were dictates of the historical processes and later the socialist ideology. The will of people and rationality of decisions can be questioned in the process of forming Special Transcaucasian Committee (1917), Transcaucasian Commissariat (1917-1918), and Transcaucasian Democratic Federative Republic (1918).

A. Moravcsik and F. Schimmelfenning (2009) propose that for an effective and fully functional integration, states need to go through a series of stages. First, they must define their "National Preferences." Next, they should engage in "Substantive Bargains" to align their interests. Finally, they need to establish a regulatory body to oversee the implementation of the agreements, a phase termed the "Institutional Choice" stage (Moravcsik & Schimmelfenning, 2009). However, it is challenging to determine what the national preferences of these states were and whether the subsequent stages were effectively carried out. Historical turmoil often prevented these stages from being fully argued or implemented, as survival became the primary concern.

In the complex geopolitical landscape of the region under study, the convergence of historical legacies from three former imperial powers[1] sets the stage for intricate dynamics and strategic considerations, warranting thorough examination. Several scholars have undertaken efforts to comprehend the geopolitical dynamics in the South Caucasus region especially after the Second Karabakh War (Dugin, 2023; Deen, Zweers, & Linder, 2023; Huseynov, 2024). Some scholars have attempted to analyze the broader geopolitical context, viewing it through the lens of the longstanding confrontation between Russia and Turkey (Isaev, 2020; Yavuz & Huseynov, 2020). Alternatively, other scholars have interpreted the situation as a form of cooperation between Russia and Turkey in the region, amidst the involvement of other powers with vested interests in the area (Isachenko, 2020).

Shiriyev and Kakachia (2013) claimed that Azerbaijan and Georgia stand out in the Caucasus region for their prolonged absence of conflict with each other. They argue that while discussions about relations after the collapse of the Soviet Union once served as a key reference point, the paradigm has shifted and now (refers to the period in 2010s), following the events of the 2008 August war, which resulted in recognizing breakaway republics, Abkhazia and South Ossetia by Russia, the focus has turned to distinguishing between periods before and after that war (Shiriyev & Kakachia, 2013).

Recently, after the Second Karabakh War, another significant milestone has been introduced to further differentiate periods. The aftermath of the war has not only influenced the region but also had repercussions beyond it. For instance, Samkharadze (2022) noted that Georgia's historical strategic ties with Azerbaijan have encountered scepticism and pragmatism due to Russia's involvement, widely recognized as an invader of Georgian territory. Consequently, Georgia refrained from participating in Azerbaijan's 3+3 initiative[2]. Semercioglu (2021) argued that the nature of relations between the two countries shifted from cooperation to pragmatism following the Second Karabakh War, reflecting a new balance of power. Moreover, Huseynov (2024) pointed out Sergey Lavrov's

[1] Russia, Turkey and Iran were once imperial sates as Russian (Romanov) Empire, Ottoman Empire and Qajar Empire.
[2] This was initiated by Azerbaijan to bring 3 South Caucasus republics (Azerbaijan, Armenia and Georgia) and 3 of their neighbours (Russia, Turkey and Iran) closer to one another.

speech which blamed the West for undermining cooperation under the 3+3 formula in the region. However, contrary to perception, he says that “In fact, the major blow to the 3+3 initiative seems to have been struck by Iran rather than the West” emphasizing Iran’s strong objections to the Zangazur corridor (Huseynov, 2024, p. 73).

Ergun and Valiyev (2024) utilize the concept of "normative power," coined by Ian Manners, to describe the EU's influence on the South Caucasus republics. They assert that the EU initially engaged with the region through Cooperation and Partnership Agreements (1999), deepening relations over time. However, they argue that the EU's approach lacked country-specific policies, instead employing a "one-size-fits-all" strategy, which they deem as a failure in addressing the individual needs and circumstances of each state (Ergun & Valiyev, 2024, pp. 182-183).

Previous research on Azerbaijan-Georgia relations has largely concentrated on the pre-war period, when the geopolitical realities and regional balance of power differed significantly from the post-2020 context. This study, therefore, focuses on the post-Second Karabakh War period to reassess these bilateral dynamics. Additionally, while most existing literature examines the EU’s direct relations with individual South Caucasus states, this article addresses an important gap by analyzing the EU’s indirect influence on bilateral relations between Azerbaijan and Georgia. In doing so, it questions whether the EU's normative power approach remains relevant or whether its traditional economic instruments prove more effective in the evolving geopolitical environment.Another noteworthy gap the article intends to fill is that so farSo far, the role of the EU in the region has been portrayed as that of a normative power, seen as an example of how laws are made and implemented. However, one crucial point has often been overlooked: the original reason for the creation of the EU — beginning with the European Coal and Steel Community and later the European Economic Community — was to revitalize war-torn Europe and, through economic cooperation, eliminate the possibility of future wars. By addressing these gaps this article offers several contributions which can be used scholars want to understand current situation in the region.

The central aim of this research is twofold:

1. To identify and compare the priorities of Azerbaijan and Georgia in their bilateral relations after the Second Karabakh War.
2. To assess the role of the European Union in fostering cooperation between the two countries across economic, political, and security domains.

The research posits that the EU is apt to facilitate economic interactions, leveraging its successful track record in this domain. This article contributes to the existing literature by shifting focus from the EU’s direct bilateral relations with individual South Caucasus states to its indirect but

significant influence on bilateral dynamics, particularly between Azerbaijan and Georgia. It also addresses the question of whether the EU's traditional economic instruments remain more effective than its normative power approach in a rapidly evolving geopolitical environment.

1. Methodology

To grasp the contemporary trend of relations between Georgia and Azerbaijan and assess the EU's contribution, this research comprised two distinct parts: a discourse analysis of speeches by state leaders from both nations. Data primarily sourced from the official website of the President of Azerbaijan and the state media outlet Azertac, supplemented by other news sources for objectivity. Speeches were categorized into two segments: visits to Azerbaijan and visits to Georgia. Importantly, the analysis focused exclusively on visits occurring after the Second Karabakh War, given the altered realities, and shifting priorities in the region. A total of seven high-level mutual visits between Azerbaijan and Georgia after the Second Karabakh War (2020) were analysed. These visits were exclusively at the presidential and head of government level, excluding other official visits by state officials.

The research employed sampling methodology, focusing on the most recent visit of Georgian Prime Minister (16.03.2024). Sentences from these visits were categorized into three groups: economic, political, and cultural. The number of sentences in each category was then counted and compared to discern any trends or shifts in emphasis across the visits. However, there is a major limitation here which is that this result might explicitly describe the period of research and cannot be used for future predictions. Another one is that grouping sentences under the given categories are relative and other people might consider it being part of another category or all of them.

Another part utilized a qualitative content analysis method to understand the EU's contribution. To collect data EU policy documents, press releases, and official statements related to the South Caucasus region and specific initiatives like TRACECA (Transport Corridor Europe-Caucasus-Asia) and other initiatives after the Second Karabakh War (2020) were chosen. Specific attentions were given to determine the EU's competence in foreign policy initiatives and which steps are welcomed in the region by both states. Moreover, the EU's promotion of relations between Azerbaijan and Georgia was divided into three key dimensions: Political, Economic, and Security. It's important to note that these dimensions can be interpreted variably by different researchers, allowing for flexibility in their scope and depth.

To ensure data validity, triangulation was employed by cross-checking statistical data from both Azerbaijani and Georgian sources. Also published scripts of speeches by both states' medias (in English) were compared to eliminate chance of misinterpretation. And finally, the methodology, results and discussions were reviewed by an expert in international relations and Western Studies to ensure the robustness of the analysis.

2. Nature and priorities of bilateral relations of Azerbaijan and Georgia

Diplomatic relations between Azerbaijan and Georgia were established on November 18, 1992, following the dissolution of the Soviet Union (MFA of Azerbaijan, 2024). These bilateral relations encompass various key areas such as cultural, political, economic, and military cooperation. Among these, the economic field emerges as particularly crucial and well-developed.

The role played by Azerbaijan went beyond economic income for Georgia. Azerbaijan demonstrated itself as a trustworthy partner during hard times. Because of the new, unfriendly regime, Russian policy against Georgia became more severe starting in the middle of 2006. Putin even compared Mikheil Saakashvili to Beria[3] (Vaisman, 2006). Gas prices have been threatened to rise from the $110 per 1,000 cubic meters of gas to $230 by Gazprom (Myers, 2006). Georgia was notified by Russia that if it were to approve the sale of the Mozdok-Tbilisi-Erivan pipeline (a.k.a. North Caucasus-Transcaucasia Gas Pipeline), the price might be negotiated. The shipment of gas to Georgia would stop on January 1, 2007, if the price could not be agreed upon or the pipeline was not sold. Putin even attempted to entice Azerbaijan to join this initiative and warned the president not to meddle to further isolate and pressure Georgia into agreeing (Shiriyev & Kakachia, 2013, p. 51). Situation started to deteriorate for Georgia considering long winter ahead and to find escape route Georgia's Prime Minister, Zurab Nogaideli, went to Turkey to negotiate the purchase gas from the Baku-Tbilisi-Ceyhan pipeline as well as obtain transportation fees (a certain amount of gas to be given to Georgia as fee). A week later, he travelled to Azerbaijan to guarantee the nation's energy security. Here sides agreed to resist Russian hegemony as well as to inform each other in case of new developments. Ultimately, after further bilateral negotiations, Azerbaijan and Georgia struck an agreement in late December 2006 that provided Georgia with 1.3 million cubic meters of gas per day at a cost of USD 120 per 1000 cubic meters, with a rise to $135 USD in 2007. Additionally, after discussions with the

[3] Lavrentiy Beria (1899–1953) was a Soviet politician and one of the most powerful and feared figures in the Soviet Union during the Stalinist era. He served as the head of the Soviet security and secret police, including the NKVD (the predecessor of the KGB), from 1938 until 1946. Beria played a central role in Joseph Stalin's Great Purge, overseeing mass arrests, executions, and deportations of perceived enemies of the state.

leaders of Georgia and Azerbaijan in Tbilisi on February 7, 2007, Turkey decided to provide Georgia a portion of its gas share from Azerbaijan's Shah-Deniz field to shield Georgia from Russia's blackmailing efforts (Shiriyev & Kakachia, 2013).

After the Second Karabakh War, Georgia-Azerbaijan relations could have been predicted to diminish because it was thought that Georgia refrained from joining the initiative of "3+3", despite maintaining regular relations with Armenia, Iran, Turkey, and Azerbaijan. From first glance it could have been claimed that Georgia's reluctance to join the 3+3 initiative stems from two main factors. Firstly, it considers Russia as an occupant of Georgian territories and refuse to cooperate. Secondly, the potential opening of the Zangezur corridor could diminish Georgia's transit significance between Azerbaijan, Turkey, and Europe (Gegelia, 2021) since possibility of relocating trade routes to Zangazur corridor is high. However, despite these initial assumptions, Georgia-Azerbaijan relations have actually shown a significant improvement, although the nature of this cooperation has remained primarily bilateral rather than multilateral.

This can be observed from the meetings of the state leaders of both countries too. Irakli Garibashvili's visit on September 29, 2021, marked the initial official leader-scale meeting following the Second Karabakh War (President.az, 2021). In total, there have been four visits by Georgian Prime Ministers to Azerbaijan (President.az, 2023a; President.az, 2023b; Azertac, 2023) and one by President Salome Zurabishvili (President.az, 2022). In turn, the Azerbaijani president has paid two visits to Georgia (Agende, 2022; Azernews, 2023). In all these meetings economic agenda was prioritized then followed by political cooperation especially emphasizing territorial integrity of both states. However, the recent visit by Georgian Prime Minister Irakli Kobakhidze on 16 March 2024, who succeeded Irakli Garibashvili, to meet with Ilham Aliyev is noteworthy. What adds to its significance is that Kobakhidze is the first Prime Minister to visit Azerbaijan after Georgia gained Candidate status in the EU in December 2023 (European Comission, 2023). In the meeting, which was open to the public, leaders delivered speeches on various topics, primarily focusing on three fields: economic, political, and cultural (See Table 1). President Aliyev primarily discussed the role of Georgia as an energy corridor between Azerbaijan and Europe, emphasizing Azerbaijani investments in Georgia. On the political agenda, the Azerbaijani side mainly discussed reforms in Georgia and cooperation. Culturally, the historical relations and the ancient roots of both nations in these lands were emphasized. Interestingly, the Georgian Prime Minister focused more on the political agenda than on other sectors, particularly highlighting Georgia's territorial integrity. The essence of the economic discussion also cantered on Azerbaijani investments, and finally, the Prime Minister supported President Aliyev's assertion regarding the ancientness of relations between the two nations.

Table 1. Characteristics of sentences leaders used in their speeches

	Economic vitality emphasized sentences	Political vitality emphasized sentences	Cultural vitality emphasized sentences
Ilham Aliyev	20	13	4
Irakli Kobakhidze	4	10	1
Total	24	23	5

Source: Official Website of President of Azerbaijan Republic

Based on the data, it might be claimed that Georgia and Azerbaijan have slightly differing priorities. Azerbaijan, having restored territorial integrity, focuses on attracting investments and solidifying its position as a hub between East and West. In contrast, Georgia prioritizes territorial integrity due to the unresolved status of breakaway regions, Abkhazia, and South Ossetia.

We can divide this economic interaction into two parts: 1. Direct Trade relations between Georgia and Azerbaijan. 2. Georgia's transit role between Azerbaijan and third countries. The first includes trade of products that destination is Georgia or Azerbaijan. In January Georgia accounted for 3.5% of total export of Azerbaijan. In total trade flow Azerbaijan exported more goods (92.4%) rather than importing (7.6%) (The State Statistical Committee of Azerbaijan, 2024).

Since 2020 due to Covid-19 pandemic state borders of Azerbaijan with all its neighbours have been closed and Georgia is one of the countries that suffered more. Deputy minister of Economy of Georgia, Mariam Kvrivishvili, claimed that this closure cost Georgia 1.5 million tourists and 400 million dollars (JAMnews, 2024). Before the closure, the monthly number of border crossers from Azerbaijan to Georgia over the age of 15 was approximately 92900. By 2023, this number had significantly decreased to 13100. The lowest recorded number was in 2021, with only 4200 people crossing the border (see Table 2). Initially, both air and land travel were banned during the early years of the closure, but currently, it is possible to fly to Tbilisi and other cities.

Table 2. Average number of border crossers from Azerbaijan to Georgia (2018-2023)

Year	Monthly average number of visitors to Georgia over age 15 and older from Azerbaijan.
2018	88200
2019	92900
2020	17700
2021	4200
2022	9600
2023	13100

Note: The figures reflect only the number of Azerbaijani citizens crossing the border, not including Georgian Azerbaijanis living in Azerbaijan.
Source: National Statistics Office of Georgia (2024)

In 2023, Azerbaijani citizens spent approximately $6 million in Georgia, ranking seventh in expenditure among foreign visitors, just after Armenia. It should be noted that the total revenue from tourism in Georgia in 2023 amounted to $4.125 billion (Taktakishvili, 2024).

3. The role of the European Union in Georgian-Azerbaijan relations

Azerbaijan's geopolitical position sets it apart from other Southern Caucasus republics. With direct borders to former imperial powers, Iran, Russia, and Turkey, Azerbaijan's diplomatic relations and strategic considerations are distinctly influenced. Stemming from this reality, Azerbaijan faces two significant implications, one negative and the other positive:

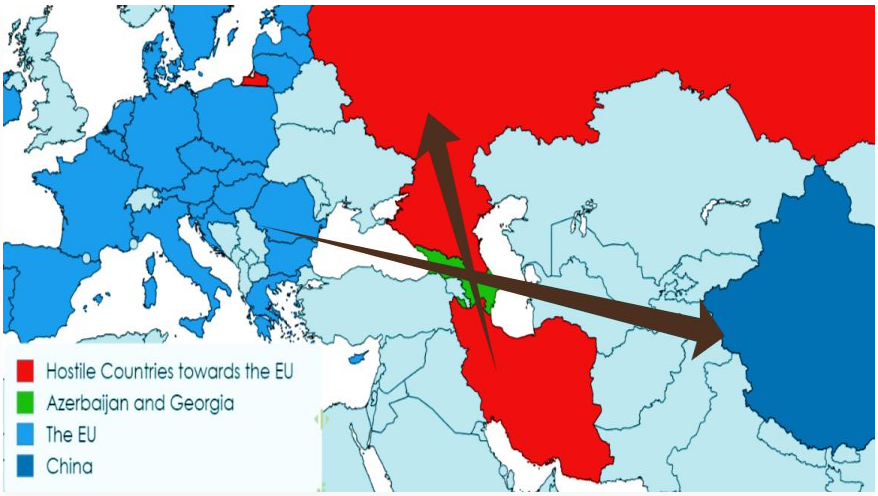
Firstly, this geographical reality imposes constraints on Azerbaijan's geopolitical autonomy, compelling the country to carefully tailor its foreign policy to navigate between the interests of its influential neighbours. Nevertheless, this geopolitical constraint does not impose imminent pressure on Azerbaijan, as one of its neighbouring countries, Turkey, maintains a strong alliance with Azerbaijan (Veliyev, 2022). Moreover, Azerbaijan engages in an "allied interaction" with Russia, further attenuating potential geopolitical pressures (President.az, 2022). If we expand our consideration from geographical borders to economic ones, the European Union emerges as a prominent economic partner for all region states. Among these, Azerbaijan stands out as one of the few states in the region maintaining positive relations with four of its neighbours. Azerbaijan's relationships primarily revolve around economic and geopolitical interests. It shares strong economic and political ties with Russia, predominantly economic connections with Iran and the EU, and a mixture of militaristic, cultural, and economic relations with Turkey. However, the dynamics vary for other regional states. For instance, while Armenia enjoys positive relations with Iran, the EU, and Russia, Turkey is perceived as a hostile neighbour. Similarly, Georgia maintains good relations with the EU and Turkey, and to a lesser extent, Iran, but views Russia as an occupying force in certain Georgian territories.

Secondly, the advantage of Azerbaijan's geopolitical positioning lies in the fact that the EU, a major trade partner of China, seeks alternative transportation routes that bypass traditional pathways through Iran and Russia which are under sanctions. Northern routes through Russia and southern routes avoiding Iran are deemed less advantageous for freight transport. Among the limited viable options, the South Caucasus corridor (Middle Corridor) traverses Azerbaijan and Georgia, making it a strategically important route for facilitating trade between Europe and Asia (see Figure 1). In

addition to the EU's interest in alternative trade routes, Iran and Russia, heavily reliant on each other due to sanctions, view Azerbaijan as a vital corridor for trade.

Being different form the previous one this corridor seems only benefit Azerbaijan since the infrastructure which stretches from Iran border to Russian customs solely passes through Azerbaijan soil bypassing Georgia. Consequently, Azerbaijan strategically leverages its geopolitical position, serving as a hub for both sides by maintaining a balanced policy towards all parties involved.

Figure 1. Geopolitical positioning of Azerbaijan and Georgia



Source: Generated by the Author

According to Deen et al. (2023), the EU's objectives in the South Caucasus encompass four main goals: promoting European values of human rights and democracy, enhancing security and stability, fostering trade and investment, and mitigating Russian influence in Georgia. Moreover, Jan Zielonka (2006) claimed that the European Union's preferred foreign policy instrument is the export of laws and regulations. Foreign trade and aid are secondary priorities, with peace enforcement ranking third, if considered at all. Additionally, there is no single institutional framework for exercising European foreign policy.

But specifically, the role of the European Union's role in Azerbaijan-Georgia relations is multifaceted and multilayered. This involvement can be grouped into three primary categories, each with several layers: political engagement, economic and energy cooperation, and security and defence

Political engagement

In this dimension, the EU has actively engaged in mediating for peace in the region, addressing both the former Nagorno-Karabakh issue and current situations in South Ossetia and Abkhazia. Their

involvement also includes fostering cultural integration between different ethnicities in Georgia and Azerbaijan, thereby promoting local unity. Additionally, the EU has been steadfast in ensuring the territorial integrity of both states. During his official visit to Georgia in 2021, European Council President Charles Michel affirmed the European Union's commitment to Georgia's sovereignty and territorial integrity. He emphasized the EU's support and said, "… You know that the EU is committed to Georgia's sovereignty and territorial integrity. It is also very important for the [EU Monitoring Mission]. We know that the situation is complex and difficult for the local people. I would like to tell the local people: you are not alone. The EU is committed to peace, stability and security" (Dumbadze, 2021). In his interview with a local news site in 2017 the former Head of the EU Delegation to Azerbaijan, Ambassador Kestutis Jankauskas asserted the EU's support for the territorial integrity and sovereignty of Azerbaijan (Baba, 2017).

Economic and energy cooperation

The EU's engagement in economic relations with the South Caucasus commenced in 1993 through the TRACECA (Transport Corridor Europe-Caucasus-Asia) initiative. This program sought to enhance economic links between the EU and the newly independent post-Soviet states alongside Turkey (Asia Regional Integration Center, 2024). In 1994, the "Contract of the Century" facilitated the export of hydrocarbons from Azerbaijan to the West, particularly to EU member states. Among these countries, Italy accounted for the largest share, comprising 46.6% of Azerbaijan's total exports. Other EU nations involved included Greece (3.6%), Spain (2.65%), Croatia (2.5%), the Czech Republic (2.4%), and Portugal (1.9%) (Workman, 2023). In 1999, the departure of the first oil tanker carrying Azerbaijani oil from the Supsa port of Georgia, facilitated by the Baku-Supsa oil pipeline, marked a significant milestone. This event underscored the growing importance of pipelines traversing Georgian territory and represented an initial substantial contribution by the EU to foster economic interaction between Georgia and Azerbaijan. The ownership structure of this pipeline was predominantly divided between BP, representing British capital with a 30.4% share, and SOCAR, which held a 25% stake (SOCAR, 2024). Another significant project was the Baku-Tbilisi-Ceyhan (BTC) oil pipeline, which became operational in 2006. This pipeline played a crucial role in transferring approximately 80% of Azerbaijan's crude oil exports. Ownership of the pipeline was shared among various stakeholders, including BP with a 30.1% stake and SOCAR with a 33.7% stake (SOCAR, 2024). It's worth noting that at that time, the UK was a member of the EU. The EU's support

here was not only limited to the financial support but extended to political backing of the projects which eased pressure from the northern neighbour.

When Azerbaijan started to export its natural resources to Europe Georgia began receiving 3.10 USD per ton for Baku-Supsa pipeline project and its share from this trade is 1.2 USD for each ton. Nonetheless, Russia opposed many larger projects, such as the Baku-Tbilisi-Ceyhan, which intended to transport resources through Georgia to Turkey. To further highlight the vitality of this pipeline, the first oil shipment to the Ceyhan port occurred on May 28, 2006, which also symbolizes Azerbaijan's 1918 independence from Russia. After a year, in 2007, the Baku-Tbilisi-Erzurum, or South Gas Corridor, was inaugurated. This megaproject boosted Georgia's importance for the region by transferring gas to Turkey. The impact of these pipelines on the Georgian economy cannot be overstated. According to former Energy Minister Natig Aliyev, Georgia transported 76.3 million tons of oil through its territory with just only Baku-Supsa pipeline between 1999 and 2016 (Babayeva, 2016), earning 91.56 million USD in revenue alone. Furthermore, the Trans-Anatolian Pipeline has enhanced Georgia's significance for the European Union, enabling the EU to access diversified gas sources via amicable territories.

The aftermath of the Second Karabakh War underscores that the European Union's engagement with the South Caucasus republics is primarily limited to economic interactions. This is largely due to the reluctance of both Turkey and Russia to relinquish their influence to Western powers voluntarily. Examining the relationship between Georgia and Azerbaijan reveals that their ties are predominantly economic and political relations playing a secondary role.

This cooperation extends beyond just carbohydrate resources to include green energy, which has recently become a trend. According to the International Renewable Energy Agency, Azerbaijan has a technical potential of 23040 MW of solar energy, 520 MW of energy from small hydropower plants, 3000 MW of wind energy, and 380 MW of bio-waste energy (Huseynli, 2023). Following the 2020 war, Azerbaijan regained control of its green energy resources, leading to a significant surge in green energy production. This increase followed the declaration by the President of Azerbaijan that the region would be designated as a "green energy" zone (Azerbaijan Renewable Energy Agency under the Ministry of Energy, 2024).

According to the European Commission's Green Paper of March 8, 2006, the EU aims to implement an energy policy focused on three key objectives, including sustainability. This involves actively combating climate change through the promotion of renewable energy sources and enhancing energy efficiency (The EU Comission, 2006). According to Romanian President Klaus Iohannis (2022), considering the current security challenges posed by military aggression against Ukraine,

enhanced cooperation and solidarity are essential to address shared challenges. Azerbaijan has emerged as an attractive partner for the EU in this context. During the same meeting where President Iohannis delivered his speech, leaders from Azerbaijan, Georgia, Romania, and Hungary signed an agreement for an underwater electric cable beneath the Black Sea. This cable aims to transport green energy from Azerbaijan to Europe (Euronews, 2022). The agreement entails the construction of a 1100-km electric cable with a capacity of 1000 MW under the Black Sea, connecting Azerbaijan to Romania (A news, 2022). This project is believed to reduce the EU's energy dependency on Russian exports, especially given the implications of the Ukrainian war.

Security and defence

Emma J. Stewart (2011) argued that Russia has been the primary competitor to the EU in terms of expanding normative power in the South Caucasus (Stewart, 2011). Amid this rivalry demonstrating the superiority of EU normative power in resolving territorial disputes through EU values, and thereby proving Russian normative power to be obsolete and inherently offensive, could bring the South Caucasus closer to the EU. However, after more than three decades of unsuccessful negotiations and conflict resolution attempts, the Nagorno-Karabakh issue could not be resolved through diplomatic means but instead through military action. This war undermined the EU's normative power in the region, which it had been promoting for a long time.

After the war, Azerbaijan gained geopolitical confidence, reducing its dependency on third parties in Armenia-Azerbaijan relations. Consequently, the EU needs to intensify its efforts to attract Azerbaijan. The war-hardened Azerbaijani army, now seen as a contributor to Caucasus stability (U.S. European Command, 2024), has garnered the attention of EU officials. Although the EU lacks its own effective military forces, NATO, of which only four EU countries (Austria, Malta, Cyprus, and Ireland) are not members, actively cooperates with South Caucasus states through several agreements. These include the Partnership for Peace with Azerbaijan and Armenia, and various military drills and systems upgrades in all respective countries.

The EU still maintains its European Union Monitoring Mission (EUMM) in Georgia, established after the August War in 2008. After the missed opportunity in Azerbaijan, the EU hopes to address this issue peacefully. The primary goals of the mission are to ensure that there is no return to hostilities, to facilitate the resumption of a safe and normal life for local communities living on both sides of the Administrative Boundary Lines (ABL) with Abkhazia and South Ossetia, to build confidence among the conflict parties, and to inform EU policy in Georgia and the wider region

(European Union External Action, 2024). Moreover, the EU's contribution to security extends beyond the monitoring centre. On December 14, 2023, the European Council granted candidate country status to Georgia (Delegation of the European Union to Georgia, 2023). This status granted Georgia the opportunity to receive over €100 million annually in technical and financial assistance, which will promote the rule of law and political stability. This opportunity is believed to strain Russian Georgian relations, which have already been fragile, potentially leading to a more assertive Russian foreign policy towards Georgia. Consequently, there is a belief that Georgia will take steps to balance Russia's influence in the region. For instance, the controversial "foreign influence bill", passed by the Georgian parliament, sparked massive protests among Georgians who claimed it could hinder Georgia's path to the EU and tilt the country towards closer ties with Russia (Brussels Times, 2024).

Even though the EU, Georgia, and Azerbaijan are interested in deep cooperation, there are still points of scepticism and resistance that the EU faces. Delcour and Wolczuk (2020) found that in both Georgia and Azerbaijan, the EU's role as a promoter of values encountered challenges, particularly regarding gender and minority rights. Additionally, the EU's promotion efforts of human rights were often perceived as meddling in domestic affairs. The findings suggest that the EU as an entity of International Relations also may do the only thing that they can do better than the others in order make the system work smoothly. The EU appears to face challenges in effectively pursuing all the objectives outlined earlier. It may need to consider prioritizing one objective, particularly in the South Caucasus region. The research proposes that focusing on economic pursuits, if not for all foreign policy endeavours, at least for the South Caucasus, could be beneficial. This assertion is grounded in the core purpose behind the EU's creation: to promote economic collaboration in Europe. This is evidenced by the establishment of the European Coal and Steel Community (ECSC) in 1951 as the inaugural step, prioritizing economic integration not initiatives like the Common Foreign and Security Policy (CFSP) which highlights political ambitions. Efforts such as the formation of a European Army ultimately ended in fiasco, further reinforcing this claim.

4. Comparison between EU’s approaching to Azerbaijan and Georgia

The EU’s approach to Georgia and Azerbaijan in terms of security is shaped by regional realities. While engaging in peacebuilding and conflict resolution, the EU acknowledges Russia’s entrenched presence in the region, particularly near Georgia’s breakaway republics (Abkhazia and South Ossetia), which border Russia. Despite this, the EU has taken no decisive steps to address these

conflicts since their inception, opting instead for a passive role focused on humanitarian aid rather than assertive political or military intervention.

This reluctance may stem from historical dependency on Russian energy resources. The EU feared that robust support for Georgia's territorial integrity could provoke Russia—which has formal alliances with the breakaway republics (NATO, 2014)—risking renewed military escalation and disruptions to resource flows to Europe. Even after the Ukraine war reduced EU reliance on Russian energy, the bloc appears inclined to maintain the status quo. This hesitancy could be attributed to competing priorities, such as the Ukraine crisis, internal EU disputes, and migration challenges or the EU was satisfied with the staus quo.

The EU's perceived indifference has strained its relationship with Georgia, slowing the latter's EU integration process despite strong domestic pro-EU sentiment. Some scholars argue that Georgia's recent overtures to Russia—the primary instigator of its territorial disputes—reflect a pragmatic shift to resolve the issue bilaterally. Ultimately, despite Georgia's longstanding reliance on the EU for diplomatic and economic cooperation, it has seen little tangible success in conflict resolution, both during the 2008 Russo-Georgian War and in its aftermath.

Regarding the Karabakh issue, we can divide the EU's involvement into two main phases: the period before the decisive 44-Day War (2020) and the period after it. Initially, the EU's approach to the region was similar to its approach to Georgia, reflecting a broader strategy that considered the South Caucasus as a whole while overlooking the distinct characteristics of each republic, including their domestic and foreign policies. However, there are several nuances that differentiate Azerbaijan from Georgia in this context. One key factor is the soft power of the Armenian diaspora within the EU, which has influenced the Union's stance. Another is the involvement of external actors, such as Turkey and Iran, who have significant interests in the region. Additionally, while the EU had a physical presence on the ground in Georgia, it was unable to implement a similar level of engagement in the former Nagorno-Karabakh issue. This reluctance has led to a perception in Azerbaijan, both among officials and the public, that the EU disproportionately promotes Armenian narratives, fostering Euroscepticism in the country.

After the second Karabakh war in 2020, the EU's involvement temporarily intensified, resulting in active negotiations in Brussels. However, this process was interrupted by the escalation of the Ukrainian-Russian conflict. During this initial phase, six high-level meetings were held in Brussels between 2021 and 2023, which generally fostered a positive atmosphere (Table 3). Notably, at the first gathering of the European Political Community, President Ilham Aliyev of Azerbaijan, Prime Minister Nikol Pashinyan of Armenia, European Council President Charles Michel, and French

President Emmanuel Macron met and achieved favorable outcomes, agreeing to deepen collaboration on border issues (Huseynov, 2022). However, this favorable atmosphere shifted during the Granada meeting, which took place without Azerbaijan's participation. Hikmat Hajiyev, Assistant to the President of Azerbaijan, explained the reason behind Azerbaijan's absence as a response to France's perceived destructive stance in the region. Specifically, he cited France's decision to send military supplies to Armenia and the refusal to include Turkey in the meeting as key factors. According to Hajiyev, these actions undermined the neutrality and balance required for constructive dialogue, leading Azerbaijan to abstain from the discussions (Hasanly, 2023).

Table 3. High Level Meetings Between Azerbaijan and Armenia facilitated by the EU

Meetings	Date	Parties	Discussed	Result
1st Brussel Meeting European Council (2021)	December 14, 2021	President Ilham Aliyev of Azerbaijan, Prime Minister Nikol Pashinyan of Armenia, and President Charles Michel of the European Council.	Humanitarian issues, prisoner exchanges, and border security.	Agreement to establish a joint commission on border demarcation.
2nd Brussel Meeting European Council (2021)	April 6, 2022		Peace negotiations, border issues, and transport links	Agreement to advance discussions on a peace treaty.
3rd Brussel Meeting Council of the EU (2022)	May 22, 2022		Progress on border demarcation and humanitarian issues.	Commitment to continue dialogue.
4th Brussel Meeting EU (2022)	August 31, 2022		Peace treaty negotiations and border security.	Agreement to intensify efforts toward a peace agreement.
5thBrussel Meeting Embassy of Azerbaijan to Belgium (2023)	May 14, 2023		Finalizing a peace treaty and addressing humanitarian concerns.	Commitment to further negotiations.
Prague meeting Huseynov (2022)	October 6, 2022	President Ilham Aliyev, Prime Minister Nikol Pashinyan, President Charles Michel, and French President Emmanuel Macron.	Border issues and humanitarian concerns.	Agreement to deploy an EU civilian monitoring mission to the Armenia-Azerbaijan border.

Granada Meeting Huseynov (2022)	October 5, 2023	The meeting was planned to include President Ilham Aliyev, Prime Minister Nikol Pashinyan, President Charles Michel, French President Emmanuel Macron, and German Chancellor Olaf Scholz. However, President Aliyev canceled his participation shortly before the meeting.	Peace treaty negotiations and regional connectivity.	Commitment to continue negotiations under EU mediation.

The approach that the EU used for each country changed based on both the Union's interests and the dynamics of the region. However, one constant in these approaches is that the EU acted as a pragmatic actor in international relations.

Conclusions

This study aimed to examine the role of the EU in shaping Azerbaijan–Georgia relations in the aftermath of the Second Karabakh War (2020), with a particular focus on economic, political, and security dimensions. To achieve this objective, the research employed a mixed-methods approach, combining discourse analysis of official speeches delivered by Azerbaijani and Georgian state leaders during bilateral visits post-2020, and qualitative content analysis of EU policy documents, press releases, and statements related to the South Caucasus. By categorizing the themes of these speeches and analyzing the EU's involvement across different sectors, the study identified the varying priorities of Azerbaijan and Georgia in their bilateral relations and assessed the extent and nature of the EU's influence.

Two major conclusions can be drawn from this research. The first conclusion is that Georgia and Azerbaijan prioritize their bilateral relations differently: Azerbaijan places more emphasis on economic aspects, while Georgia focuses on political considerations. This divergence likely stems from Georgia's desire to secure unwavering support for its territorial integrity, whereas Azerbaijan aims to enhance its intermediary role in global economic politics to attract more funds for the reconstruction of the newly acquired Karabakh region. Another conclusion is that the EU's role in the relations between Georgia and Azerbaijan appears to be more successful in the economic sector. This success stems from the EU's foundational purpose of revitalizing economic ties within Europe.

Considering the regional dynamics outlined above, several policy recommendations can be made. The EU should prioritize strengthening economic cooperation, with a focus on renewable energy projects, transport infrastructure, and investment in post-conflict areas such as Karabakh.

Additionally, the EU should support defense diplomacy by implementing training and capacity-building initiatives for the security institutions of both Georgia and Azerbaijan, ensuring that such efforts do not inflame tensions with Russia. Lastly, at the political level, the EU should adapt its engagement to align with the specific priorities of each country, placing particular emphasis on reaffirming Georgia's sovereignty and facilitate trilateral cooperation between Turkey–Azerbaijan–Georgia under EU auspices to enhance connectivity and trade efficiency.

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Navigating new trade winds: the EU's strategic response to RCEP in a shifting global economy

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Abstract

The trade strategy of the European Union has experienced substantial transformations in the initial two decades of the millennium, focusing on Asia, the strategy emphasises competitive bilateralism, shared values, and alignment with European trade standards. The EU's trade strategy has been influenced by Asia's economic expansion, trade interdependence, and regional accords such as the Regional Comprehensive Economic Partnership (RCEP). The significance of the RCEP for Europe is contentious, with sceptics emphasising its superficial characteristics and optimists underscoring its potential for trade and investment unification. The RCEP, an integral element of the Association of Southeast Asian Nations (ASEAN), represents a substantial transformation in regional economic collaboration. This paper examines the significant role of the EU in global trade agreements, focusing on its impact on the development of sustainable business practices, diplomatic relations, and economic progress. This paper is a descriptive analysis of the consequences of RCEP for the EU, including the challenges it presents and the opportunities it offers.

Keywords: RCEP, European Union, ASEAN, global trade, economic integration

Introduction

The global economic landscape is perpetually transforming, influenced by a complex interplay of trade agreements, geopolitical changes, and technological progress. A notable recent development is the Regional Comprehensive Economic Partnership (RCEP), a trade agreement involving 15 nations in the Asia-Pacific region, including prominent economies such as China, Japan, and South Korea. Following its implementation in 2022, RCEP emerged as the largest free trade agreement globally, representing nearly 30% of worldwide GDP and population (Aladdin, 2022). Although Europe is not a direct participant, the agreement significantly impacts its economic prospects. RCEP seeks to streamline and enhance trade among member nations by standardising rules of origin, lowering tariffs, and establishing frameworks for e-commerce, intellectual property, and investment.

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It builds upon existing bilateral and multilateral agreements, fostering a cohesive market that promotes regional economic integration (Borrell, 2020).

Historically, foreign trade and investment have served as catalysts for economic expansion, industrialisation, and wealth generation throughout Asia and the broader Indo-Pacific area. Since 1981, East Asia has consistently exhibited the highest rate of economic development among global regions, except for one year during the Asian financial crisis in 1998. To stimulate trade and investment, various bilateral and multilateral trade and investment agreements have been established in recent years, with the ASEAN Economic Community and the Comprehensive and Progressive Agreement for Transpacific Partnership (CPTPP) being the most significant (Capie & Evans, 2002). East Asia is increasingly integrating through trade, both internally and with the broader Indo-Pacific area. East Asia has the second largest intra-regional trade intensity, following Europe. RCEP represents the climax of a protracted endeavour for trade liberalisation and market integration in the world's most economically dynamic and significant region.

This paper examines the significant role of the European Union (EU) in global trade agreements, focusing on its impact on the development of sustainable business practices, diplomatic relations, and economic progress. The global trade agreements instituted by the EU are essential drivers of economic growth, both within the EU and among its trading partners. The European Union has enhanced market access for its goods and services through several accords, notably the Comprehensive Economic and Trade Agreement (CETA) with Canada and the Economic Partnership Agreement with Japan (Itakura & Lee, 2019). This greater access has led to economic growth, job creation, and enhanced living conditions for the country's population.

This study evaluates the potential impacts of RCEP on the EU and the challenges that may arise. This paper examines the RCEP's impact on the EU's trade policy, investment trends, and overall standing in the global economic framework. Considering the evolving dynamics resulting from RCEP, the paper assesses how the EU may modify its policies and initiatives. Therefore, it aims to provide scholars, legislators, and corporate executives valuable insights into the interconnections among these pivotal actors in the global economy through a comprehensive investigation of the subject. Moreover, the EU's trade agreements often incorporate provisions that promote equitable competition, protect intellectual property rights, and reduce or eliminate tariffs. These initiatives establish a more predictable and stable enterprise environment, fostering investment and trade growth. The EU's dedication to open and rules-based commerce has advantaged its member states and provided a paradigm for other nations to replicate.

In addition to economic consequences, the EU's worldwide trade accords significantly contribute to the enhancement of diplomatic relations internationally. Trade discussions extend beyond tariffs and quotas, providing positive communication and collaboration possibilities. Trade agreements promote diplomatic dialogue and foster confidence between states, enhancing global stability and peace. The EU's trade agreements frequently incorporate human rights, employment standards, and environmental protection stipulations. These features incentivise partner countries to harmonise their policies with international standards, advancing ideals that the EU cherishes. Consequently, the EU's trade agreements serve as instruments for fostering beneficial global change (European Commission, 2021). The commitment of EU global trade agreements to promoting environmentally sustainable corporate practices is a hallmark of these agreements. Moreover, the EU's trade agreements frequently promote the establishment of sustainable supply chains, thereby mitigating adverse environmental and social effects linked to manufacturing and trade. These agreements enhance global trade's ethical and sustainable framework by implementing responsible sourcing and manufacturing criteria.

The subsequent sections of this paper provide a detailed evaluation of the evolving trade dynamics between the European Union and the Regional Comprehensive Economic Partnership (RCEP). Although the EU is not a member of RCEP, the agreement’s vast economic footprint significantly influences the EU’s trade environment and strategic interests. The paper explores how RCEP reshapes global trade patterns, assesses its direct and indirect impacts on the EU’s economic and policy landscape, and identifies the challenges this presents for European businesses and policymakers. Furthermore, the analysis highlights the potential opportunities that RCEP creates for the EU, such as new avenues for trade cooperation, investment diversification, and enhanced engagement with the Asia-Pacific region. By examining these aspects, the study aims to provide a comprehensive understanding of the strategic adjustments the EU may need to consider in response to the shifting global economic order shaped by RCEP.

1. EU and RCEP: evolving trade dynamics

The RCEP allows the EU to strengthen its economic involvement with the Asia-Pacific region. The EU can enhance its market access by investigating prospective trade deals or collaborations with RCEP member nations, promoting economic growth and employment opportunities. Incorporating RCEP member nations into global supply chains is anticipated to alter production and trade dynamics. The EU may strategically capitalise on these trends by modifying its trade tactics and industrial

policies. The RCEP has geopolitical ramifications, especially with China assuming a prominent position in the accord. The EU can utilise its reaction to the RCEP to enhance its diplomatic contacts and partnerships in the Asia-Pacific region (Rahman, 2024). The success of the RCEP highlights the significance of multilateral trade accords. The EU may leverage its substantial expertise in trade talks to promote the rejuvenation of multilateral trade dialogues while reaffirming its dedication to a rules-based global trading framework.

The RCEP is anticipated to exert considerable influence on the global economy. Establishing the world's largest free trade area can augment commercial flows and economic interconnectedness among member nations. Its objective is to streamline customs processes, diminish tariffs, and enhance market accessibility for goods and services. The agreement encompasses various domains, including intellectual property, e-commerce, and competition regulation, which can foster a more cohesive and efficient regional market. The diminishment of trade barriers and the standardisation of rules can decrease trade costs and enhance the competitiveness of enterprises within the RCEP zone (Plummer, 2021). This may result in heightened investments, technical transfer, and innovation, propelling economic growth. Moreover, the agreement can enhance supply chains by offering other options for acquiring materials and components, thereby increasing the region's resilience to external disruptions.

Although the European Union (EU) does not participate in RCEP, the agreement's execution may indirectly influence the EU's economic environment. The EU has consistently supported multilateral trade agreements and regional integration. The establishment of RCEP may motivate the EU to enhance its trade relations with RCEP member states to prevent exclusion from the expanding economic prospects in the Asia-Pacific region. The EU may utilise its current trade agreements and negotiations with significant RCEP members, including Japan, South Korea, and Vietnam, to strengthen its economic relations with the region (Tommy Koh, 2020). By doing so, the EU can capitalise on the economic growth and market expansion facilitated by RCEP. Furthermore, the EU may pursue new trade agreements or partnerships with additional RCEP members to diversify its trade portfolio and mitigate dependence on any singular market.

Strategically, the EU can leverage the implementation of RCEP to promote elevated standards in trade agreements, especially for worker rights, environmental protection, and sustainable development. By advocating these principles, the EU may differentiate its trade policies from the RCEP's and entice similarly aligned nations to participate in its projects. The RCEP signifies a substantial transformation in the global trading environment, offering prospective advantages for its member nations and indirect consequences for the EU (Drysdale & Armstrong, 2021). The EU may capitalise on this chance to enhance its economic relations with the Asia-Pacific region, advocate for

elevated trade norms, and secure its position as a significant participant in the changing global economy.

1.1. Fundamental elements of EU Trade Policy

The European Union (EU) has positioned itself as a significant economic force and a crucial participant in global commerce. Trade policy is defined by principles and structures designed to promote economic growth, ensure equitable competition, and encourage sustainable development. It offers a concise summary of the principal characteristics that delineate the EU's trade policy and prepares for a more in-depth examination of its diverse elements. Trade has consistently been a fundamental pillar of the European Union, considerably enhancing the region's economic growth and global standing. The European Union's trade policy aims to establish a stable and predictable environment for enterprises, consumers, and trading partners (European Commission, 2021). It includes various measures such as trade agreements, regulatory norms, and enforcement methods.

A primary objective of the EU's trade strategy is to expand market access for European enterprises while safeguarding their interests. This entails establishing extensive trade agreements with nations and regions globally. These agreements seek to diminish tariffs, eradicate trade obstacles, and formulate investment, intellectual property, and services regulations. In doing so, the EU aims to establish equitable conditions for its enterprises and bolster their competitiveness in the global marketplace. The EU's trade policy fosters economic growth and adheres to stringent standards in worker rights, environmental protection, and human rights (European Parliament, 2021). The EU endeavours to ensure that its trade agreements embody these ideals, fostering sustainable development and ethical corporate practices. This strategy benefits the EU and aids worldwide initiatives tackling climate change and socioeconomic inequality.

A significant aspect of the EU's trade strategy is its focus on multilateralism and collaboration. The EU engages in international organisations like the World Trade Organisation (WTO) and endorses initiatives to enhance the global trade system. The EU seeks to collaborate with other nations and regions to tackle shared challenges and advance a rules-based world order. In summary, the EU's trade policy is defined by its holistic approach, dedication to elevated standards, and emphasis on multilateral collaboration. These attributes have positioned the EU as a prominent participant in global trade, influencing the regulations and standards that dictate international commerce (Plummer, 2021). The subsequent sections will explore the individual elements of the EU's trade policy, offering a comprehensive study of its principal components and their influence on the world economy.

The EU is assertive in its commercial dealings, seeking contemporary Free commercial Agreements (FTAs) encompassing rules of origin, services, intellectual property rights, public procurement, subsidies, competition, sustainability, and regulatory collaboration. The Director-General for Trade must mitigate non-tariff barriers (NTBs) to secure approval. Free Trade Agreement talks are protracted, challenging, and frequently unproductive owing to these stringent qualitative criteria. The EU seeks to advance and implement European and worldwide standards via Free Trade Agreements (FTAs), encompassing rules of origin, industrial regulations, food safety, and data protection. It emphasises the execution of trade agreements to establish equitable conditions and enhance regulatory authority, especially in green and digital transformation (European Commission, 2021). The EU mitigates protectionism by prioritising the enhancement of living and working circumstances and compliance with worldwide standards, such as those established by the worldwide Labour Organisation, instead of elevating European norms.

The European Union's trade strategy is shaped by economic, political, and security considerations, emphasising the promotion of European ideals and standards. This policy is shaped by the Treaty of Lisbon, the 2009 Common Approach, and trade strategies from 2015 and 2021. The EU anticipates that partners will acknowledge political stipulations, including human rights, the rule of law, democracy, peace maintenance, and the non-proliferation of weapons of mass destruction. The European Union (EU) has ceased negotiating trade and investment protection concurrently, opting to pursue either distinct accords or one of the two separately. The Commission seeks to guarantee that comprehensive trade agreements necessitate approval from the Council and the European Parliament. In contrast, Investment Protection Agreements (IPAs) mandate national ratification in all member states (Windischer, 2019). The EU has evolved from a mercantilist stance inside the GATT framework to an advocate of the WTO system, in contrast to the US's reluctance towards regulations and China's state-driven economy. Notwithstanding competitive bilateralism, the EU continues to uphold the centrality and reform of the WTO.

1.2. The EU's trade realignment with Asia and the Indo-Pacific

The EU encounters difficulties in its connections with Asia owing to its intricate political and legal framework, protracted decision-making processes, and competition between the EU and member states regarding foreign and trade policy. As a result, engagement with Asia has remained slow and ineffective, with Europe being late to recognise the region’s growing economic and political influence. The European Union's strategy towards Asia has been reactive, characterised by a more

stringent 'Asia Strategy' founded on the New Asia Strategy established by the European Commission in 1994. The Asia-Europe Meeting (ASEM) commenced in 1996, emphasising political, economic, and social collaboration between Asia and Europe (INTA committee, 2021). It currently comprises 51 nations, ASEAN, and the EU. ASEM has facilitated tighter ties between the two areas; nonetheless, its potential remains unfulfilled due to ambiguous policy aims and indistinct contributions. Due to sluggish engagement, the EU faces challenges in establishing a substantial political presence in Asia.

Europe's interest in Asia has historically centred on trade and economic growth dynamics. It remained unclear which geopolitical objectives the EU should pursue in Asia and the Indo-Pacific area, whose significant strategic importance could no longer be overlooked in the new millennium. The EU has established strategic cooperation with ASEAN and strategic relationships with Japan, South Korea, China, and India (Gunther, 2022). The EU has been sluggish and tardy in elucidating its regional political, security, and governance interests. In 2016, the European External Action Service (EEAS), the EU's diplomatic entity, asserted that the EU should fully leverage its economic capabilities to fulfil its security objectives within its comprehensive foreign policy framework.

In 2018, as a first response to China's Belt and Road Initiative, the EU said that its principles of 'connectivity' are sustainability, comprehensiveness, and adherence to norms. The EU has committed to investing €300 billion in infrastructure in poor and emerging nations through its recent Global Gateway Initiative in collaboration with partners. Significantly, a comprehensive EU policy strategy for the Indo-Pacific region was established in 2021 after the national Indo-Pacific strategies of three member states: France, Germany, and the Netherlands. The EU declared its political commitment to prioritise the Indo-Pacific area. A framework for strategic involvement in the Indo-Pacific region has been established (European Union, 2021). One of the seven focal areas is sustainable and inclusive prosperity, encompassing trade. Another domain encompasses digital governance and partnerships, which involve trade. Trade policy will henceforth be integrated into a broader European strategy for the Indo-Pacific area.

Nonetheless, the EU's political strategy for the Indo-Pacific lacks an internal dimension. The economic vitality of the Indo-Pacific and the evolving unfair trade agreements in the region have significantly impacted Europe's trade, trade policy, and broader foreign policy agenda. No discernible influence on Europe's regionalisation trend can be observed. The global financial crisis and the ensuing euro crisis compelled the EU, already the most liberalised and interconnected economic union globally, to advance its integration further in the 2010s. The European Semester, an annual assessment of national budgetary, fiscal, economic, and social policies established in 2011, compelled

member states impacted by the euro crisis to adopt stringent structural adjustment programs and deregulate their markets. Secondly, agreements were established to form a capital markets union and a banking union (INTA committee, 2021). Consequently, RCEP and Asia likely did not significantly influence recent European regionalisation patterns despite prevalent expectations of drawing Asian investment due to successful structural reforms.

1.3. Influence of EU Member Countries

The European Union's trade policy is formulated by the Commission, which represents the EU and its member states, acting on their behalf. The Commission's function is to propose and enforce policy directives agreeable to all member states, notwithstanding considerable European discord about critical policy matters. Alterations in government frequently result in modifications to national trade policy direction. The European Union's trade policy is under discussion, with proponents of liberalism asking for access to Asian export markets and economic parity, while mercantilists demand protection against inequitable imports. Denmark, Luxembourg, the Netherlands, and Sweden advocate for a liberal trade policy. Meanwhile, Central and Eastern European nations such as the Czech Republic, Poland, Slovakia, and the Baltic states endorse a mercantilist strategy (Telegraph, 2004).

EU member states largely concur on the necessity for more Free Trade Agreements (FTAs) with Indo-Pacific nations, except for Austria and Bulgaria. The majority endorses a comprehensive trade agreement spanning the entire area, including CPTPP nations or the ASEAN group. Possible FTA partner nations comprise Australia, New Zealand, Indonesia, and India. Nevertheless, only 10 member states endorse the inclusion of China in a comprehensive agreement or the establishment of a free trade agreement solely with China. The EU perceives the Indo-Pacific area as a substantial economic opportunity; however, most member states prioritise foreign policy and security concerns over economic and political interests (Official Journal of the European Union, 2016). Only Germany, the Netherlands, and France, which have formulated a national Indo-Pacific policy, emphasise these elements. There are varying perspectives on employing trade and investment policies to attain non-trade goals, including sustainability and the preservation of human rights, as well as the equilibrium between European trade and investment interests and national regulatory aims. Member states possessing robust civil societies prioritise these matters and champion them within the European Council and Trade Policy Committee.

Germany and France have significant roles in the EU's trade policy concerning the Indo-Pacific and RCEP, but for distinct reasons. Germany, the predominant economy within the EU, holds

significant importance for EU–RCEP trade. In 2020, Germany represented 40.4% of total EU-27 exports to RCEP, exceeding the combined exports of the five major exporting countries: France, the Netherlands, Italy, Spain, and Belgium. Moreover, Germany serves as the conduit for RCEP exports from other EU member states, particularly those in Central Europe, via the industrial supply networks of German enterprises. Germany's trade policy issues about the RCEP region are significantly influenced by the country's export strength, thus holding considerable importance within the Commission. France, with overseas territories in the Indo-Pacific housing 1.5 million French citizens, regards itself as a regional resident power. France's foreign and security policy issues are also those of the European Union (Borrell, 2020). Consequently, they must also be considered in the EU's trade policy. Furthermore, as RCEP's second most significant trading partner in Europe, France possesses critical defensive and offensive economic interests that must be acknowledged.

1.4. RCEP and EU-ASEAN cooperations

The connection between the Association of Southeast Asian Nations (ASEAN) and the European Union (EU) has developed for over forty years. In 1972, the EU, then known as the European Economic Community, formed informal relations with ASEAN. In 1977, the EU became an ASEAN Dialogue Partner, and the ASEAN-EEC Cooperation Agreement was signed in 1980. In 2012, the EU became the inaugural regional organisation to agree to the Treaty of Amity and Cooperation in Southeast Asia (TAC). In 2020, the EU and ASEAN established a Strategic Partnership, signifying a new phase in their partnership. The EU-ASEAN Commemorative Summit marked 45 years of dialogue and collaboration in 2022. The EU ranks as ASEAN's third-largest trading partner, whereas ASEAN is the EU's fifth-largest trading partner. The European Union is the largest source of foreign direct investment in ASEAN, constituting 24% of the total (Zreik, 2021). The collaboration between ASEAN and the EU is expanding, emphasising diplomacy, trade, and the joint resolution of global concerns. The emergence of RCEP as a prominent economic bloc in the Asia-Pacific region presents new opportunities and challenges for the EU to enhance its trade relations with ASEAN countries. Bilateral and international institutions are anticipated to facilitate these connections, which will have significant implications for specific sectors.

The European Union has been forced to reevaluate its economic engagement strategy with Asia because of the alterations in the regional commercial landscape brought about by the RCEP. The European Union, a proponent of multilateralism, would find it advantageous to embrace a more nuanced strategy that integrates multilateral and bilateral trade agreements. The EU may adopt a

multilateral strategy on the RCEP, exploring the potential for a comprehensive regional trade agreement or partnership. This strategy enables the EU to leverage the collective economic might of RCEP member states to get improved trade terms and enhanced market access (Zyla, 2020). The European Union could gain from establishing bilateral agreements with specific ASEAN countries, particularly in sectors with evident economic synergies or common goals. The digital services, environmental technology, and advanced manufacturing sectors provide possible focal points for these accords, considering the EU's comparative advantages and strategic goals in these domains.

2. RCEP's impact on the European Union

A primary issue for Europe is the possibility of trade diversion. European enterprises may encounter competition from RCEP member nations, perhaps resulting in a diminished trading influence for the EU. The RCEP is anticipated to enhance economic integration in the Asia-Pacific region, potentially yielding both advantageous and detrimental consequences for Europe. On the one hand, it may result in enhanced trade and investment prospects for European enterprises. Conversely, it may hinder Europe from establishing future trade regulations. The agreement may adversely affect European policy, resulting in a diminished trading authority for the EU and the potential exclusion from future trade rule-making initiatives (Dadush, 2020). To alleviate these concerns, the EU possesses other trade policy alternatives, such as finalising free trade agreements with RCEP member nations or other trading partners in the Indo-Pacific area. In summary, although RCEP is unlikely to exert a substantial direct economic influence on Europe, it offers both difficulties and opportunities for European enterprises and politicians.

2.1. The economic repercussions

A primary economic concern for the EU is the potential for trade diversion. The RCEP's reduction of trade barriers among member nations may shift towards intra-regional trade, redirecting trade flows from the EU. European enterprises may encounter intensified rivalry from RCEP nations in critical sectors. The EU may have challenges in accessing the RCEP markets. The absence of a direct trade deal with RCEP members may result in elevated tariffs and non-tariff barriers for EU exports, impacting market opportunities and competitiveness (Whitman, 2007). The integration of RCEP into global supply chains may disrupt current production and trade patterns, affecting the EU's supply chain operations. The EU must adjust to these changes to maintain competitiveness. The

efficacy of RCEP may rejuvenate multilateral trade discussions. The EU, historically an advocate of multilateralism, today confronts the task of navigating an increasingly multipolar economic landscape, wherein regional agreements such as the RCEP hold substantial influence. The EU must identify strategies to engage effectively in the changing economic landscape while maintaining the relevance and strength of the multilateral trading system.

The RCEP agreement liberalises tariffs and harmonises origin regulations, facilitating intra-RCEP trade within the free trade zone while influencing external trade with third nations, particularly the EU. This may result in trade diversion, given that EU exports to the RCEP region constitute more than one-fifth of overall EU exports. Trade diversion among RCEP member nations will fluctuate according to tariff liberalisations. The EU will not encounter further trade distortions in ASEAN, Australia, and New Zealand (Tindemans, 1975). Eliminating discriminatory tariffs in trilateral commerce among Japan, Korea, and China may adversely affect European exporters. China's tariff concessions may be an advantage over Japan and Korea; however, this will be tempered by extended transition periods.

Trade analysts forecast annual export losses amounting to billions of dollars for the EU due to RCEP agreements, while also expecting beneficial welfare impacts stemming from heightened import demand and reduced export prices due to a more efficient manufacturing system. The RCEP's long-term dynamic effects on value, supply chains, investment, and economic growth will enhance the attractiveness of the RCEP region, necessitating adaptations by European enterprises to legal and structural modifications (Kim, 2022). The EU prioritises investment in the expanding RCEP free trade area, especially in member countries that have established bilateral agreements with the EU or are close to doing so, as they provide accessible market entry and an integrated corporate landscape. The escalating import demand and tariff reductions inside the RCEP free trade area may incentivise European corporations to invest. The region's permissive laws of origin enable value-added production from European sources, promoting engagement in expanding markets. Enhanced regional trade integration reduces transaction costs, increases specialisation, and improves export facilitation. A robust economic presence facilitates growth and industrial enhancement. Incorporating market dynamics into the largest free trade zone threatens Europe's technological and economic competitiveness (Borrell, 2020). Companies headquartered in the EU have restricted access to trade networks and may delay adopting new technologies. Politics and business must ensure that comparative advantages do not disadvantage the EU.

2.2. The political consequences

The RCEP, a superficial trade deal, can influence global trade dynamics and regulations. As the economic hub of the EU, it has the potential to shape trade and foreign policy. The primary ramifications of the EU encompass the redistribution of international commercial authority, the shaping of regulations and standards, and the influence on trade multilateralism and the WTO. The RCEP trading bloc, which includes East Asia, Australia, and New Zealand, substantially modifies international trade policy. It advantages ASEAN and China by reconciling enduring tensions and fostering self-assurance (Young, 2017). Nonetheless, non-RCEP trade nations like the EU possess bargaining strength. This poses a challenge to the EU's market authority and regulatory influence. The EU must enhance its single market and negotiate trade agreements with significant global actors to ensure access to international commerce and manufacturing networks. The members of RCEP possess diverse regulatory systems and standards. Aligning legislation with EU standards poses challenges due to the necessity of mutual agreements and revisions, which demand considerable time and effort. The intellectual property rights and data protection standards vary among the RCEP nations. The EU's robust stance on data privacy and intellectual property protection may clash with the policies of certain RCEP members.

Despite its superficial characteristics, the RCEP pact possesses the capacity to influence global trade regulations and standards. It may be significant in formulating new trade regulations with the EU, the US, Japan, and the CPTPP. China, Japan, Korea, and ASEAN may aspire to establish themselves as preeminent standard-setters within the 2035 plan. China occupies a pivotal position in the RCEP, both economically and geopolitically. The EU has a problem navigating its relationship with China, considering the nation's increasing influence in the area via the RCEP. Achieving an equilibrium between competitiveness and collaboration with China is a multifaceted diplomatic challenge (Hu, 2021). The advent of RCEP introduces a novel aspect to the global economic framework, potentially contesting the EU's status as a principal proponent of a rules-based international trading system. The EU must manoeuvre through a changing global environment while safeguarding its ideals and interests. The EU can impact this process by participating in collaborative standard-setting with RCEP, particularly because the agreement enhances trade regulations. The EU may use previous free trade agreements with Japan, Korea, Singapore, and Vietnam while establishing norms for sustainable value chains and rules-based commerce (Itakura & Lee, 2019). The magnitude of RCEP renders it a significant factor in the multilateral trading system since it has the potential to bifurcate global trade into RCEP and non-RCEP categories. Nonetheless, the RCEP

may adopt protectionist measures, potentially inciting political responses from larger member nations. The EU should remind RCEP member nations of their responsibilities to the multilateral system and their obligations under the WTO and the RCEP agreement.

2.3. ASEAN as an economic community: consequences for the EU

The EU might encounter several challenges and problems stemming from the emergence of ASEAN as an economic community. This action aligns with ASEAN's broader goals for economic community development, aimed at establishing a more dynamic, interconnected, and competitive Southeast Asian market. The European Union must modify its policies and strategically address the potential and challenges ASEAN presents as it develops a more robust economic bloc. The ASEAN member states have collaborated to reduce tariffs, standardise investment and trade regulations, and liberalise trade in goods, services, labour, and capital in their quest for economic integration (Shimizu, 2021). These efforts aim to establish a cohesive manufacturing base and market akin to the internal market of the European Union. This trend towards enhanced integration yields two advantages: it enhances ASEAN's position in the global economy and renders it a more significant commercial and investment ally for the European Union.

The economic integration of ASEAN presents enhanced trade and investment potential for the European Union. Due to a more integrated ASEAN market, European enterprises may benefit from streamlined regulatory frameworks and potentially enhanced economies of scale. These enhancements are poised to benefit the infrastructure, energy, technology, and services sectors, representing domains where the European Union possesses a comparative advantage. ASEAN's standardised regulations and enhanced market accessibility may facilitate the expansion of European Union enterprises throughout Southeast Asia. However, specific challenges accompany ASEAN's development as an economic entity (Ravenhill, 2008). Certain European companies may have disadvantages in specific sectors due to the heightened competitiveness of ASEAN firms and the region's enhanced economic connections with other significant economies via accords such as the RCEP. To maintain its regional market share and economic advantage, the European Union must respond strategically.

The EU may need to adopt a more stringent approach to trade matters, potentially by engaging in FTA negotiations with ASEAN or its member nations. Enhancing European companies' access to ASEAN markets and securing more favourable trade conditions could equalise competition. The EU and ASEAN may collaborate to further mutual growth objectives by enhancing cooperation in green

technology, sustainable development, digital innovation, and other areas of shared interest (Borrell, 2020). The European Union's foreign policy should be reassessed to address the shifting power dynamics in the region as part of its strategic response. The EU's effectiveness in engaging ASEAN collectively may hinge on its capacity to maintain robust bilateral relationships with individual member states.

By implementing this dual strategy, the EU might protect its interests and effectively navigate the complexities of regional politics and economics. To enhance ASEAN's community-building efforts, the EU might leverage its proficiency in regional integration. Through the exchange of expertise in economic policy, regional governance, and regulatory harmonisation, the EU and ASEAN might establish a more robust alliance and create a foundation for a sustainable economic partnership, which would be advantageous to both ASEAN and the EU's integration initiatives.

3. RCEP: opportunities for the EU

The EU's trade policy is constrained by its capacity to attain outcomes contingent upon partner endorsement of its plans. The EU Commission, as an autonomous liberal entity, must operate per the EU member states and the European Parliament (EP), which sometimes provides difficulties. The EU's trade policy plan must be aligned with member states and the European Parliament, and it should garner support from both entities. The latest review of EU trade policy neglects to consider Asia and the Indo-Pacific area, despite their significance. Collaboration among aligned regional stakeholders is crucial for upholding a rules-based trading system. The EU favours bilateral discussions to advance commercial interests and fundamental objectives such as human rights, sustainable development, and the rule of law; nevertheless, dangers encompass protracted and perhaps unsuccessful negotiations. The Commission is pressured to accelerate negotiations and implement a more comprehensive regional strategy (European Commission, 2021). The EU may establish free trade deals with partners outside the RCEP region, particularly India, to mitigate China's increasing utilisation of trade as a political instrument. Both parties have consented to resume negotiations, and the EU is prepared to engage with the US regarding tariff reductions and market access.

The EU might rejuvenate EU-ASEAN relations by reassessing an ASEAN-EU Free Trade Agreement, concentrating on current negotiations with Indonesia. The ASEM route, which the EU and its Asian partners have underutilised, may facilitate a comprehensive trade initiative impacting the entire region and fostering consensus. The EU should contemplate connecting directly with RCEP

and CPTPP to address significant concerns. The EU may collectively negotiate free trade with the CPTPP, improving market access and augmenting its economic influence in Asia's market-oriented commerce (Itakura & Lee, 2019). This may incentivise the US to rejoin the CPTPP, circumventing exclusion from global trade regulations and positioning itself as an economic and political participant in the Indo-Pacific area. Nevertheless, complete EU accession to the CPTPP would be challenging due to substantial trade liberalisation initiatives and regulations, and establishing an equivalency framework would be protracted and onerous. The EU's participation might potentially fortify the multilateral trade framework.

Although the European Union (EU) is not a partner in the Regional Comprehensive Economic Partnership (RCEP), the deal presents various prospective advantages for the EU and its member states. These modifications can enhance economic engagement, identify resolutions to mutual issues, and strengthen diplomatic and commercial relations.

The most significant opportunity for the European Union from the side of RCEP is the enhanced economic involvement; the RCEP region represents one of the most extensive and most rapidly expanding economic sectors globally, offering the EU substantial prospects to intensify its economic involvement (Hu, 2021). Through collaboration with RCEP countries, the EU may access a substantial market with a growing middle class, potentially enhancing European exports, investments, and employment opportunities. The EU may investigate the potential for bilateral trade deals with RCEP member nations. Although the RCEP seeks regional integration, individual member nations maintain trade policies and may negotiate independent accords with the EU. Bilateral agreements would facilitate the EU in forging tighter relations with pivotal nations in the RCEP region. promotion of European values and standards, the EU can leverage its legal framework and standards to motivate RCEP members to conform their practices to European principles. The EU can compel the RCEP nations to conform to elevated norms by promoting ethical corporate practices, environmental sustainability, and labour standards.

Participation in global supply chains, the RCEP regional integration, can potentially transform global supply networks. The EU may strategically align within these supply chains to capitalise on the RCEP trade flows. Through promoting collaboration and trade links, the EU can secure its ongoing position as a pivotal participant in global production networks (Capie & Evans, 2002). The RCEP has stipulations about trade in digital services and technology. The EU, known for its creativity and technological expertise, can pursue collaborative opportunities in these domains. This may result in knowledge transfer, research collaborations, and business prospects in emerging markets. The RCEP nations share a mutual interest in tackling environmental issues. The EU may leverage its

expertise in sustainable practices and climate initiatives to collaborate with RCEP members on environmental matters, including clean energy, sustainable agriculture, and waste management.

The formation of RCEP carries geopolitical ramifications, particularly due to China's pivotal involvement in the accord. The EU can leverage its reaction to the RCEP to enhance diplomatic and strategic alliances with nations in the Asia-Pacific region while preserving a balanced stance in its international dealings. The achievement of RCEP underscores the significance of multilateral trade accords. The EU may leverage its substantial expertise in trade talks to promote the rejuvenation of multilateral trade dialogues while reaffirming its dedication to a rules-based global trading framework (INTA committee, 2021). The Regional Comprehensive Economic Partnership (RCEP) holds substantial consequences for the European Union (EU). Both RCEP and the EU profoundly influence global economic dynamics. The RCEP's trade-oriented framework promotes regional integration in the Asia-Pacific, whereas the EU's regulatory authority and unified market model establish global standards. Collectively, these frameworks provide insights into regional collaboration while highlighting issues such as achieving equitable development, preserving unity, and responding to geopolitical changes.

Conclusions

The Regional Comprehensive Economic Partnership (RCEP) signifies a substantial transformation in the global economic framework, with important consequences for Europe. As the most significant free trade agreement globally, comprising a substantial share of the world's population and GDP, RCEP's impact transcends its member states, offering difficulties and opportunities for the European Union. Europe must manoeuvre through this novel economic landscape with strategic forethought. The possibility of trade diversion is a significant concern since European enterprises encounter heightened competition from RCEP member nations. This competition may result in a diminished trading capacity for Europe, requiring a reassessment of trade tactics. This problem also allows European businesses to innovate and enhance their competitive advantage in the global market.

The European Union is reassessing its trade and investment policies and contemplating its role and approaches within the international trading system as part of its strategic adaptation. The European Union can navigate this new economic environment by participating in bilateral and international endeavours and focusing on sectors with a competitive advantage. If ASEAN is committed to forming an economic community, the EU would serve as an exemplary partner, given

its history of regional integration. Enhancing EU-ASEAN relations through joint initiatives in ecologically sustainable practices, digital innovation, and regulatory harmonisation could benefit both areas. The EU can leverage these collaborations to influence economic governance standards in alignment with its objectives and priorities.

The economic integration of the Asia-Pacific region, enabled by RCEP, is a significant factor. This integration may enhance European firms' trade and investment prospects, but also risks marginalising Europe in developing future trade regulations. In response, Europe must proactively engage in discussions with RCEP member nations and endeavour to assert its influence through strategic alliances and accords. The policy implications of RCEP are significant. The EU must modify its policies to respond to changing economic trends and maintain its position as a significant participant in global trade. This may entail finalising free trade agreements with RCEP member nations or other trading partners in the Indo-Pacific region. By doing so, Europe can alleviate the dangers of exclusion from future trade rule-making processes and maintain its significance in the global economy.

The advent of RCEP undeniably influences the economic landscape of Europe. The deal does not threaten Europe's economic stability but necessitates a proactive strategy to preserve its competitive advantage. European enterprises and governments must collaborate to capitalise on the benefits offered by RCEP while confronting the associated problems. The impact of RCEP on Europe is complex, encompassing trade diversion, economic integration, and policy modifications. The attitude of Europe to this emerging economic landscape will dictate its future position in global trade. Through adopting innovation, cultivating strategic alliances, and modifying policies to align with the changing economic landscape, Europe can effectively address the problems posed by RCEP and capitalise on its benefits. The way ahead is evident: proactive involvement, strategic anticipation, and a dedication to preserving Europe's status as a significant participant in the global economy.

The EU must recognise RCEP's challenges, including expanding its political and economic clout and the heightened competitiveness in critical sectors. The EU must invest in innovation, enhance its digital economy, and bolster its competitive edge in high-value sectors to adapt to the new economic landscapes created by RCEP. Maintaining a nuanced equilibrium in interactions with other significant global actors is crucial for the EU's strategic positioning, as is enhancing ties with ASEAN and its individual member states.

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Demographic ageing in Romania and the EU countries: a quantitative approach using a composite index

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Abstract

This study presents a comprehensive methodological approach to construct a composite index of demographic ageing, with a particular focus on Romania in comparison to the other 26 Member States of the European Union (EU). Drawing on data from 2000 to 2022, the research integrates multiple demographic indicators, such as birth and death rates, ageing and dependency ratios, migration flows and population structure into a single index. Using Principal Component Analysis (PCA) for weighting and aggregation, the index captures both the magnitude and dynamics of the ageing phenomenon across countries. The findings reveal significant heterogeneity in ageing patterns across the EU, with Romania positioned in an intermediate but upward trajectory. The study contributes to the literature by offering a replicable, multidimensional tool for comparative demographic analysis and underscores the urgent need for data-informed policy responses to address the socioeconomic impacts of population ageing.

Keywords: demographic ageing, composite index, European Union, Romania, dependency ratio

Introduction

The demographic transformations of recent decades represent a major challenge for all European Union Member States, including Romania. Phenomena such as declining birth rates, increasing life expectancy, population ageing and large-scale external migration have led to significant changes in population structure, with visible effects on both economic and social balances, carrying profound implications for labour markets, public health systems, social protection scheme and economic sustainability.

Demographic ageing constitutes one of the most serious challenges currently facing Romania, as well as both developed and less developed countries. These demographic changes have far-reaching consequences for the labour market, as well as for healthcare and pension systems.

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From a statistical perspective, demographic ageing is a multidimensional process that cannot be fully captured by a single indicator. Therefore, composite indices provide a valuable methodological alternative by integrating multiple indicators into a single, standardized measure, allowing for a more comprehensive and comparable evaluation across countries and time periods. This study adopts a quantitative methodology, constructing a composite index to measure and compare the degree of demographic ageing across Romania and other EU countries over the period 2000–2022.

This paper aims to conduct an analysis of a composite index built using a couple of demographic variables that are relevant for the demographic ageing phenomenon. The methodological approach involves the selection of key demographic indicators, such as total population, birth rate, mortality rate, demographic ageing rate and dependency rate, active population replacement rate and net migration. From the methodology, PCA is used for dimensionality reduction and to identify the latent factors that explain most of the variance in the dataset. The extracted components are then interpreted and used to construct the composite index.

The resulting composite index synthesizes the initial set of variables into a unidimensional score, which serves as the basis for comparing countries in terms of the intensity and evolution of demographic ageing.

The objective is to highlight the extent to which Romania's demographic trajectory aligns with or diverges from the European average, the focus being on the demographic ageing pattern. Based on the findings and the values obtained by the composite index, this study outlines the distinctive features of individual countries.

Romania, like many countries in Central and Eastern Europe, has undergone a dramatic demographic transformation in recent decades. The primary driver of demographic ageing is the sustained decline in birth rates. Romania has experienced several critical historical moments that have significantly shaped its demographic trends, including agrarian reforms, legislation concerning the organization of the healthcare system and laws regulating marriage, divorce and abortion (Trebici, 1978 and 1981).

Understanding the magnitude and pace of ageing within Romania's population, particularly in comparison with other EU states, can inform strategic planning, resource allocation and long-term socio-economic resilience. This article develops a composite index to measure demographic ageing, enabling robust cross-country comparison while identifying national specificities and broader regional patter.

The purpose of this study is to present a statistically grounded methodological approach to constructing a composite index of demographic ageing and to empirically evaluate Romania's demographic profile in the context of the European Union, based on data spanning from 2000 to 2022.

1. Literature Review

Understanding the level of demographic ageing is of critical importance, as this phenomenon is essential for identifying trends and informing the adoption of appropriate policy measures. Demographic ageing represents one of the most profound structural changes affecting modern populations, resulting from a combination of factors such as declining fertility and birth rates, increased life expectancy and reduced mortality, all of which are further amplified by migration. This process has significant implications for social protection systems, labour markets and economic dynamics and is regarded as an advanced stage of the demographic transition (Lee & Mason, 2010).

Demographic changes profoundly affect the economic, social and political structure of a country. Among all ongoing transformation, whether declining birth rates, migration or increased life expectancy, the most significant and impactful is the phenomenon of demographic ageing, which places considerable pressure on the sustainability of modern societies.

One of the primary challenges posed by demographic ageing concerns the economy, particularly its effects on the active labour force and economic productivity. As the number of economically active adults declines and the number of retirees rises, economic systems face a dual strain: decreasing contributions to pension schemes and increasing public expenditures for elderly care. The growing old-age dependency ratio, especially relative to the working-age population, threatens the sustainability of social protection systems. In the absence of timely reforms in pension policies and labour markets, these pressures risk evolving into severe economic crises.

Population ageing directly impacts labour market equilibrium by reducing the number of working age individuals and increasing the proportion of retirees within the total population. This trend leads to labour shortages, economic stagnation and mounting pressure on social protection systems.

During the communist period, Central and Eastern European countries exhibited high fertility rates. However, following the collapse of these regimes, fertility declined sharply due to economic instability, high unemployment, changes in family behaviours (such as delayed marriage and postponement of the first child) and increased access to contraception and individual reproductive choices. Since the early 2000s, fertility patterns have shown signs of recovery, largely attributed to

economic stabilization and the implementation of family-friendly policies (Sobotka, 2011). This evolution suggests a direct relationship between fertility trends and socio-economic conditions.

The main drivers of economic growth - labour supply, productivity, consumption and savings, are all significantly influenced by the age structure of the population. Economies with a higher proportion of the working age population—those fit for employment—tend to have a greater potential for economic expansion. Conversely, countries with a disproportionately high share of young or elderly populations often face more limited growth prospects.

Research by Maestas, Mullen and Powell (2016) identifies a clear relationship between population ageing and productivity growth. This relationship is mediated through three core elements: output levels, labour productivity and workforce participation. Their findings suggest that a 10% increase in the share of the population aged 60 and over is associated with a 5.5% decline in per capita GDP growth. Two-thirds of this reduction stems from slower productivity growth across all age groups, while one-third is due to a deceleration in labour force expansion.

Similarly, a study by Iftimi and Panaite (2021) concludes that the pace of demographic ageing may hinder economic growth—both in terms of GDP per capita and labour productivity. As the population ages, the demand for social services, healthcare and pension benefits is expected to rise, placing additional strain on the working-age population.

While earlier research (Preston, 1975, cited in Bloom et al., 2011) found that increased life expectancy is strongly correlated with higher per capita income, more recent studies (Iftimi and Panaite, 2021) confirm that demographic ageing can dampen GDP and productivity growth. These findings underscore the need for proactive economic measures to mitigate the potential adverse effects of ageing on economic performance.

Demographic ageing has significant implications for healthcare systems, influencing both the demand for medical services and their structural organization. As the population ages, the prevalence of chronic illnesses and comorbidities increases significantly, prompting a reorientation of priorities within the healthcare sector.

As individuals age, the likelihood of developing chronic diseases increases substantially. According to Prince et al. (2015) in their study “The Burden of Disease in Older People and Implications for Health Policy and Practice”, over 70% of older adults suffer from at least one chronic condition, with more than 50% experiencing comorbidities. This clinical complexity necessitates an integrated and multidisciplinary approach to healthcare, placing additional pressure on medical infrastructure and service delivery systems.

The construction and use of composite indices have gained prominence in recent years as a means of capturing complex, multidimensional phenomena. In the context of demographic analysis, such indices enable the synthesis of various indicators, such as birth and death rates, ageing ratios, dependency levels and migration into a single, interpretable measure (OECD, European Commission and Joint Research Centre, 2008).

Despite the wealth of research, relatively few studies focus on the creation of a composite index specifically aimed at quantifying the intensity of demographic ageing across EU countries. This study addresses that gap by offering a detailed methodology and applying it to current European data, with a particular focus on Romania. Therefore, a composite index integrates demographic indicators, enabling nuanced cross-national comparison and contextualizing Romania's ageing pathway in the broader EU demographic landscape.

2. Methodological approach to construct a composite index

The construction of a composite index requires a rigorous and transparent methodological framework to ensure its validity, reliability and interpretability. Composite indices are widely used in empirical research to synthesize multidimensional phenomena into a single metric, facilitating comparative analysis and informed decision-making. This section outlines the key methodological steps involved in building the composite index, including indicator selection, data normalization, weighting and aggregation.

The construction of a composite index involves the following steps: an analysis of the theoretical framework, followed by the selection of data and variables, imputation of missing data, data normalization, weighting and aggregation and finishes by the uncertainty and sensitivity analysis.

a. Theoretical framework analysis

This step involves examining the theoretical foundation that underpins the construction of the composite index.

b. Data and variable selection

This step entails selecting relevant data and analytical variables.

c. Missing data imputation

Imputing missing data helps to standardize the database, minimize errors and correct for information that is difficult or costly to collect (OECD, European Commission and Joint Research Centre, 2008).

In the case of a dataset containing missing values, one of the following methods may be applied (OECD, European Commission and Joint Research Centre, 2008):

- Simple imputation (e.g., replacing missing data with the mean, median, or using regression methods, hot and cold deck imputation, or the Expectation Maximisation (EM) method).
- Multiple Imputation (e.g., using methods such as Markov Chain or Monte Carlo algorithms).

Regardless of the method used, a complete dataset is essential for the accurate calculation and use of a composite index.

d. Data normalization

According to OECD guidelines (2008), data normalization is recommended prior to applying any data aggregation method to form a composite index. This is necessary due to the differing ranges of variation often found among quantitative variables (Pintilescu, 2022).

Some of the most used statistical variable normalization methods include:

- Ranking Method – a simple method where scores are assigned to each value of a variable based on its relative importance (Încalțărău, 2023).
- Min-Max normalization – transforms original variables into new variables with values in the range [0, 1], aiming to reduce the influence of outliers. The normalization formula is:

$$\frac{x_i - x_{min}}{x_{max} - x_{min}}$$

where x_{max} and x_{min} are the maximum and minimum values of the given variable.

- Standardization (Z-score calculation) – transforms variables into new ones with a mean of zero and a variance of one (Pintilescu, 2022). The transformation from a normal distribution to a standard normal distribution is done following the relationship (Jaba, 2002):

$$x_i' = \frac{x_i - \bar{x}}{s}$$

Standardization is particularly appropriate when comparing variables expressed in different units of measurement and it is recommended when using methods aiming to maximize the variance, such as Principal Component Analysis (Pintilescu, 2022).

Regardless of the normalization method applied, it is essential to consider the direction of influence of each variable. If a variable has a negative influence on the phenomenon being studied, it should be normalized in reverse. This adjustment ensures interpretative consistency and contributes to the development of a meaningful and comparable synthetic indicator (Încalțărău, 2023).

e. Weighting and aggregation

The primary statistical methods used to determine the weights of variables in constructing a composite index are multivariate data analysis techniques, particularly Principal Component Analysis and Factor Analysis.

Principal Component Analysis (PCA) is a descriptive method of multidimensional data analysis applied to the study of relationships among quantitative variables, using Euclidean distance to measure the distance between points. PCA is used to reduce the dimensionality of statistical variables and to assess whether the phenomenon's dimensions are statistically balanced in the composite index calculation (OECD, European Commission and Joint Research Centre, 2008).

Starting with a number of p variables, PCA reveals p ranked lines, known as factorial axes or principal components, onto which individuals and variables are projected based on their degree of differentiation (Pintilescu, 2022). These axes are ordered according to their discriminatory power (i.e., the variance or inertia explained), in descending order. The sum of the eigenvalues equals the number of original variables.

In PCA, correlated statistical variables are grouped into a new set of uncorrelated variables, based on the covariance matrix or correlation table. Factor Analysis (FA) is similar to PCA, but is based on a specific statistical model (OECD, European Commission and Joint Research Centre, 2008). It is particularly useful when analysing a large number of highly correlated variables (Stevens, 2002). FA aims to identify the underlying structure of the relationships among variables, revealing latent factors not directly measured in the analysis (Pintilescu, 2022).

The authors of the OECD, European Commission and Joint Research Centre (2008) recommend the usage of multivariate analysis methods only when the number of statistical units exceeds the number of variables. Otherwise, the statistical robustness of the results may be compromised.

Weight calculation (w_i) is based on the correlation coefficients between variables and the factorial axes (factor loadings). The squared correlations are calculated and divided by the sum of variances for each factor. The highest value for each variable across all axes is then selected and multiplied by the proportion of variance explained by that axis. Finally, the weight for each variable is computed by dividing this product by the sum of all such values.

Once the weights for all variables are obtained, a linear combination is formed by multiplying each weight with the corresponding variable value (V_i, $i=1, p$):

$$composite\ index = w_1 * V_1 + w_2 * V_2 + \cdots + w_p * V_p$$

f. Uncertainty and sensitivity analysis

The construction of a composite index involves numerous decisions regarding the selection of indicators, data normalization methods, weight calculation and so forth. Therefore, it is strongly recommended to perform sensitivity analysis and robustness checks on the resulting composite indicator.

3. Building the composite index

In order to calculate the composite index, this study considered the period 2000 – 2022 for all 27 member states of the European Union. The variables considered are presented in Table 1 below:

Table 1. Definition of the variables of interest used in the calculation of the composite index

Indicator	Definition	Measurement unit
Total population (pop_t)	Population recorded on January 1st, with a certain citizenship, residing in a given territory	Number of inhabitants
Birth rate (birth_rate);	Number of live births recorded in a year, relative to the population recorded at mid-year	Births per 100 inhabitants (%)
Crude death rate (death_rate)	Number of deaths recorded in a year, relative to the population recorded at mid-year	Deaths per 1,000 inhabitants (‰)
Demographic ageing rate (ageing)	Number of elderly persons (aged 65 and over) relative to the number of young persons (under 15 years old)	Elderly per 1,000 young persons (‰)
Demographic dependency rate (dependency)	Number of elderly (65+ years old) and young (under 15 years old) persons relative to the number of working-age adults (15–64 years old)	Young and elderly per 1,000 adults (‰)
Active population replacement rate (replacement)	Estimates the number of adults who will be active in the labour market over the next 15 years; calculated by multiplying the number of young people (under 15 years old) by three times and dividing the total by the adult population (15–64 years old)	Young per 1,000 adults (‰)
Net migration (net_migr)	Difference between the number of immigrants and emigrants during a given reference period	Number of persons

Source: Eurostat

In order to calculate the composite index, the analysis period selected was between 2000 and 2022, as the statistical information available from international organizations for this timeframe is valid and complete compared to the years prior to 2000. This period includes key stages of social and economic transformation in Romania as well as in the EU countries, capturing a new phase of transition experienced by Romania—its accession to the European Union and the opening of international borders for the labour force.

Additionally, this timeframe includes major global events such as the economic crisis of 2007–2008 and the COVID-19 pandemic that began in 2019. All these events had a significant impact on economic development and produced measurable demographic effects relevant to the present study. Moreover, data availability for the 2000–2022 period is accurate, providing valid and relevant statistical information for all EU countries.

3.1. Missing data imputation

In order to use only complete time series, a simple imputation method was applied —the Expectation-Maximization (EM) algorithm. This approach estimates a regression model based on all available observed values and then replaces the missing data with the values predicted by the regression model. This is an iterative process, repeated until the estimated values converge and stabilize.

The EM method relies on the principle of maximum likelihood estimation and is performed in two main steps (Dellaert, 2002): during the first step, E-step (Expectation), a local lower bound of the posterior distribution is constructed and the missing values are estimated based on the conditional distribution of the observed data and the current model parameters. During the second step, M-step (Maximization), the lower bound found in the E-step is optimized, thereby improving the estimation of the missing values. In other words, the parameters are re-estimated to maximize the likelihood function for both the observed and the estimated data.

3.2. Calculation of variable weights in the construction of the composite index

Principal Component Analysis (PCA) is a descriptive method of multidimensional data analysis that, starting from a large set of variables, identifies a system of factorial axes that concentrate the information for better visualization. In other words, it is a dimensionality reduction technique that transforms a large number of variables into linear combinations in the form of principal components

(factorial axes). The method also involves data standardization, where the variables are centered and scaled (Pintilescu, 2022).

In this study, PCA was applied to the statistical variables defined above and the results are presented in Table 2, which shows the eigenvalues of the correlation matrix and the variance explained by the factorial axes. The first principal component has an eigenvalue (variance) of 2.83, explaining 40.46% of the total variance of the data. The second principal component has a variance of 1.63, accounting for 23.26% of the total variance. Together, the first two components explain a cumulative variance of 63.73%. The third principal component has a variance of 1.23, explaining 17.56% of the total variance. Altogether, the first three principal components explain 81.29% of the total variance in the dataset.

Table 2. Eigenvalues of the correlation matrix and the variance explained by the principal components

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.832	40.461	40.461	2.832	40.461	40.461
2	1.629	23.264	63.725	1.629	23.264	63.725
3	1.229	17.560	81.285	1.229	17.560	81.285
4	0.502	7.178	88.464			
5	0.477	6.820	95.283			
6	0.323	4.613	99.896			
7	0.007	0.104	100.000			

Source: own calculations based on Eurostat data

Based on Kaiser's criterion, the principal components selected for analysis are those with eigenvalues greater than 1. Therefore, according to Kaiser’s criteria, the first three principal components are retained for further analysis. Thus, Table 3 presents the loading values (coordinates) of the variables on each principal component. For interpretation purposes, this study considered loadings with an absolute value greater than or equal to 0.5 as statistically and interpretatively significant.

Accordingly, the demographic ageing rate, mortality rate, active population replacement rate and birth rate are correlated with the first principal component—the first two positively and the latter two negatively. The demographic dependency rate is associated with the second principal component, while total population and net migration are correlated with the third principal component.

Table 3. Principal component matrix

Factor Method: Principal Factors
Covariance Analysis: Ordinary Correlation
Sample: 2000 2022
Included observations: 621
Number of factors: Minimum eigenvalue = 1
Prior communalities: Squared multiple correlation

	Unrotated Loadings			Communality	Uniqueness
Variables	**F1**	**F2**	**F3**		
dependency	0.27199	**0.90468**	-0.2847	0.973489	0.026511
ageing	**0.96757**	0.20299	-0.0604	0.981041	0.018959
replacement	**-0.8244**	0.53451	-0.1322	0.982804	0.017196
pop_t	0.29078	0.29247	**0.50878**	0.428952	0.571048
death_rate	**0.50326**	-0.0742	-0.3681	0.39425	0.60575
birth_rate	**-0.7189**	0.15487	0.09817	0.550479	0.449521
net_migr	0.23637	0.26156	**0.57028**	0.449495	0.550505

Source: own calculations based on Eurostat data

Based on factor analysis, three key components were identified: The first factor (F1), *the ageing and demographic transition factor* is represented by the variables related to the demographic ageing rate (0.968), mortality rate (0.503), active population replacement rate (-0.824) and birth rate (-0.719). This factor captures the opposition between the intensification of demographic ageing and the decline in birth rates, as well as the difficulty of replacing the retiring labour force with younger cohorts entering the labour market.

The 2nd factor (F2): *the demographic pressure factor*, is primarily associated with the demographic dependency ratio of the young and elderly on the working-age population (0.905). Additionally, the active population replacement rate (0.535) exceeds the 0.5 threshold, although it has a stronger association with the first factor. This factor reflects the demographic pressure exerted by the inactive population on the active population.

Finally, the 3rd factor (F3): *the migration and population dynamics factor* is defined by the net migration (0.570) and total population (0.509), capturing population dynamics and migratory flows.

Table 4 presents only the variance explained by these three factors. This step is crucial for evaluating the explanatory power of the factor analysis and the degree of dimensionality reduction achieved. The total variance accounted for by the three retained factors is 4.76. The first principal component explains over half of the total variance (54.62%), identifying it as the most influential factor. This highlights the predominance of the demographic ageing and transition dimension in the dataset. The second principal component accounts for 27.91% of the common variance, while the third principal component explains the remaining 17.46%. Together, these three components capture the majority of

the shared variance, indicating a substantial dimensionality reduction and effective summarization of the original variables.

Table 4. Total variance and the proportion of common variance explained by the three factors

Factor	Variance	Cumulative	Difference	Proportion	Cumulative
F1	2.60036	2.60036	1.27158	0.546236	0.546236
F2	1.32879	3.92915	0.49743	0.279127	0.825364
F3	0.83136	4.76051	---	0.174636	1
Total	**4.76051**	**4.76051**		1	

Source: own calculations based on Eurostat data

3.3. Composite index calculation

In order to calculate the composite index, the next step involved squaring the loading values of each factor (Table 5). Subsequently, each squared loading was divided by the variance of the corresponding factor (as shown in Table 6).

Table 5. Steps in the calculation of the composite index

Variables	Unrotated loadings			Squared factor loadings for each variable		
	F1	F2	F3	$F1^2$	$F2^2$	$F3^2$
dependency	0.27199	**0.90468**	-0.2847	0.07398	0.81844	0.08107
ageing	**0.96757**	0.20299	-0.0604	0.93619	0.04120	0.00365
replacement	**-0.8244**	0.53451	-0.1322	0.67964	0.28570	0.01746
pop_t	0.29078	0.29247	**0.50878**	0.08455	0.08554	0.25886
death_rate	**0.50326**	-0.0742	-0.3681	0.25327	0.00551	0.13547
birth_rate	**-0.7189**	0.15487	0.09817	0.51686	0.02398	0.00964
net_migr	0.23637	0.26156	**0.57028**	0.05587	0.06841	0.32521
Variance	2.60036	1.32879	0.83136			

Source: own calculations based on Eurostat data

Table 6. Steps in the calculation of the composite index

Variables	Ratio of squared factor loadings to the variance explained by each principal component			Relative weight of the factors	Product between maximum value and factor weight
	F1	F2	F3		
dependency	0.02845	**0.61593**	0.09751	0.27913	0.17192
ageing	**0.36002**	0.03101	0.00439	0.54624	0.19666
replacement	**0.26136**	0.21501	0.02101	0.54624	0.14277
pop_t	0.03252	0.06437	**0.31137**	0.17464	0.05438
death_rate	0.09740	0.00414	**0.16295**	0.17464	0.02846
birth_rate	**0.19876**	0.01805	0.01159	0.54624	0.10857
net_migr	0.02149	0.05148	**0.39118**	0.17464	0.06831
Total					0.77107

Source: own calculations based on Eurostat data

Based on Table 6, for each variable, only the factor on which it registers its maximum value is considered further (for example, the highest value for demographic dependency appears on Factor 2, meaning that only this value is retained). This maximum value is then multiplied by the proportion of variance explained by the corresponding factor (from Table 4, "Proportion" column). Next, to compute the final weight of each variable (presented in Table 7), the resulting values were normalized once more by dividing each of them by the sum of all previously computed values.

Table 7. Computed weight assigned to each variable

Variables	Assigned factor	Proportion of each variable
dependency	F2	0.22297
ageing	F1	0.25504
replacement	F1	0.18515
pop_t	F3	0.07052
death_rate	F3	0.03691
birth_rate	F1	0.14081
net_migr	F3	0.08860
TOTAL		**1.00000**

Source: own calculations based on Eurostat data

In order to calculate the composite index, the seven statistical variables were normalized using the standard min-max normalization method. As a result, for each variable considered, values ranging between 0 and 1 were obtained for each year. Then, weights were applied to the normalized values of the selected statistical variables and the values of the indices were aggregated.

3.4. Results

The composite index was calculated for each European Union country for every year during the period 2000–2022. The higher the index value, the more aged the population of the country; on the other hand, the lower the index value, the younger the population.

The composite index values obtained for each EU countries during the 2000–2022 period are presented in the Annex 1. The results obtained were analysed from three perspectives:

- A comparative analysis between the European Union countries across intervals (low, medium and high rates of demographic ageing);
- A spatial analysis of the evolution of the composite index within the EU countries:
- A temporal analysis of the composite index in the year 2022 and the average annual change over the period 2000–2022.
-

Comparative analysis of countries based on the intensity of the demographic ageing phenomenon

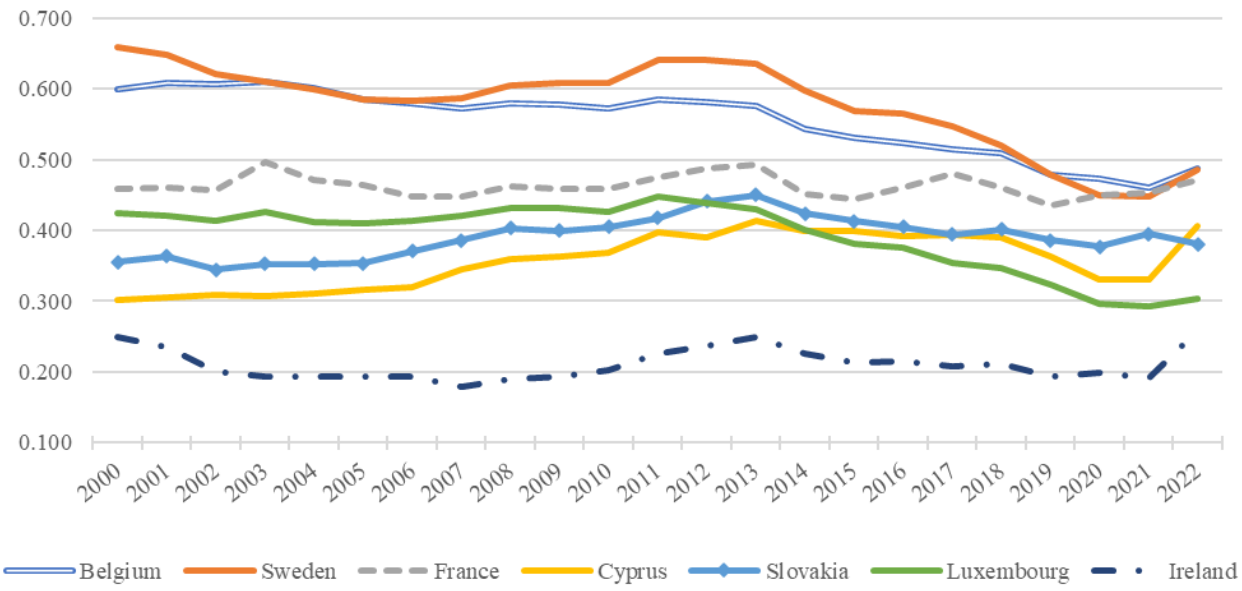
For a more detailed analysis, the European Union member states were categorized into three groups based on their composite index values for the year 2022:

- countries with index values below 0.5;
- countries with index values ranging from 0.5 to 0.65;
- countries with index values above 0.65.

A comparative analysis was then carried out for each of these groups.

Among European Union countries, seven states fall into the category of *low rates of demographic ageing*, according to the results obtained from the composite index calculation: Ireland, Luxembourg, Slovakia, Cyprus, France, Sweden and Belgium. The evolution of the demographic ageing index for these countries over the period 2000–2022 is presented in Figure 1.

Figure 1. The evolution of the composite index values (during the period 2000–2022) for countries with low rates of demographic ageing



Source: own calculations and representation based on Eurostat data

Based on Figure 1 of this research, some particular characteristics of the countries were observed. First, among the European Union countries, Ireland registered the lowest composite index value, indicating the youngest population throughout the analysed period. The index exhibited a continuous decline until 2007, reaching a minimum value of 0.180. Subsequently, it experienced an upward trend

until 2013, peaking at 0.248, followed by a slight decline, culminating at 0.258 in 2022. This pattern suggests a relatively stable demographic structure with limited pressure from ageing phenomena.

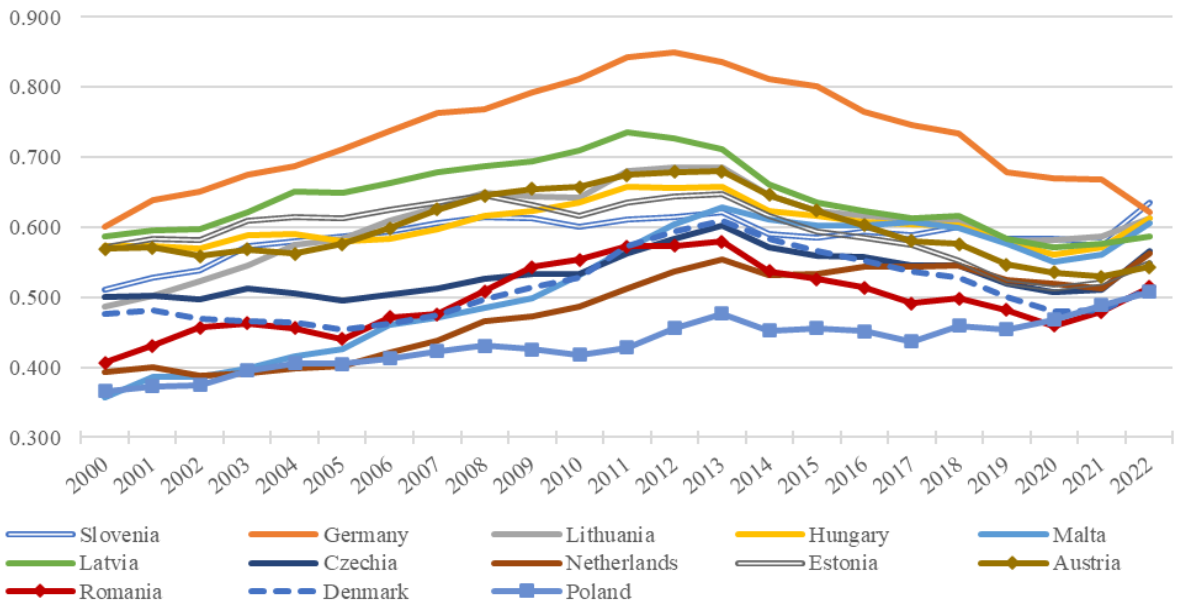
France also demonstrated a relatively stable demographic ageing index over time; its index remained comparatively constant throughout the analysed period, oscillating between a minimum of 0.435 in 2019 and a maximum of 0.497 in 2003, indicating a stable demographic ageing profile.

Belgium and Sweden, while starting the period with higher index values above 0.6, experienced a gradual decline over time; since 2019, both countries have consistently recorded values below 0.5, reflecting a reduction in the intensity of demographic ageing.

Luxembourg, Slovakia and Cyprus followed similar trajectories, marked by relatively stable index values near the 0.4 threshold, showing minor fluctuations over the analysed period. Their composite index values increased until the period 2011–2013, but shown a significant decrease afterwards, mostly notable in Luxembourg.

Thirteen EU countries fall into the category of *moderate demographic ageing*, with composite index values ranging between 0.5 and 0.65 in 2022. Although these countries exhibited considerable variation in their demographic ageing index throughout the 2000–2022 period—fluctuating between 0.357 and 0.850, Figure 2 shows that by the end of the reference period, the variation range of the demographic ageing index had narrowed considerably, lying between 0.508 and 0.635. This indicates the presence of a similar pattern in demographic ageing among these countries.

Figure 2. The evolution of the composite index values (during the period 2000–2022) for countries with moderate rates of demographic ageing



Source: own calculations and representation based on Eurostat data

From the countries in the moderate demographic ageing category, Poland recorded the lowest value of the composite index in 2022, of 0.508. Notably, this value also represents the highest level reached by Poland over the entire analysis period (2000–2022). This indicates a gradual and steady increase in demographic ageing, though still moderate compared to other states.

Several countries, including the Netherlands, Malta, Denmark, Romania and the Czech Republic, followed similar evolutionary trends with cyclical behaviour. These countries share a comparable trajectory: initially low index values (below 0.5), followed by a gradual increase until approximately 2013, then a slight decline leading up to the COVID-19 pandemic. In the case of Romania, the index ranged from 0.407 in 2000 to 0.580 in 2013, with an average annual growth rate of 1.17%, reflecting a progressive intensification of the demographic ageing process.

Six countries, Slovenia, Lithuania, Austria, Hungary, Estonia and Latvia saw an evolution of the composite index in two-phases. These countries began the reference period with index values around 0.5, experiencing a marked increase until 2013, surpassing the 0.7 threshold. Subsequently, the period between 2014 and 2020 saw slight declines, followed by renewed increases from 2021 onwards, suggesting a resurgence in demographic ageing pressures.

Germany stands out for its fluctuating and irregular trend, with index values around 0.6 at both the beginning and end of the period, and a notable peak at 0.850 in 2012, marking it as an outlier in terms of demographic ageing dynamics.

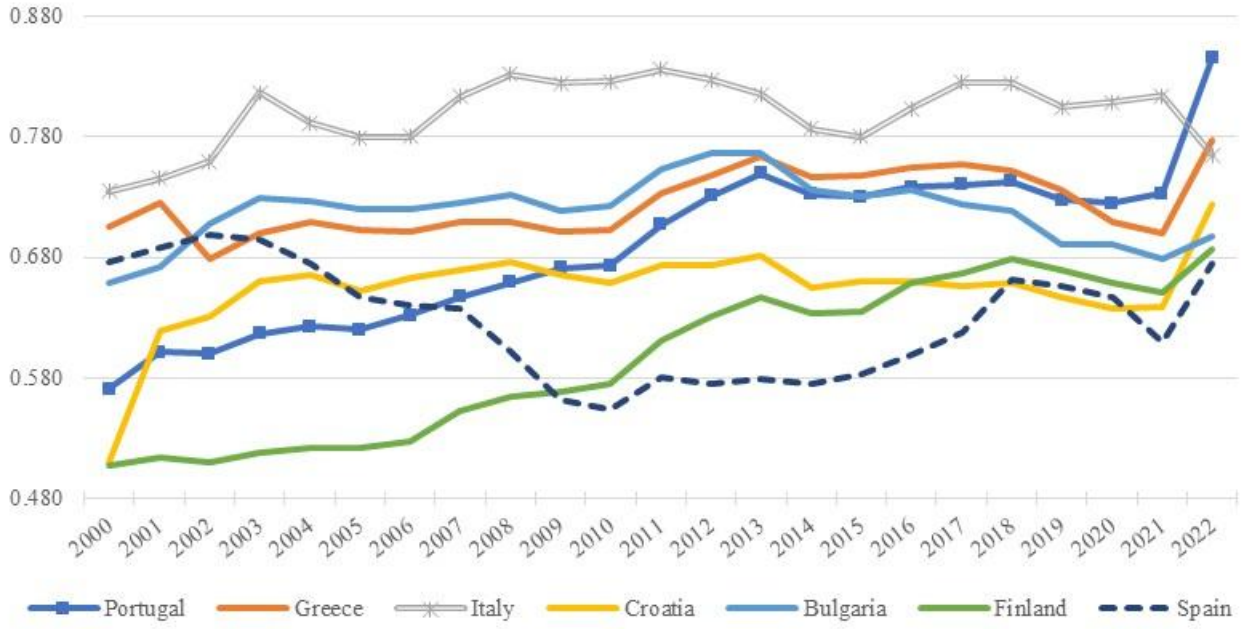
While the countries in this category display intermediate levels of demographic ageing, a more detailed analysis reveals distinct evolutionary patterns that tend to converge in the later years of the period under review. This suggests a relative homogenization of the demographic ageing process across the EU countries falling within this medium category.

The third category comprises countries experiencing *high rates of demographic ageing* with composite index values ranging from 0.675 to 0.846 in 2022. These countries reflect the most advanced stages of demographic transition within the EU, characterized by a significant ageing population. The data are graphically represented in Figure 3.

Among the countries facing high rates of demographic ageing, several distinct trends emerge. Finland experienced a steady increase in its composite index, rising from 0.507 in 2000 to 0.687 in 2022, with an average annual growth rate of 1.42%.

Portugal followed a similar upward trajectory but with more pronounced increases, starting at 0.571 in 2000 and reaching the highest value among all analysed countries—0.846—in 2022. Notably, Portugal also registered the highest year-on-year growth rate between 2021 and 2022, at +15%.

Figure 3. The evolution of the composite index values (during the period 2000–2022) for countries with high rates of demographic ageing



Source: own calculations and representation based on Eurostat data

Spain, by contrast, showed significant fluctuations, while the index remained roughly the same at both ends of the period (around 0.68). However, the country experienced an average annual decline of 2% between 2000 and 2010, reaching a minimum of 0.554. Subsequently, the index began to rise again at a similar average annual rate.

Greece and Bulgaria displayed relatively stable patterns, with index values generally around 0.7. Both countries recorded increases up to 2013, followed by slight declines until 2021. In 2022, Greece experienced a notable increase of 11% compared to the previous year. Croatia followed a similar but more moderate path than the other two, with its index rising from 0.510 in 2000 to 0.724 in 2022.

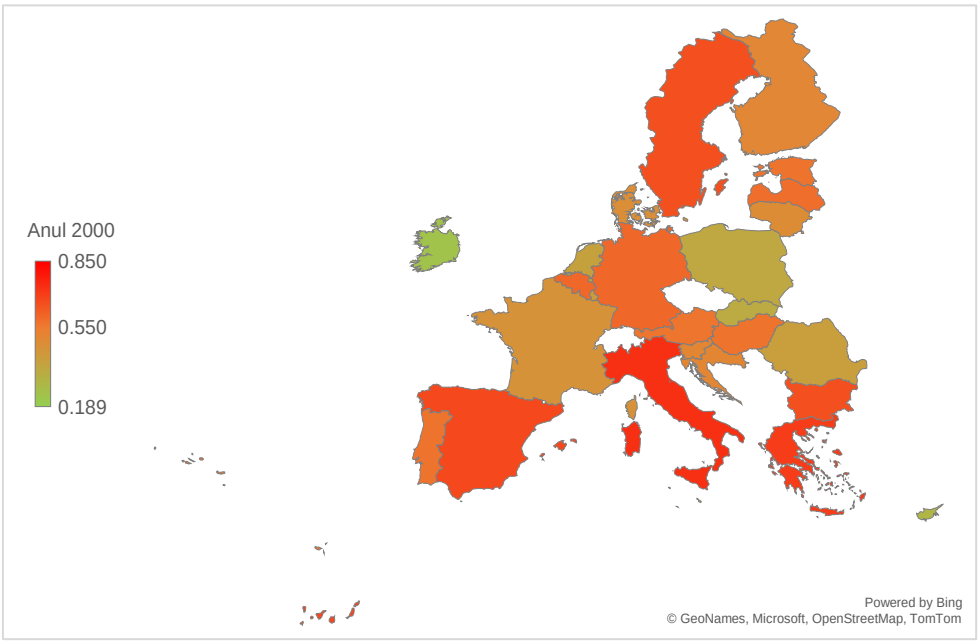
Italy recorded the highest values of the composite demographic ageing index throughout the 2000–2021 period. Although overtaken by Portugal in 2022, Italy maintained consistently high index values, ranging from 0.735 at the beginning of the reference period to a peak of 0.836 in 2011.

Spatial analysis of the evolution of the composite index in European Union countries

The maps presented in Figures 4, 5, 6 and 7 illustrate the spatial distribution of the composite index values across the 27 European Union Member States for four reference years: 2000, 2008, 2019 and 2022 (the calculated differences are provided in Annex 2).

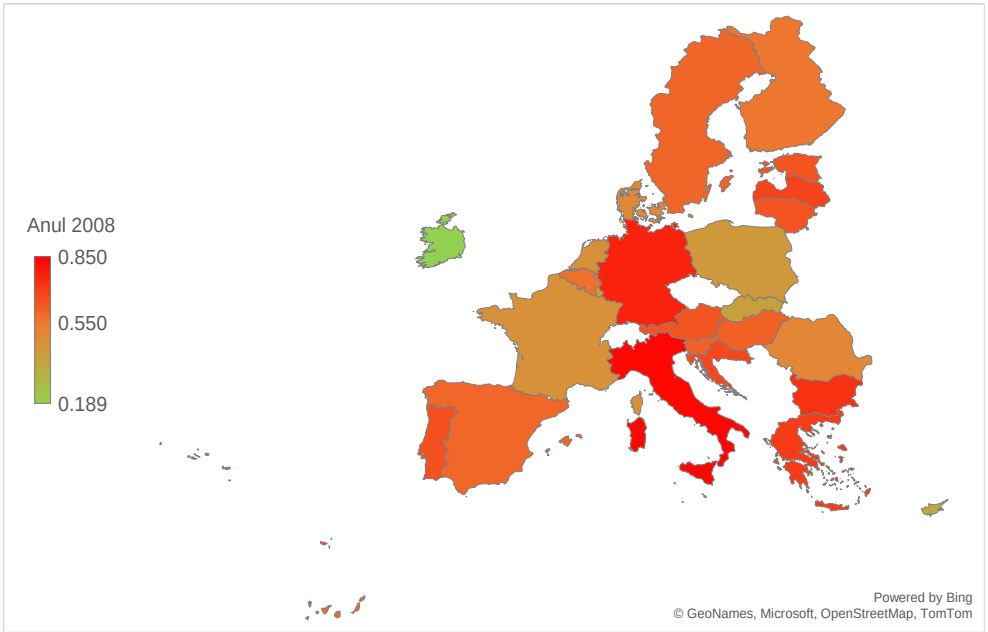
The colour symbolism used in the maps follows a gradient fr indicating low index values), through orange (moderate values), to bright red (high index values). The more intense the red hue, the higher the value of the composite index; on the other side, the closer the colour is to green, the lower the index value for the respective country. The orange shade denotes an intermediate level, situated between the minimum and maximum values.

Figure 4. Map of the composite index of demographic ageing in European Union countries, in 2000



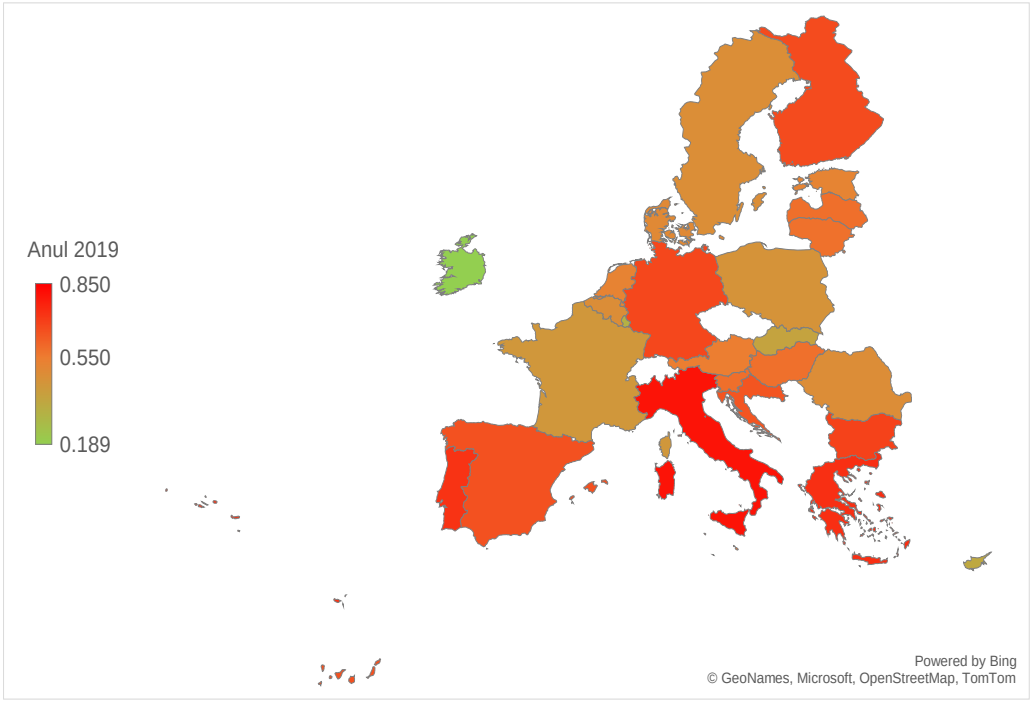
Source: own calculations and representation based on Eurostat data

Figure 5. Map of the composite index of demographic ageing in European Union countries, in 2008



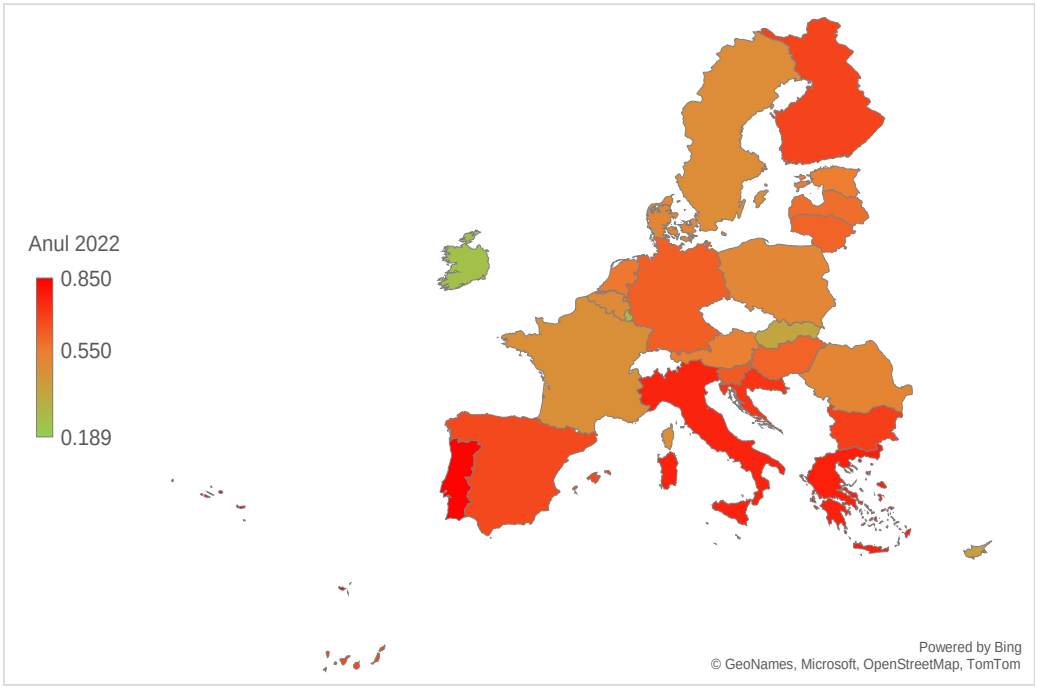
Source: own calculations and representation based on Eurostat data

Figure 6. Map of the composite index of demographic ageing in European Union countries, in 2019



Source: own calculations and representation based on Eurostat data

Figure 7. Map of the composite index of demographic ageing in European Union countries, in 2022



Source: own calculations and representation based on

In 2008, compared to 2000, a generalized increase in the composite index can be observed across most EU countries, as evidenced by the progressively redder tones in the map shown in Figure 5. This trend reflects a marked intensification of the demographic ageing process. Exceptions to this pattern include Belgium (-0.021), Ireland (-0.061), Spain (-0.075) and Sweden (-0.053), where the index either remained stable or experienced a slight decline.

On the other hand, by 2019, a declining trend in the composite index was observed in more than half of the European Union Member States compared to 2008. Specifically, reductions in the composite index were recorded in 17 countries: Belgium, Bulgaria, the Czech Republic, Germany, Estonia, France, Croatia, Italy, Latvia, Lithuania, Luxembourg, Hungary, Austria, Romania, Slovenia, Slovakia and Sweden.

Although these decreases were relatively modest—ranging between 0.007 and 0.127—the phenomenon is still noteworthy in the context of demographic ageing. This is visually represented by the paler or more orange tones in the map shown in Figure 6 (specific for year 2019), compared to the deeper red tones in Figure 5 (specific for year 2008). In contrast, countries such as Finland, Malta, Portugal, the Netherlands, Spain, Greece, Poland, Ireland, Cyprus and Denmark exhibit more intense red hues in Figure 6 relative to Figure 5, indicating an increase in the composite index values between 2008 and 2019. This reflects a continued intensification of demographic ageing in these countries during this period.

In contrast to the previous period, the year 2022 (Figure 7) shows a renewed intensification of the population ageing phenomenon compared to 2019, as indicated by the increase in the composite index values across all European Union Member States. The most significant increases were recorded in Portugal (+0.118), Croatia (+0.077), Ireland (+0.065), Poland (+0.053) and Slovenia (+0.051), each exceeding 0.05 units. Only five countries exhibited a reverse trend, with the composite index values in 2022 being lower than those in 2019: Germany (-0.058), Italy (-0.040), Luxembourg (-0.019), Slovakia (-0.005) and Austria (-0.003).

Temporal analysis of the composite index in 2022 and the average annual change over the period 2000–2022

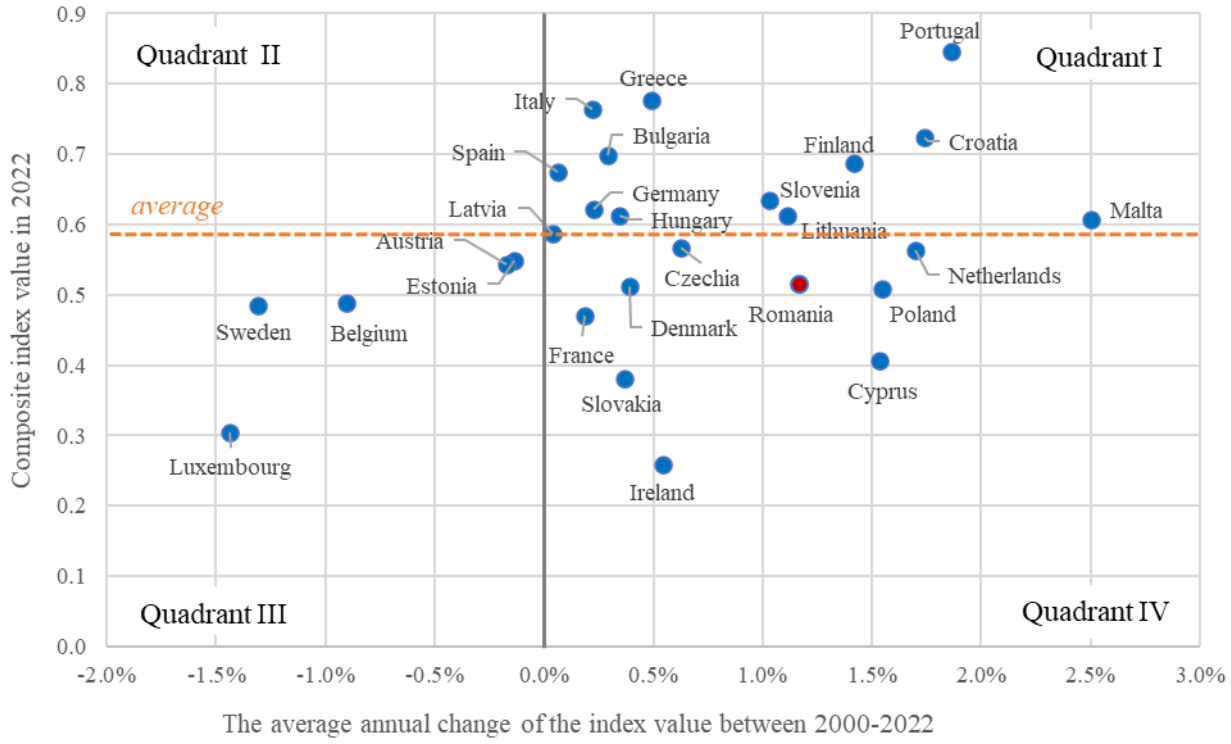
The temporal analysis of the composite index highlights significant differences among European Union States, both in terms of the current level of demographic ageing and the trajectories observed over time.

Figure 8 provides an overview of the current state of demographic ageing in the 27 European Union Member States by comparing two key dimensions: the value of the composite index in 2022

and its average annual change over the period 2000–2022, based on the computed index values. A positive average annual change in the composite index indicates an intensification of the ageing process, whereas a negative value reflects a reduction in demographic ageing.

This two-dimensional representation illustrates the relationship between these two variables, enabling the classification of EU countries into four quadrants, each representing a specific profile based on the interplay between the level and progression of demographic ageing.

Figure 8. The value of the composite demographic ageing index in 2022 compared with the average annual change recorded during the period 2000–2022



Source: own calculations and representation based on Eurostat data

Countries located in the *third quadrant* exhibit the most favourable ageing profiles, characterized by both low composite index values in 2022 and negative average annual changes over the analysis period. This group includes Luxembourg, Sweden, Belgium, Austria and Estonia, all of which recorded index values below 0.6 units, indicating comparatively limited demographic ageing.

At the opposite end, the *first quadrant* highlights countries experiencing continuous demographic ageing, with positive average annual changes and composite index values exceeding 0.57 units. The most affected countries in this group are Portugal, Croatia, Malta, Finland, Slovenia, Lithuania, Hungary, Germany, Latvia, Spain, Bulgaria, Italy and Greece.

The countries from the *fourth quadrant* are characterized by having composite index values below 0.57, but they are showing a positive average in the annual increases. This profile includes the Netherlands, Poland, Cyprus, Denmark, the Czech Republic, France, Slovakia, Ireland and Romania.

According to the graph, no EU country falls into the *second quadrant*, which would correspond to countries with composite index values above the 2022 EU average, but exhibiting negative average annual changes between 2000 and 2022.

Therefore, based on the temporal analysis, Romania, along with several Central and Eastern European countries, occupies an intermediate position, but follows an upward trajectory regarding demographic ageing. In contrast, countries such as Italy, Portugal and Germany are already facing the direct effects of an advanced ageing process, while a limited number of countries manage to maintain a sustainable demographic balance.

Conclusions

The findings of this study underscore the growing importance of demographic ageing as a policy challenge within the European Union. By constructing and applying a composite index based on robust statistical methodology, this research provides a clear and comprehensive picture of ageing trends across Member States.

The analysis of the composite index of demographic ageing across the 27 European Union Member States over the period 2000–2022 reveals significant spatial and temporal dynamics, reflecting both convergence and divergence in the ageing process at the national level.

Romania's position is particularly notable. While it remains in the intermediate tier in terms of ageing intensity, the upward trajectory of its composite index suggests accelerating demographic pressure in the near future. This trend aligns with the broader patterns observed in Central and Eastern Europe, where the combined effects of emigration, low fertility and increasing longevity are reshaping population structures.

But, there are still notable differences in pace and intensity of the ageing phenomenon across countries. Portugal, Finland and Italy showed the highest index values, with Portugal reaching the peak in 2022. While some countries like Spain experienced fluctuations, others such as Greece, Bulgaria and Croatia followed relatively stable trajectories. Italy led in ageing until 2022, when Portugal surpassed it. On the other hand, Ireland and Luxembourg are the European countries with the lowest levels of demographic ageing.

Spatial maps reveal a widespread increase in the index from 2000 to 2008, followed by slight declines in over half the Member States between 2008 and 2019. However, between 2019 and 2022, the ageing trend intensified again, with significant increases in Portugal, Croatia, Ireland, Poland and Slovenia. Only five countries recorded slight declines.

In summary, demographic ageing is accelerating across the EU, reinforcing the need for strategic policy responses. The empirical approach outlined in this study demonstrates the utility of composite indices in demographic research, particularly for cross-national comparisons. The multidimensional nature of the index ensures that it captures not only the magnitude but also the dynamics of ageing processes. The results highlight the need for proactive and tailored policy responses, including pension reform, labour market adaptation and targeted social services.

In conclusion, the demographic ageing process continues to be a pervasive and accelerating phenomenon across the European Union, with implications for social policy, healthcare, labour markets and intergenerational equity. While some countries exhibit more stable or fluctuating trajectories, the general trend points toward increasing demographic pressure associated with ageing populations, necessitating coordinated and forward-looking policy responses at both national and EU levels.

To sum up, this research contributes to the demographic literature by providing a replicable and adaptable tool for monitoring population ageing. It also offers a foundation for future studies aimed at linking demographic indicators with socio-economic outcomes and for designing evidence-based policy interventions that address the challenges of an ageing Europe.

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Annexes

Annex 1. The values of the composite index calculated for the European Union countries, for the period 2000-2022

Table A1. The values of the composite index calculated for the European Union countries, for the period 2000-2022 (part I)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Belgium	0.601	0.608	0.606	0.610	0.601	0.585	0.579	0.573	0.580	0.578	0.573	0.585
Bulgaria	0.659	0.673	0.708	0.729	0.727	0.721	0.720	0.725	0.732	0.718	0.722	0.753
Czechia	0.500	0.502	0.496	0.513	0.506	0.496	0.503	0.512	0.527	0.533	0.533	0.562
Denmark	0.477	0.481	0.470	0.467	0.464	0.453	0.462	0.475	0.497	0.514	0.528	0.574
Germany	0.600	0.639	0.651	0.676	0.687	0.712	0.737	0.764	0.769	0.793	0.811	0.843
Estonia	0.571	0.583	0.581	0.610	0.614	0.614	0.625	0.636	0.645	0.632	0.616	0.635
Ireland	0.250	0.234	0.201	0.193	0.194	0.193	0.192	0.180	0.189	0.194	0.202	0.225
Greece	0.706	0.725	0.678	0.701	0.709	0.703	0.701	0.710	0.710	0.702	0.702	0.733
Spain	0.677	0.689	0.699	0.695	0.674	0.647	0.640	0.638	0.602	0.562	0.554	0.581
France	0.459	0.461	0.457	0.497	0.472	0.465	0.448	0.448	0.462	0.460	0.460	0.475
Croatia	0.510	0.619	0.631	0.661	0.665	0.653	0.663	0.669	0.676	0.666	0.659	0.673
Italy	0.735	0.746	0.759	0.817	0.792	0.779	0.780	0.813	0.832	0.825	0.826	0.836
Cyprus	0.302	0.305	0.308	0.307	0.311	0.316	0.319	0.344	0.360	0.364	0.369	0.397
Latvia	0.587	0.596	0.598	0.622	0.650	0.649	0.663	0.678	0.687	0.694	0.710	0.736
Lithuania	0.486	0.502	0.524	0.546	0.574	0.584	0.610	0.629	0.649	0.644	0.641	0.680
Luxembourg	0.424	0.420	0.414	0.426	0.412	0.410	0.414	0.421	0.431	0.432	0.427	0.448
Hungary	0.573	0.574	0.569	0.589	0.591	0.581	0.583	0.598	0.617	0.622	0.636	0.658
Malta	0.357	0.386	0.386	0.398	0.415	0.427	0.460	0.471	0.484	0.499	0.532	0.570
Netherlands	0.393	0.401	0.388	0.392	0.399	0.401	0.420	0.438	0.466	0.473	0.486	0.513
Austria	0.569	0.571	0.559	0.568	0.562	0.576	0.599	0.625	0.646	0.655	0.658	0.675
Poland	0.366	0.373	0.374	0.395	0.406	0.405	0.413	0.423	0.431	0.426	0.418	0.429
Portugal	0.571	0.601	0.600	0.617	0.623	0.620	0.632	0.647	0.659	0.671	0.673	0.707
Romania	0.407	0.431	0.457	0.463	0.456	0.440	0.471	0.476	0.509	0.543	0.554	0.573
Slovenia	0.511	0.529	0.539	0.573	0.581	0.587	0.594	0.607	0.615	0.614	0.600	0.611
Slovakia	0.356	0.364	0.344	0.353	0.353	0.353	0.371	0.386	0.403	0.399	0.405	0.418
Finland	0.507	0.514	0.510	0.517	0.521	0.521	0.527	0.552	0.565	0.568	0.574	0.611
Sweden	0.658	0.648	0.621	0.610	0.600	0.586	0.583	0.587	0.605	0.609	0.608	0.641

Source: own calculations based on Eurostat data

Table A2. The values of the composite index calculated for the European Union countries, for the period 2000-2022 (part II)

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Belgium	0.582	0,577	0,543	0,531	0,524	0,515	0,509	0,479	0,473	0,460	0,488
Bulgaria	0.766	0,766	0,736	0,731	0,736	0,724	0,719	0,691	0,690	0,678	0,698
Czechia	0.584	0,602	0,571	0,560	0,558	0,546	0,546	0,519	0,507	0,510	0,566
Denmark	0.594	0,610	0,583	0,566	0,552	0,538	0,528	0,500	0,479	0,482	0,512
Germany	0.850	0,837	0,812	0,801	0,766	0,745	0,734	0,679	0,671	0,669	0,622
Estonia	0.643	0,648	0,616	0,594	0,586	0,575	0,552	0,521	0,513	0,521	0,549
Ireland	0.237	0,248	0,225	0,213	0,215	0,207	0,211	0,193	0,199	0,192	0,258
Greece	0.748	0,764	0,746	0,748	0,755	0,757	0,752	0,736	0,709	0,700	0,777
Spain	0.575	0,579	0,575	0,584	0,599	0,618	0,661	0,656	0,647	0,610	0,675
France	0.488	0,492	0,452	0,445	0,460	0,480	0,461	0,435	0,450	0,454	0,471
Croatia	0.674	0,681	0,655	0,661	0,660	0,657	0,659	0,647	0,638	0,639	0,724
Italy	0.828	0,815	0,787	0,781	0,804	0,825	0,825	0,805	0,809	0,814	0,765
Cyprus	0.391	0,413	0,399	0,399	0,391	0,394	0,390	0,364	0,331	0,330	0,407
Latvia	0.728	0,712	0,662	0,636	0,624	0,614	0,617	0,584	0,572	0,576	0,587
Lithuania	0.685	0,686	0,645	0,622	0,617	0,612	0,610	0,580	0,581	0,587	0,613
Luxembourg	0.439	0,431	0,401	0,382	0,376	0,355	0,346	0,323	0,296	0,292	0,304
Hungary	0.656	0,658	0,623	0,616	0,608	0,604	0,603	0,580	0,562	0,571	0,613
Malta	0.604	0,629	0,612	0,603	0,602	0,608	0,599	0,576	0,551	0,561	0,606
Netherlands	0.537	0,554	0,532	0,533	0,543	0,544	0,546	0,525	0,519	0,512	0,563
Austria	0.679	0,680	0,646	0,624	0,603	0,581	0,576	0,547	0,536	0,529	0,543
Poland	0.456	0,477	0,453	0,456	0,452	0,437	0,460	0,455	0,468	0,489	0,508
Portugal	0.731	0,749	0,733	0,730	0,738	0,741	0,743	0,728	0,725	0,733	0,846
Romania	0.573	0,580	0,537	0,526	0,514	0,491	0,498	0,482	0,459	0,480	0,515
Slovenia	0.614	0,621	0,590	0,585	0,593	0,589	0,601	0,584	0,584	0,581	0,635
Slovakia	0.442	0,450	0,424	0,413	0,405	0,395	0,401	0,386	0,377	0,395	0,381
Finland	0.631	0,647	0,633	0,635	0,659	0,667	0,678	0,669	0,658	0,651	0,687
Sweden	0.642	0,635	0,598	0,570	0,565	0,546	0,520	0,478	0,450	0,448	0,486

Source: own calculations based on Eurostat data

Annex 2. Relative modification of the composite index values, in the UE27 countries, during the following years: 2008 compared with 2000, 2019 compared with 2008 and 2022 compared with 2019

Table A3. Relative modification of the composite index values, in the UE27 countries, during the following years: 2008 compared with 2000, 2019 compared with 2008 and 2022 compared with 2019

Country	2008-2000	2019-2008	2022-2019
Belgium	-3.4%	-17.4%	2.0%
Bulgaria	11.2%	-5.6%	1.0%
Czechia	5.3%	-1.4%	9.1%
Denmark	4.3%	0.5%	2.4%
Germany	28.2%	-11.6%	-8.5%
Estonia	13.1%	-19.3%	5.3%
Ireland	-24.3%	2.3%	33.4%
Greece	0.5%	3.8%	5.5%
Spain	-11.1%	9.1%	2.8%
France	0.5%	-5.8%	8.3%
Croatia	32.7%	-4.3%	11.9%
Italy	13.2%	-3.3%	-5.0%
Cyprus	19.0%	1.1%	11.9%
Latvia	17.0%	-14.9%	0.4%
Lithuania	33.4%	-10.6%	5.7%
Luxembourg	1.7%	-25.0%	-6.0%
Hungary	7.7%	-5.9%	5.6%
Malta	35.6%	19.0%	5.2%
Netherlands	18.5%	12.8%	7.1%
Austria	13.4%	-15.3%	-0.6%
Poland	17.9%	5.4%	11.7%
Portugal	15.5%	10.4%	16.2%
Romania	25.1%	-5.2%	6.7%
Slovenia	20.3%	-5.0%	8.7%
Slovakia	13.3%	-4.3%	-1.3%
Finland	11.5%	18.4%	2.6%
Belgium	-8.1%	-21.0%	1.5%

Source: own calculations based on Eurostat data