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ks. dr hab. Krzysztof Kietliński, prof. UKSW[1] ⓘ
Cardinal Stefan Wyszynski University (UKSW)

Erich Fromm's moral antonyms

Introduction

Erich Fromm was a scientist exploring various fields of expertise, specialising mainly in humanistic psychoanalysis. He was also interested in philosophy, ethics, sociology, psychology and religions: Judaism, Christianity and Buddhism. His studies on man and society were grounded in the ideas and writings of Meister Eckhart and Baruch Spinoza, but it was mainly from Sigmund Freud's and Karl Marx's findings that he drew conclusions from and built his theories on (Fromm, 1962, pp. 21–22). Fromm acknowledged that Freud's psychoanalysis greatly influenced his ideas: "I had been trained in accordance with the strictly orthodox Freudian procedure of analysing a patient while sitting behind him and listening to his associations" (Fromm, 1962, p. 117). On the other hand, he polemicised against Freud's view of man as being driven solely by sexual impulses. In Fromm's opinion, one had to account for cultural and social influences. Freud made a fundamental error by mixing an anthropological model with a cultural one (Fromm, 1991, pp. 44–63). Fromm agreed with Marx that the production of objects engrosses people so much that they cannot reach their full development in capitalism. On the other hand, he questioned Marx's hypothesis about man's total submission to economic processes. In Fromm's opinion, one has to value the psychological at moral elements of a man. In his book *Beyond the Chains of Illusion: My Encounter with Marx and Freud*, Fromm compared Sigmund Freud's psychoanalysis with Karl Marx's social sociology, pointing out similarities and differences. Fromm also took inspiration from the works of Spinoza (*Ethics, Demonstrated in Geometrical Order*), Sigmund Freud (*The Interpretation of Dreams*) and Karl Marx (*Capital. Critique of Political Economy* and *The Economic and Philosophical Manuscripts*). Thus, Fromm's analysis of human nature was based on Meister Eckhart's spirituality, Spinoza's moral dissertations, Freud's

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[1] Correspondence address: e-mail: chkietl@o2.pl. ORCID: 0000-0003-1170-0339.

psychoanalysis and Marx's historical materialism. Fromm wrote, for instance: "I was deeply troubled by questions concerning individual and social phenomena, and I was eager for an answer. I found answers in both Freud's and in Marx's systems" (Fromm, 1962, p. 16).[2] He also pointed out that any scientific work aimed to "clarify the relation of my psychoanalytic concepts to Freud's theories" (Fromm, 1964, p. 7).

Fromm created a typology of human characters to which he attributed two main properties: productivity or destruction. He believed that based on character orientation one can determine a number of conditions caused by humans in social life (Funk, 1988, pp. 215–229). He devoted a large part of his studies to the question of the essence of man and society, including the problems of good and evil. In one of his book's introductions, he wrote: "In this book I discuss the nature of evil and of the choice between good and evil" (Fromm, 1964, p. 6). Inspired by Baruch Spinoza, Erich wrote that doing good brings a person closer to their identity, while evil causes them to become increasingly distant from it (Fromm, 1964, p. 113). Fromm emphasised that human life is about more than "releasing tension and avoiding pain" (Fromm, 1962, p. 119). He also offered an exact paradigm of a morally mature man and a healthy society (Fromm, 1949, p. 6).

When interpreting reality, he was using innovative and, at the same time, quite opposing words (i.e., giving a reverse meaning to the chosen term). These moral antonyms include juxtapositions such as: authoritarian-humanistic religion, authoritarian-humanistic conscience, priests-prophets, wolf-sheep man, authoritarian-heteronymous obedience, idolatry-faith, mode of having-being, needs-desires, destructive-constructive needs, alienation-productivity, decay-growth syndrome and necrophilia-biophilia. Using terms that constitute a semantic counterbalance, Fromm described the moral situation of man and society.

It should be noted that despite numerous studies, commentaries and articles, there is no research devoted to Fromm's antonyms, which should not only be considered a determinant of his work, but – above all – an indicator of his innovative descriptive method allowing diagnosis of the moral condition of man and society at that time. The author of the article aims to fill this gap.

AUTHORITARIAN-HUMANISTIC RELIGION

Fromm sees religion as an integral part of a culture, making understanding of the world easier. He argues people need three things in life: religion, faith and value models because thanks to them, their existence is free of suffering and alienation (Fromm, 1942, pp. 32–36). According to Fromm, there are no societies

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[2] Researching Fromm's workload, M. Cortina (2015, pp. 388–422) rated his genial synthesis of Freud and Marx as one of the most significant accomplishments of Fromm.

without religion. So, the question of whether someone is religious or not is simply wrong. Rather, you should ask what religion someone professes, because there is no person who does not have religious needs. Therefore, Fromm was convinced that a person cannot develop properly without religion, that is, without a system based on values and some object of worship. He emphasised that a religious phenomenon does not necessarily require faith, divinity or an object of worship. Thus, Fromm redefined the concept of religion. He argued that being religious does not mean believing in God or a deity. There is no need to perform sacred rituals either. Religion may be a certain system of ethical thinking and action, recognising some object of cult and faith. Therefore, instead of rejecting religion, one should only choose among its various types. Searching for an appropriate method for assessing a religious phenomenon, Fromm adopts an interdisciplinary perspective, using other traditions and sources, such as Jewish, Christian and Buddhist theologians, as well as philosophers and sociologists of religion. It should be noted that the most important religious thinkers who influenced Fromm's ideas were Saint Augustine, Eckhart, Spinoza, Comte, Spencer, Durkheim, Weber and Rabbis Seligmann Bar Bamberger, Seligmann Pinchas Fromm (his grandfather and great-grandfather), Jakob Horovitz, Ludwig Krause, Nehemi Anton Nobel and Rabinikov. He devoted a large part of his work to this issue, examining the spiritual condition of humanity – especially the impact of religion on the individual and society.

Fromm creates his typology of religion, dividing it into authoritarian and humanistic. While criticising authoritarian religions – those that are exceedingly confessional as well as those used in politics or economics (because both aim to enforce the pre-planned attitudes of individuals) – he approves of humanistic religions, which lead to the independence and development of the human person. He argues that authoritarian religion is dominated by idolatrous adulation, where a deity, an institution or an organisation coerces individuals into obedience, preventively threatening them with punishments for committing some evil or breaking the rules. In humanistic religion, on the other hand, God is a symbol of strength and virtue, who assists people and helps them become the individuals they are supposed to be. Fromm points out that the symptoms of a man professing an authoritarian religion are a constant sense of guilt and sinfulness and even enslavement, while the signs of humanistic religion are a feeling of joy, love and affirmation of life. As a specific example of authoritarian religion, Fromm points to a cybernetic religion (the religion of the industrial era), in which people believe only in technological progress and submit to the management of priests-technocrats (Lidz, 1982, pp. 287–305).

Fromm sees a similarity between psychoanalytic practice and religious experience. He studies the psychological consequences of moral choices and their impact on mental health. He emphasises that man – by nature – strives not only to

satisfy his physiological drives, but also to respect universal moral norms. In his opinion, man expresses his essence to the fullest through conscience, as it defines the meaning and purpose of human existence (Fromm, 1950).

Authoritarian-humanistic conscience

Fromm finds conscience, which is at the same time the overseer and judge of human actions, an essential element in making man aware of rules and principles of human conduct. He writes: "It is the voice which calls us back to ourselves, to our humanity" (Fromm, 2010, p. 7). Fromm rejects the Christian view that conscience comes from God because he believes that each person's life circumstances primarily influence the form and formation of conscience (e.g., society's culture, philosophical trends or various experiences and conditions). He believes that, thanks to conscience, a man discovers moral values and experiences freedom, enabling him to oppose various forms of evil and enslavement. On the other hand, by appeasing his conscience or acting against it, man undermines his own identity, as Fromm notes, or loses himself. Thus, the task of conscience is to amass moral knowledge that indicates the choice of good. Fromm stresses that it is not so much about fighting evil in oneself but about increasing good and opportunities for development. What should shape man's character are not the desires of the body but the needs of conscience. At the same time, Fromm admits that cravings must be fulfilled first, but once they are satisfied, the needs of conscience should be addressed. Fromm explains that the voice of conscience in man is not easy to read because it usually puts forward what one should not do rather than what one should do.

Fromm differentiates two types of human conscience: humanistic and authoritarian (Fuchs, 2020, pp. 298–325). The first is founded on man's freedom expressed outwardly through his individual activity and creativity. It is characterised primarily by independent thinking and independent choices of the individual. According to Fromm, an essential manifestation of humanistic conscience is a lasting sense of happiness and joy in life (Fromm, 1949, p. 157). It should be noted that Fromm, like Spinoza, associates the attitude of joy with doing good and sadness with evil deeds. Good and evil are opposed to each other and are associated with experiencing the emotions of joy or sadness. Therefore, the experience of good or evil influences a person's behaviour, that is, it favours or harms his or her identity (Frankena, 1977, pp. 15–44). Only when a person develops according to his predispositions and existential interests does he achieve satisfaction and contentment. In Fromm's view, the multiplication of individual talents and human abilities is always a manifestation of productivity. Man's productive attitude and externalised joy create fundamental and constant moral

virtue. In his opinion, formation – that is, the strengthening or weakness of the humanistic conscience – depends on the degree of productivity, which should constitute an essential feature of a robust human character as well as a test of how well he is coping with his life. Whereas inefficiency or inability to achieve life goals are typical symptoms of conscience that do not work correctly, leading to frustration and even mental illness (Wilde, 2007, pp. 39–53). Therefore, Fromm noted that the sources of norms of ethical behaviour should be sought in human nature and that their violation results in mental disorders and nervous breakdowns.

In Fromm's opinion, the main obstacle to the proper formation of the humanistic conscience is the attitude of conformity, consisting of a more or less unconscious repetition of behaviour dictated by external authorities or a particular human weakness and apathy in developing consistent action following one's conscience. Then, "the individual ceases to be himself; he adopts entirely the kind of personality offered to him by cultural patterns and he, therefore, becomes exactly as all others are and as they expect him to be" (Fromm, 1942, p. 160). According to Fromm, conformists are focused mainly on consumption and satisfying their desires because they value the world of commodities more than openness and relationships with other people. Fromm reminded us that the authority in power usually tries to force citizens into respecting the regulations and laws issued. Thus, "the contents of the authoritarian conscience are derived from the commands and tabus of the authority; its strength is rooted in the emotions of fear of, and admiration for, the authority. A good conscience is a consciousness of pleasing the (external and internalised) authority; a guilty conscience is the consciousness of displeasing it" (Fromm, 1942, p. 121). Therefore, argued Fromm, the authoritarian conscience is shaped by external factors imposed by various socio-political conditions (Alexander, 2021, pp. 3–9).

Prophets-priests

Using the *prophets-priests* antonym, Fromm draws attention to important differences in ethical attitudes of the leaders of humanistic and authoritarian religions. He also explains the importance of their ideas and their influence on their followers. He states that it is not enough for religious guides to point out a new way and teach a certain truth. They themselves must be its zealous followers and worshippers. "If a man expresses the idea of humility and is humble, then those who listen to him will understand what humility is. They will not only understand, but they will believe that he is talking about a reality, and not just voicing words" (Fromm, 2010, p.12). In his opinion, only those who are convincing (i.e., who propagate original ideas and are guided by them) can be called prophets. Among the prophets who played an essential role in human

history, Fromm includes Socrates, Christ, Buddha and Spinoza, stressing that their actions always coincided with the teachings and views proclaimed (Fromm, 2010, p. 14). "Most of Fromm's writings do not address Judaism or the Bible in depth, but they present a number of consistently recurring themes which Fromm strongly linked in his writings on humanistic psychology to the values espoused in the Prophets and, though to a lesser extent, in the Talmud and other rabbinical texts as well" (Schimmel, 2009, pp. 9–45). The prophets, unlike the priests, preached something they truly believed in and were even willing to sacrifice their health and life for it, while the priests could only copy certain concepts from the prophets and interpret them for their own benefit. Passing themselves off as the prophets' successors and continuators, the priests thus gained the power to influence the conduct of the people. Fromm also emphasised that prophets, unlike priests, did not "inherit" their vocation but were convinced God Himself had chosen them and entrusted them with their mission. Quoting an idiom of biblical origin, Fromm warned against treacherous priests or wolves in sheep's clothing: "Beware of false prophets which come to you in sheep's clothing, but inwardly they are ravening" (Matthew 7, 15). He also pointed out that the life of priests had little to do with their mission of transmitting prophetic teachings.

Wolf-sheep man

In examining the causes of human destructive behaviour and the reasons for using violence and committing crimes, Fromm poses two crucial questions: why do some people quickly give in to evil promptings and take actions that are unfavourable to them? And what determines why some people are considered wolves while others are considered sheep? Fromm strongly rejects T. Hobbes' hypothesis that *man is a wolf to man* and the belief that, by nature, man can be *a wolf in sheep's clothing*. T. Hobbes argued in Leviathan: "If any two men desire the same thing, which nevertheless they cannot both enjoy, they become enemies. Therefore, in trying to attain their end, which is principally their own conservation, or sometimes it is only their delectation, men endeavour to destroy or subdue one another. (...) This war is every man against every other man" (Hobbes, 2016, p. 205). He challenges the common belief that people can be divided into good and bad and that those who easily submit to powerful leaders can be called sheep, while those who think primarily of domination, power and killing can be called wolves. Fromm states that only seemingly most people are sheep, and a minority are wolves, for man has a dormant tendency to be both wolf and sheep. He emphasises that situations or circumstances only to some extent determine man's actions but do not release him from responsibility for doing both good and evil. Fromm agrees with Spinoza that if an individual does evil, he becomes more evil,

because experience shows that "hatred increases through mutual hatred" (Fromm, 1964, p. 11). According to Fromm, nature does not condition one attitude or another because man, as a free being, can always make a choice. He points out that even giving in to destructive desires does not mean that they are insurmountable or always determining (Fromm, 1964, p. 15).

Authoritarian-heteronomous obedience

Fromm emphasises that man can discover fair and objective ethical norms through his mind. Therefore, no one should obediently accept legal regulations or moral principles promulgated by the legislator and adopted by society. Fromm polemicises, among other things, with the classic assertion that all obedience is a virtue and disobedience a vice. He believes a man should obey human nature, but – above all – his own reason and conscience (*heteronomous obedience*). Therefore, human disobedience to any ideology or various authorities (*authoritarian obedience*) was a virtue. Thanks to this distinction (*heteronomous-authoritarian obedience)* Fromm can show the complexity of the above dilemma and draw boundaries between obedience and disobedience. He argues, among other things, that in history, the progress of mankind required courage and was based on constant acts of disobedience. He writes: "By breaking the ties with earth and mother, by cutting the umbilical cord, man emerged from a pre-human harmony and was able to take the first step into independence and freedom" (Fromm, 2010, p. 4). He also argues that – just as the ancient acts of disobedience described in the Hebrew traditions or in Greek myths (the story of Adam and Eve or Prometheus and Antigone) were sparks that initiated human history – so obedience may cause its end (Fromm, 2010, p. 5). Man's intellectual development also depended on disobedience (i.e., contesting an unacceptable reality, resisting overbearing power or not succumbing to collective public opinion). According to Fromm, man, through an attitude of disobedience, learns best to live in freedom and self-reliance. Thanks to the predisposition of reason and, above all, the ability to doubt and think critically, man is capable of renouncing obedience to an authoritative state, political institution or production organisation. Fromm emphasises that both obedience and disobedience should only be subject to the imperative of human conscience and reason.

Being-having mode

Some goods and commodities are necessary for human life and development, but man cannot always use them correctly. In his works, Fromm draws attention to the issue of excessive consumption, man's dependence on possessions and

the habit of buying goods with no heed to actual needs. Therefore, according to Fromm, man must learn to make moral choices between excessive desires and essential needs. By desires, Fromm understands a constant yearning to accumulate resources and increase wealth while needs fulfil elementary provisions for a decent life. The choice between needs and desires depends on what mechanism a person will implement: developmental or defensive. "From these two contradictory strivings in every human being it follows that the social structure, its values and norms, decides which of the two becomes dominant" (Fromm, 2008, p. 86).

Fromm points out that man only thinks he is a free and independent consumer, while environmental or political-economic conditioning and, above all, advertising affect his desires and decisions. He emphasises that entirely intentional human purchasing activities are rare because buyers easily succumb to specialists and management experts, as well as to the company's positive image, creating artificial and illusory desires. As he recalls, in the preface to *The Contribution to the Critique of Political Economy*, Marx had already written: "It is not the consciousness of men that determines their existence, but their social existence that determines their consciousness" (Marx, 2007, p. 4). He himself agrees with Marx that a person's desires influence his feelings and actions. He realises that even people's unconscious desires shape their relationships with society.

One of the better-known questions formulated by Fromm is whether a man should *be more* or *have more*? In analysing another moral antonym (*the mode of having-being*), Fromm is inspired by the teaching of Meister Eckhart, who wrote that "people should not consider so much about what they are to *do* as what they *are*. (...) Thus, take care that your emphasis is laid on *being* good and not on the number or kind of things to be done" and "however holy the deeds may be, they do not sanctify us insofar as they are deeds, but rather, insofar as we are and have being" (Eckhart, 2009, p. 489). Fromm also refers to Karl Marx, who saw the primary motive of action in human greed, in the unbridled desire to consume and possess more and more (Fromm, 1962, p. 47). Fromm resolves this quandary by distinguishing between constructive and destructive needs, where the former favours human development while the latter leads to the disintegration of human beings. He also mentions two types of property: functional and personal; the first is natural and supports life, while the second is the result of the human desire to possess and acquire ever newer products (Fromm, 2008, pp. 78–79). Thus, he tries not only to separate, but to contrast the two ways of human existence. To *the category of the being mode*, Fromm attributes the following features: openness, prudence, a positive approach to change, kindness, commitment or a search for truth. On the other hand, according to Fromm, the *having mode* is characterised by excessive material consumption, apathy, fear of unintended change, distrust and pretence (Fromm, 2008, p. 72).

Fromm states that modern man in industrial society has completely surrendered to the economic conditions that have determined his way of life. Gradually submitting to the products of his work, he became a thing himself (Fromm, 1962, p. 48). In this way, man depersonalises both himself and other people, treating human beings as products or commodities with a price tag, which makes them subject to market exchange. Such a person increasingly loses control over the fruits of his or her labour because, as Fromm noted, things can dominate the sense of human identity and influence the mental state to such an extent that human existence depends on the things owned and purchased. He criticises individuals whose professional goal is to adapt their personality to the employer's requirements or the organisation's mission, regardless of their values. He adds that such people want to respond to the demands of commerce and to be desirable in the personality market. Fromm called this phenomenon a marketing character: the living being became a commodity and the economic market determines his use and value. Thus, while studying the phenomenon of human consumerism, he points to many pathologies of the capitalist system.

Fromm emphasises that in modern economics, there is no place for people who do not work or buy because not only are they useless and unnecessary; worse, they are a burden on society. Therefore, only those who produce or consume are valued. Fromm points out that the constant increase in production leads to market pressure to buy in order to maintain existing customers, as well as to acquire new ones. Decades later, sociologist Z. Bauman confirmed Fromm's predictions by writing that in today's world, the productive part of society has been replaced by a consumer society. The work ethic has been replaced by the aesthetics of consumption too (Kietliński, 2007, pp. 69–82). Fromm argues that it is impossible to reconcile the principles of capitalism, which constantly seeks to increase production and generate ever-greater profits, with the pursuit of the common good and the concept of a fairly managed society. In his view, such a system not only fails to satisfy natural needs, but also perpetually creates new desires. As a result, individuals spend their time focused on accumulating wealth to enhance their purchasing power, rather than enjoying life. The capitalist system of commodification inevitably fosters an idolatrous cult of possession and a reliance on cheap, readily available entertainment and distractions. Fromm contends that within capitalism, what matters are artificial, false and non-developmental commodities, with the desire to amass as many possessions as possible being a prime example.

In his book *To Have or to Be?* Fromm notes the drama of the modern world is an idea of man, whose existence can be summed up in the phrase *I am what I consume*. Fromm points out that man does not see the danger of reducing his life to acquiring and using commodities. He criticises the attitude in which the status of possession counts above all, leading man to spend his life in pursuit of constant

enrichment and the search for new products (Fromm, 2008, pp.134–135). That is why Fromm postulates the definition of certain limits in the exploitation and use of limited natural goods. Crossing these limits not only makes it impossible to maintain the virtue of moderation but also leads to the reduction of human life merely to its material dimension. Man then forgets spiritual values, and the only purpose of his existence becomes to buy, appropriate and use things. Thus, the desire to have more and more becomes an obsession for man and, at the same time, a trap – because it will never be fully satisfied. That is why Fromm warns against the greediness which makes human beings slaves to what they possess. Based on the teaching of St. Paul, Fromm identifies greed as the root of all evil. In this perspective, human attachment to possession rather than to existence qualifies as a devil's temptation. "For the love of money is a root of all kinds of evil" (1 Timothy 6, 10). Fromm emphasises that the truly rich are those who give much, not those who possess much. „The hoarder who is anxiously worried about losing something is, psychologically speaking, the poor impoverished man, regardless of how much he has" (Fromm, 2009, p. 22). Fromm argues that a life focused on having leads to the dehumanisation of man, who measures his value by the amount of accumulated or purchased goods. Therefore, he postulates that the economy should be guided by the principle of fulfilling elementary human needs and not by achieving income and profit. Fromm emphasises that the duty of companies and organisations operating in a given region is to contribute to the development and well-being of society. He sees the need for a moral renewal of society, which should once again become a subject of productivity and not a human resource dependent on the strategies of economists or politicians. Fromm believed that true productivity should be free from the desire to hold on to things. A manifestation of a person's productive character is the production of both ideas and goods, assuming that productivity should always serve human development.

ALIENATION-PRODUCTIVITY

Fromm sees man as a being lost in the modern world, immersed in the dichotomy of life and death, which is both an animal and a person, a physical being but also a spiritual one, a being belonging to two incompatible realities. Thus, the human being, according to Fromm, is at the same time assigned to nature and transcends it. "Man is confronted with the frightening conflict of being the prisoner of nature yet being free in his thoughts; being a part of nature and yet, as it were, a freak of nature; being neither here nor there" (Fromm, 1964, p. 104). He points out that since man broke the primary bond with the natural environment, he was forced to create a secondary relationship with the world and society. Therefore, the determinant of human action became the socio-economic

structure of society, which decided a new way of existence. Fromm recalls that the classical model of human civilisation built on Judeo-Christian tradition was challenged in favour of the new idea that human nature can be freely shaped and changed through culture. He disagrees with the views of modern psychologists and sociologists, who believe that a person can be shaped freely and that only the influence of cultural and social conditions counts. Fromm emphasises that despite the changes, man constantly strives not only for material security or physical satisfaction, but also for a sense of belonging and social ties and still seeks unity with nature. Fromm believes that the moral principles that have been written like man are immutable and, therefore, their rejection must lead to his disintegration. He criticises civilisations based on subjective beliefs, extreme individualism, the denial of natural law, moral norms and all obligations. Fromm warns that in the absence of a stable culture, man's abandonment of nature will give rise to problems that are difficult to overcome in the modern world.

Analysing the conditions of human freedom, Fromm noted that "man the more he gains freedom in the sense of emerging from original oneness with man and nature and the more he becomes an 'individual', has no choice but to unite himself with the world in the spontaneity of love and productive work or else to seek a kind of security by such ties with the world as destroy his freedom and the integrity of his individual self" (Fromm, 1942, p. 21). He knows that an alienated person who wants to free himself from internal disharmony and moral loneliness is forced to adapt to the environment and society around him, as well as to develop a new system of values. Thus, Fromm, in relation to the human person, asked: "How can man be free, how can he be fully man, how can he become what he could be?" (Fromm, 1962, p. 118). Fromm stated that the main problem of humanity is man's "loneliness and alienation, of his lack of productive interests in life" (Fromm, 1962, p. 107). He also believed that alienation is the cause of human mental disorders, social exclusion or even loss of the meaning of life. As one of Fromm's researchers wrote, productivity is a necessary condition for human development (Itzkowitz, 2017, pp. 81–92). Fromm's diagnosis was as follows: "human self-awareness has made man a stranger in this world, separate, lonely and frightened" (Fromm, 1964, p. 104). Therefore, Fromm wondered how to help a person, make him mentally healthy, productive and happy? In psychological research, he worked on transforming neuroses and irrational human behaviour into conscious and free action. "Mental health is characterised by the ability to love and create, by the emergence from incestuous ties to clan and soil, by a sense of identity based on one's experience of self as the subject and agent of one's powers, by the grasp of reality inside and outside of ourselves, that is, by the development of objectivity and reason" (Fromm, 1956, p. 64).

According to Fromm, one of the essential factors alienating man is the attitude of conformity, which occurs when a person submits to an external and

relative system of values out of a need to ensure his safety or for short-term gain. He wondered why people so easily renounce creative freedom and submit to the orders of authoritarian power or a totalitarian system. Fromm notes that man then loses the opportunity to shape reality, further weakening his position in society (i.e., deepening the sense of estrangement, frustration and alienation). Thus, a conformist, at the cost of renouncing his identity, adjusts his opinion, behaviour and views, succumbing to the opinion of a given majority. According to Fromm, such an attitude not only makes it impossible to emphasise the individuality and subjectivity of the human being, but also inevitably leads to the loss of freedom. In his psychoanalytic model, Fromm points to a certain pattern of a man with a productive orientation. He believes that it is possible to shape a human character that would be distinguished by creative thinking, creative love and practical work. He is convinced that acting in accordance with oneself brings man the joy of life, and effective action (with power) becomes a permanent human ability. "Nothing can be more useful to man in furthering the preservation of his being and his enjoyment of rational life than a man who is guided by reason" (Carlisle, 2020, p. 280). He emphasises that human productivity depends on combining two crucial factors: reason and love. Thanks to mental abilities and psychoanalytic intuition, man can get to know himself and the world around him objectively, becoming increasingly understanding of its complexity and singularity. In turn, the ability to love, Fromm counts among man's primary and natural predispositions, which is a condition of mental health. He emphasises that authentic love is the complementary love of oneself and other people. According to Fromm, love allows people to free themselves from the state of alienation and mental disorders; it is a path leading humanity to progress and moral renewal. Thus, both productivity elements fundamentally determine man's development and happiness. At the same time, Fromm points out that loving only one person can turn into a symbiotic bond of a sadistic or masochistic nature.

According to Fromm, man can satisfy his most important needs only through love, understood not so much as a pleasant or strong feeling but as a certain erudition and knowledge that man acquires throughout his life. Love, in fact, allows man to overcome the feeling of redundancy and loneliness in relation to other people and, at the same time, to maintain his originality and uniqueness. Fromm notes that love is a certain paradox, which consists in the fact that a man and a woman – uniting in unity – at the same time lose nothing of their separateness. As for manifestations of proper love, he mentions four elements: care, responsibility, respect and commitment. In the introduction to his book *The Art of Loving*, he writes: "The first step to take is to become aware that *love is an art*, just as living is an art" (Fromm, 2009, p. 5). First, one should learn the theory and then proceed to practise because only specific knowledge and experience will allow a person to solve his most critical existential problems. The negation of love is a narcissistic

attitude, which consists of the inability to enter into relationships and build bonds with another person. Narcissism, according to Fromm, is a pathological attitude because it results from selfishness and closing oneself to reality, focusing only on oneself and one's desires. On the other hand, mature love is manifested not so much in taking from others but above all in the ability to give to others. Thus, Fromm defines life without love as a sin. Love is usually accompanied by such virtues as care, responsibility, respect and knowledge. He emphasises that a person's life cannot be happy and fulfilled without love.

Necrophilia-biophilia

According to Fromm, man is inherently good and life-loving. Similarly, Spinoza taught that "The free man thinks of nothing less than of death, and his wisdom consists in the contemplation not of death, but of life" (Carlisle, 2020, p. 274). Fromm noted that under the influence of abandoning nature and submitting to modern social conditions, man had lost his natural moral sense. Despite this, man still has the opportunity to do both good and evil and "is responsible to the point where he is free to choose for his own action" (Fromm, 1964, p. 134). Fromm assumed that man had almost unlimited possibilities for intellectual and spiritual development. Thus, in an individual's life, the most important thing is to work on oneself and make spiritual progress.

Fromm mentions two different attitudes of man towards the world: biophilic (love of what is alive) and necrophiliac (love of what is dead). He argues that this distinction shows the most fundamental difference between people, psychologically and morally. He repeats after Marx that "only the free and productive man, united to his fellow man, can give the right answer to man's existence" (Fromm, 1962, p. 98). According to Fromm, biophilia is more primary than necrophilia because it results from nature and affects all living beings. In contrast, necrophilia appears as an internal disharmony due to the inability to develop the instinct of life. He added that in people both tendencies coexist in different proportions. You should pay attention to the dominant tendency because it determines most of a person's life decisions and behaviours. Fromm sees in biophilia the love of life and the desire to create, which are manifested in the day-to-day existence of man. It finds its expression in everyday gestures, opinions or statements. It is part of the general aspiration of all nature to life and growth, against death and dying. A man with a biophilic character wants to be with people who love life and each other, who support development and creativity. On the other hand, people with necrophiliac tendencies most often think about illness, death and burial; they also find pleasure in what is unnatural and dead. They want to show strength by destroying life and disintegrating their environment, above all by inflicting pain and suffering

on other people. They admire those who kill while they feel only contempt for those who are killed. Fromm argues that such behaviours are distinctive to people whose proper development has been disturbed. That is why they take pleasure in enslaving others and doing something wicked to them. Fromm emphasises that in the face of adversity in life necrophiles easily give in to frustration or a sense of powerlessness. Because of insatiable desires, envy is born in them and gradually grows laced with jealousy. They are characterised by the syndrome of opposing life, which manifests itself through sadomasochism, destructiveness, greed, narcissism and incest (Durkin, 2014, p. 187). As Fromm briefly summed up in The Fear of Freedom, "the more the drive toward life is thwarted, the stronger is the drive towards destruction" (Fromm, 1942, p. 158).

A significant part of the society of his contemporaries Fromm assigns to the necrophiliac category. Among the typical necrophiliac manifestations, he includes the widespread cult of technology and machines in which he sees the subordination of people to dead mechanisms and artificial technological structures. Fromm emphasises that civilisation without human values and relationships with nature inevitably leads to mental disorders and self-annihilation. His illustration of this thesis is a wealthy Western society immersed in boredom and neurotic depression, guided only by the desire to possess and the search for satisfaction of countless cravings. According to Fromm, people are content with some substitute and illusion of action, accepting unquestioningly the roles imposed on them by technocrats and those with power. Fromm points out that people immersed in inactivity expect to be stimulated by simple entertainment based on destruction or various forms of violence. Living in a dehumanised world, they involuntarily succumb to such trends propagated by widely available media. Fromm warns that necrophiliacs are gradually losing their grasp on reality and cease to seek answers to questions about the meaning of life; considering themselves intelligent, they can only exist to buy, consume and use things (Fromm, 1973, p. 367).

Conclusion

Drawing on an analysis of the ideas of Meister Eckhart, Baruch Spinoza, Sigmund Freud and Karl Marx, Erich Fromm proposed an idealistic vision of man and society. He described reality using antonyms, which became unconventional tools in logical semantic conversion. An innovative way of using antonyms with a moralising message to assess the situation of man and society is undoubtedly Fromm's important contribution and brings him credit.

Fromm was able to combine different concepts in the field of philosophy, theology, psychology and economics. These were not only theoretical speculations. He strove to heal the man and society of that time. Through systematic psycho-

analytic research and discovering the role unconscious motivation plays in human choices, Fromm significantly expanded existing knowledge. According to him, conscious and unconscious processes permeate mental life and influence human behaviour and choices equally. Fromm echoed Freud and Marx that human beliefs are controlled by human cravings on the one hand and, on the other, by social structures.

In necrophilia, intense narcissism and a symbiotic-incestuous orientation, Fromm saw manifestations of the syndrome of decay, while in biophilia, love of neighbour and freedom – the syndrome of growth. For him, an alienated person constituted a case of mental pathology, while a creative, active and autonomous person was an emanation of mental health. He knew that in heading to freedom, man must become aware of the circumstances that determined his life, from which he could free himself only by making a great effort and acting according to his conscience. He assumed that a person needs the acceptance of others, belonging to a group and creating social bonds. That is why he devoted himself to the study of the complex phenomena of human alienation and social exclusion. Fromm noticed that a person experiences alienation when he or she is confused by a certain situation and is unable to respond appropriately to it. At the same time, he or she is filled with a sense of uncertainty, anxiety and guilt due to the inability to overcome loneliness. In order to solve this problem, Fromm combined philosophical anthropology with individual and social psychology. Thus, he sought the foundations of man's harmony in his relationship with society and the environment. He believed that human life could not be reduced to the acquisition or possession of commodities because the most important thing is the richness of being. Based on psychoanalytic practice, Fromm concluded that the inability or incapacity to establish a relationship with others not only leads to loneliness but also gives rise to a sense of hostility and even a desire to inflict pain and suffering. Therefore, the drama of alienation can only be overcome by providing the love that, according to Fromm, one must learn. He argued that not only love, but also life, is an art that must be practised on the basis of four elements: discipline, concentration, patience and passionate commitment. Fromm concluded that man must belong to a social group or be guided by a certain moral system in which love, justice and truth are paramount.

In the author's opinion – based on the analysis of Fromm's work – another important antonym should be added, which seems to be a logical continuation of Fromm's thinking. It highlights an opposition between desire and needs, which should make it possible to solve many of the moral dilemmas of the present age, above all in establishing the boundary between consumption that aids man and excessive consumption that makes man dependent on possessions and commodities. This antonym would draw attention to the difference between human desires and needs, where the former are associated with disordered human

emotions and feelings and therefore with something spontaneous and unnecessary, while the latter appears to be essential in maintaining a durable existence and development.

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Summary

When interpreting reality, Erich Fromm used innovative words that were, at the same time, completely opposite in meaning, giving the chosen terms an antonymic quality. Moral antonyms include combinations such as authoritarian-humanistic religion, authoritarian-humanistic conscience, priests-prophets, man-wolf-sheep, authoritarian-heteronymous obedience, idolatry-faith, way of being, needs-desires, destructive-constructive needs, alienation-productivity, decay-growth syndrome and necrophilia-biophilia. By employing terms that serve as semantic counterweights, Fromm described the moral situation of both individuals and society.

Keywords: biophilia-necrophilia, productivity-alienation, to have-to be, growth syndrome-decay, humanistic religion-authoritarian.

Antonimy moralne Ericha Fromma

Streszczenie

Erich Fromm, interpretując rzeczywistość, posługiwał się słowami nowatorskimi, a jednocześnie całkowicie przeciwstawnymi, to znaczy nadającymi wybranemu terminowi przeciwne znaczenie. Do antonimów moralnych zaliczają się takie kombinacje, jak religia autorytarno-humanistyczna, sumienie autorytarno-humanistyczne, kapłani-prorocy, człowiek wilk-owca, autorytarno-heteronimiczne posłuszeństwo, bałwochwalstwo-wiara, sposób bycia, potrzeby-pragnienia, potrzeby destrukcyjno-konstrukcyjne, alienacja-produktywność, zespół gnicia i wzrostu, nekrofilia-biofilia. Używając terminów, które same w sobie stanowią semantyczną przeciwwagę, Fromm opisał sytuację moralną człowieka i społeczeństwa.

Słowa kluczowe: biofilia-nekrofilia, produktywność-alienacja, mieć-być, syndrom wzrostu-zaniku, religia autorytarno-humanistyczna.

JEL: Z19.

prof. dr hab. Heorhiy Cherevko[1] ⓘ

Institute of Economics and Finance
University of Rzeszów

Poverty in Ukraine due to Russian military aggression

Introduction

"Wealth-poverty" is an eternal axis around which everyday life revolves, and social, philosophical, political and economic discussions take place. This axis encompasses such vital concepts as freedom, justice and equality. Therefore, more and more countries in the world at the beginning of the 21st century are aware of the negative consequences of population poverty, and among the 8 main Millennium Development Goals approved by the UN, solving this issue is one of the highest priorities. The transformational stagnation in modern Ukraine, especially under the conditions of war, has exacerbated the problem of wealth and poverty to a terrible limit. Thus, addressing this problem requires the involvement of all resources of society – political will, intellectual potential, civic conscience, moral responsibility and effective economic mechanisms. The purpose of this study was to establish the real level of poverty in Ukraine and to determine its meaning and factors of formation in the specific conditions of Russian military aggression in the country, as well as to form a vision of the nearest prospects for its dynamics. The research covered the period 2000–2023. The methodology of the conducted research was formed on the basis of a dialectical approach to the study, in combination with methods of analysis and synthesis, as well as induction and deduction, using the method of scientific abstraction and the analytical-descriptive method.

Literature review

Even in the 4th century, before the birth of Christ, Plato – in the treatise "Laws" – touched on the issues of the ratio of wealth and poverty (Plato, 1990).

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[1] Correspondence address: University of Rzeszów, Institute of Economics and Finance, Ćwiklinskiej st. 2, 35–601 Rzeszów; e-mail: gcherevko@ukr.net. ORCID: 0000-0003-4339-0152.

According to Aristotle, the predominance of one of these elements determines the appropriate form of government (Aristotle, 1983).

It is believed that representatives of classical political economy (A. Smith, D. Ricardo, J. Mill, G. Spencer, A. Marshall, E. de Sotto, T. Malthus and others), for the first time, formulated a complete system of views on the problem of the distribution of monetary incomes, the phenomena of poverty and wealth, and also developed a coherent system of views on the distribution of monetary income, the phenomena of poverty and wealth. They found that poverty is the result of industrial development and that the distribution of income between different classes determines the distribution of property.

T. Malthus noted that the cause of poverty is the higher rate of population growth compared with the growth of resources (Malthus, 1993). A. Smith revealed the relative nature of poverty between social standards and the real ability to adhere to them; it was believed that poverty is a consequence of industrial development (Smith, 1962). F. Giddings and his followers called poverty a disaster that cannot be prevented, while at the same time it is the driving force of social progress (Giddings, 1898, p. 152). J. Proudhon also considered poverty to be a social good and an integral feature of humanity, since its needs are growing all the time (Proudhon, 1908, p. 10). G. Spencer also defined poverty as a positive and natural phenomenon that stimulates human development. He considered the state's intervention in the natural development of society to be inappropriate and stimulating the passivity of the population (Spencer, 1906).

According to F. Hayek, poverty is an inevitable reality in any society that cannot be overcome by administrative or coercive methods but can only be slightly reduced on the basis of increasing general well-being (Hayek, 1983, p. 226).

The diametrically opposite point of view was held by the so-called "egalitarians" (E. Reklu, K. Marx, F. Engels). The existence of poverty alongside wealth – in their opinion – is a social disaster, a consequence of unfair distributional relations. It is necessary only to change relations and absolute equality will prevail (Reklu, 1906).

B. S. Roventry first conducted a scientific study of poverty, introduced the concept of a basket of basic products and distinguished between "primary" (insufficient resources to meet basic needs) and "secondary" (when basic needs are not satisfied with irrational expenditure of resources) poverty (*Approaches…*, 2020).

The study of poverty through a set of functional capabilities was carried out by A. Sen, according to which the main point of eradicating poverty is to increase the basic capabilities of the individual (education, medical care, political rights), which leads to an increase in the production capabilities of workers and their opportunities to receive income (Sen, 1993, p. 11).

However, to this day, there are no clear definitions of the concept of poverty. The difficulties mentioned are obviously related both to the multifaceted nature of this phenomenon and to the goals of individual research, which are undertaken by

scientists of various specialties – economists, sociologists, philosophers, political scientists and public administration specialists – using different conceptual apparatus (*Poverty and wealth…*, 2020).

Determining the essence and causes of poverty is especially important in the context of explaining the existence of social inequalities and the division of the countries of the world into rich and poor, which, as it turns out, is important for explaining the behaviour of these countries. R. Sharma, in the book *Rise and Decline of Countries*, draws attention to the peculiarities of such a division and concludes that, in general, if a country focuses on economic growth, then the indicators of human development will rise along with the economy (Sharma, 2016, pp. 20–21).

To the greatest extent, D. Acemoglu and J. Robinson managed to answer the question of why some countries are rich and others are poor, establishing that the huge differences in global inequality are obvious to everyone, and asserting that "inequality in the modern world is mostly a consequence of the difference between countries in the level of economic success due to the presence in them of different institutions, rules that determine the operation of the economy, and incentives for motivating people" (Acemoglu, Robinson, 2018, p. 67). Accordingly, inclusive institutions, such as those in South Korea or the United States, encourage large masses of people to participate in economic activities that allow them to reveal their talents and skills and to make choices based on their own wishes (Acemoglu, Robinson, 2018, p. 68). Nations decline when they have extractive economic and political institutions, as a result of which economic growth is restrained or even blocked (Acemoglu, Robinson, 2018, p. 76).

On the basis of his research, O. Galor came to the conclusion that "the differences in living conditions in the world are so colossal that from one end of this spectrum it is difficult to understand how people live at the other end..." (Galor, 2023, p. 123). The scientist also points to institutions as the root cause of such inequalities and poverty (Galor, 2023, p. 137).

J. Diamond formulated the problem as follows: "Why do some societies decline, while others develop successfully?" (Diamond, 2021). The scientist sees the key to success in the effective resolution of extremely complex environmental problems related to the surrounding natural environment, which enables long-term existence and strong positions. As an example, he cites the successes of Iceland, whose population has one of the highest indicators of average income (Diamond, 2021, p. 22).

E. Reinert, in his book *How Rich Countries Became Rich and Why Poor Countries Remain Poor*, thoroughly illustrated that the so-called "ontological circle of poverty" dooms some countries with enormous starting opportunities to permanent descent along the "rings of poverty" to the bottom of the well (*The economy…*, 2019). The main reason is the priority given to monoproduction

and the incorrect application of the theory of comparative advantages. Thus, favourable conditions for agriculture in Ukraine contributed to its specialisation in raw monoproducts with diminishing returns, where the scale effect does not work. Industries with increasing returns, which could be based on the use of relative advantages, did not develop properly in Ukraine (Kutsiak, Chopenko, 2019).

Among the representatives of the Ukrainian economic school, E.M. Libanova, V.M. Novikov, A.F. Revenko, Y.I. Sayenko, L.M. Cherenko and others are considered the most well-known in the problem of poverty, whose vision of poverty and its causes in general was formed in the context of the understanding of the concept of poverty according to the definition of the EU Council of Ministers formulated in 1984. Based on the rather popular concept of P. Townsend, poverty is a people, family or group whose resources (material, cultural and social) are so limited that they exclude them from the minimally acceptable way of life led by other inhabitants of the European countries where they live. P. Townsend based his analysis on a certain set of restrictions, multidimensional deprivation, which he understood as a state of observed and proven disadvantage of an individual, family or group against the background of society or the nation as a whole (Townsend, 1979, p. 31). V. Voronova, V.O. Mandybura, E. Libanova and O. Sergienko in their works highlight the issues related to the reasons for increasing property and material differentiation of the population, criteria for defining poverty and ways to overcome it. The typology of poverty models is given in the works of Yu. Sayenko (Prykhodko, 2018, p. 531).

The UN defines four main manifestations of poverty: short life, low professional and educational training, deprivation of the economic basis of normal life (water, medical services and quality food) and withdrawal from social life (*About…*, 2001). According to the approach of the World Bank, poverty is considered a situation in which the population lives on less than \$5.50 a day (*How the level …*, 2023).

The analysis and synthesis of its results show that almost all approaches to defining poverty refer to a person's lack of resources necessary to provide for the minimum needs. The difference is only in the way or method of expressing these minimally necessary needs and determining their optimally reasonable level.

Approaches to defining poverty common in global practice can be combined into two main concepts: the concept of "absolute" poverty and the concept of "relative" poverty (Prykhodko, 2018, p. 529). If the absolute approach characterises poverty according to established and scientifically based physiological or social norms, without taking into account the actual levels of consumption of the population, then the relative criterion provides information about what part of the population cannot provide for itself the level of consumption that has actually formed in a specific country for the current period and is typical for most of the population. The strengthening of income differentiation and uneven distribution of the effects of economic growth between strata of Ukrainian society with different

levels of well-being brings the problem of studying relative poverty to the fore (Cherenko, 2006, p. 317).

So, on the one hand, poverty has an absolute essence – hunger and neediness. On the other hand, it also depends on the standards of societal life, so in researching the problem of poverty, it is advisable to combine both concepts.

Thus, poverty is the absence of resources or their insufficient amount, which leads to the emergence of a whole system of restrictions in various spheres of everyday life of people, which generally corresponds to the methodology of comprehensive assessment of poverty, developed for the implementation of the Poverty Alleviation Strategy, approved by the order of the Cabinet of Ministers of Ukraine dated 16 March 2016 (*The Cabinet…*, 2017). In general, any concepts, definitions and classifications of manifestations of poverty have their flaws. Each country, based on its economic capabilities, chooses a certain option.

Research methodology

The methodology of the conducted research was formed on the basis of a dialectical approach to the study of socio-economic phenomena in an organic combination with the methods of analysis and synthesis and induction and deduction using the method of scientific abstraction and the analytical-descriptive method. A problematic but integral element of the applied research methodology was the determination of the way of expressing the real level of poverty so that it would be possible to analyse the dynamics of its level and make appropriate comparisons in time and space in relation to certain types of poverty. Based on the results of the analysis of existing approaches to poverty measurement, it is accepted that the tool for determining the prevalence of poverty and the degree of impoverishment of the population is the poverty line, which can be determined in two ways: normative and relative (statistical), and both were used during the conducted research. The subsistence minimum is used as a certain social norm to determine the poverty line. Depending on the need and the degree of availability of information, other criteria for classifying the population as poor are applied – structural-expenditure, resource, system and subjective criteria.

The main research limitations were related to the fact that the collection of statistical data from official state bodies during martial law is prohibited; therefore, the main sources of information were operational materials from scientists and practitioners who monitor the course of events and changes in the situation regarding poverty in the conditions of Russian military aggression, as well as published materials from institutions, organisations, analytical portals and information agencies, including SlovoiDilo, ZaxidNet, Epravda, Migrant.biz.ua, Ukrinform, The Ukraine News, Facty.ua, etc.

Analysis of results and their interpretation

The problem of poverty in the world is gaining more and more weight and importance. Evidence of this is at least the establishment of the International Day for the Fight against Poverty – October 17. In 1981, there were approximately 2 billion poor people in the world, that is, in fact, 40% of the world's population (Kapustynska, 2019). In recent years, another 165 million people have fallen below the poverty line and, in total, about 1.65 billion people live below the poverty line on the planet (*About 1.65…*, 2023). In 2022, more than 250 million people in the world faced severe hunger amid the worsening global food crisis. Among the key factors in this phenomenon, the UN cites the war launched by Russia against Ukraine. In addition, the lingering impact of the COVID-19 pandemic and climate change have also played a role in exacerbating the crisis (*Last year…*, 2023).

According to the United Nations Development Program (UNDP), about 71 million people faced poverty due to the Russian–Ukrainian war (Kryzhanivska, 2022). During the first three months of the war in 2022, approximately 51 million people found themselves below the poverty line. While increasing the number of the world's poor to 9%, the war also caused the daily income of about 20 million people to fall below the $3.20 poverty line in lower-middle-income countries (*Last year…*, 2023).

The world economy is cyclical: an upswing is followed by a downturn – the recovery to another recession. But never has recovery from a fall stopped so quickly as it is now. The Russian invasion of Ukraine brought losses to the global economy, destabilised energy markets, exacerbated food shortages and poverty in many developing countries (Melnyk, 2022).

That is, the world will pay a high price for Russia's war against Ukraine. However, it is Ukraine that pays the most – in human lives, and these costs are non-reimbursable.

The war in Ukraine has also led to population migration on a historic scale not seen since World War II. The number of refugees from Syria reached 3 million after two years of conflict, while the same number left Ukraine in the first three weeks (Kalmykov, 2022; Melnyk, 2022)

So, the main factor shaping the current level of poverty in Ukraine is undoubtedly the war – Russian military aggression, which affects the growth of poverty due to destruction and losses.

Before the war, according to UNICEF and the Institute of Demography and Social Research named after Ptukha, the poverty level of the population of Ukraine decreased from a high of 71.2% in 2000 to a minimum value of 19.9% in 2008. It then increased and subsequently decreased, reaching a maximum of 25.8% during this period in 2011 (*How the level…*, 2021). A sharp deterioration in the level of poverty in Ukraine occurred after the occupation of Crimea and the start of the

war in Donbas – from 28.6% in 2014, it grew to 58.6% in 2016 and then began to decrease to 37.8% in 2019 (*How the level…*, 2021) (Figure 1).

Now, Ukraine is the poorest country in Europe, and back in the late 1990s and early 2000s, it was third from the bottom – ahead of Albania and Moldova in terms of poverty (Lemko, 2022a).

In 2023, 67% of Ukrainians were already below the poverty line, and Ukraine has almost returned to the poverty level of 2001 – having lost 20 years due to the war unleashed by Russia. Unfortunately, for the years 2022–2023, state statistics practically do not collect relevant data because according to laws related to martial law, demographers and sociologists cannot conduct certain surveys and research. According to simulated data, poverty in Ukraine was 60% in 2022 and 67% in 2023. However, according to the estimates of the Institute of Demography and Social Research named after Ptukha of the National Academy of Sciences of Ukraine, 30–31 million people live in the controlled territory of Ukraine, so it can be assumed that 20 million Ukrainians are below the poverty line.
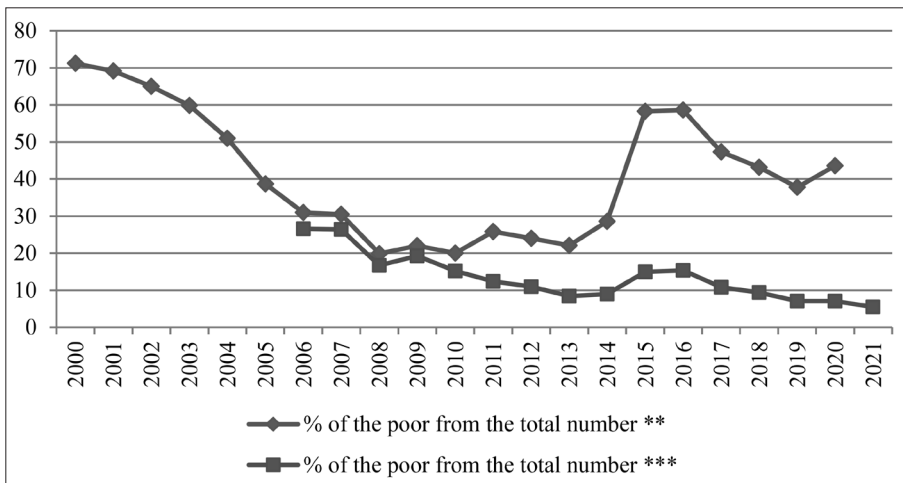
Figure 1. Dynamics of the poverty level in Ukraine (according to various data sources)

*– without taking into account the temporarily occupied territory of the ARC, the city of Sevastopol and the ATO zone.
** source – according to UNICEF data based on research by the State Statistics Service and the Institute of Demography and Social Research named after M.V. Ptukha (*How the level…*, 2021).
*** source – according to the data of the World Bank (the poor – less than $5.50 /day) (*How the level…*, 2023).

Traditionally, this is poverty associated with low standards of pay, which is related to the low-cost labour model that the country chose back in the early 90s and with which it exists, although in 2017 serious steps began to increase the minimum wage. In addition, rural poverty is also traditionally higher (*Due to the war…*, 2023).

According to the World Bank, in 2006–2007 the level of poverty in Ukraine was even higher than during the full-scale war – 26.6% and 26.4%, respectively. In 2008, the poverty rate was estimated at 19.3%. The number of the population of Ukraine living below the poverty line then decreased to 8.4% in 2013. In 2014–2016, the poverty level in the country increased again to 15.4%, but by 2020 it decreased smoothly to 7.1% (Figure 1). In 2021, before the start of a full-scale war, Ukraine had the best poverty rate – only 5.5%. For 2022, according to the World Bank, it increased to 24.1% (*How the level…*, 2023), resulting in 7.1 million people living below the poverty line (*Due to the war…*, 2023), and by the end of 2023, according to forecasts from the World Bank, it may increase to 55% (*How the level…*, 2023).

The main reason for the increase in poverty in Ukraine due to the Russian military aggression is the terrible consequences of the latter, especially for the economy of the country, which has suffered colossal losses from the full-scale aggression of Russia. According to the results of 2022, the GDP decreased by a third, which is the worst indicator in the history of independence (*How the life…*, 2023). According to the results of 2021, annual inflation in Ukraine amounted to 10%, and according to the results of 2022, 26.6%. The nominal GDP of Ukraine at the end of 2021 was ₴5 trillion 460 billion (₴ = hryvnia), and at the end of 2022, it was ₴4 trillion 825 billion (-11.6%). At the same time, the average salary increased for 2022–2023 by almost 20% – up to ₴17,700/month (equal to €450) (*Average…*, 2022). For comparison, the average monthly salary in Poland is €1,114, Hungary – €1,067, the Czech Republic – €1,249, Romania – €742, Albania – €422 and Germany – €3,812 (*Salaries…*, 2023). The average Ukrainian can buy 4.5 times fewer goods than the average Swiss person or 3 times fewer than the average German (Ben, 2020).

The minimum wage in Ukraine rose to ₴6,700 (€168 at the exchange rate of ₴40/euro), compared to ₴6,000 in 2021 and ₴5,000 in 2020. Notably, this rate was maintained throughout 2023 (*Minimum…*, 2023).

Pensions continue to be indexed: the minimum pension in 2023 increased to ₴3,120 for unemployed and ₴2,520 for working pensioners (*What is…*, 2023).

From January 1, 2023, the subsistence minimum per person per month was ₴2,589 – at the level of 2022 and ₴196 more than in 2021 (Grubrina, 2023). Comparing this living wage with the level of prices for basic necessities, it can be considered a rather symbolic indicator.

But the number of registered unemployed people in Ukraine has almost halved: as of January 31, 2023, there were officially 166,000 unemployed citizens. Among the reasons for such an anomaly are the departure of Ukrainians abroad, mobilisation and the citizens staying in the occupied territories. In fact, as of the end of 2022, according to the Ministry of Economy, the number of unemployed people was 2.6 million. In August 2023, the unemployment rate was 15.1%.

According to the Ukrainian Institute for the Future (UIF) – approximately 28.5 million people currently live in Ukraine. However, what matters is not the total number, but the structure. Among these 28.5 million, there are 16.8 million professionally inactive people – retirees and children. About 11.7 million are economically active, but only about 9–9.3 million of them are actually employed. If you subtract budget employees from this number, there will remain 6–7 million people who are, in fact, the "sleigh" that pulls the entire economy (Marushchak, 2023).

Due to the fuel crisis during the war, the price of fuel increased: a litre of A-95 petrol rose in price by 59.9%, a litre of diesel – by 78.5% and autogas – by 47.7%. In addition, the prices of basic foods soared: bread rose in price by more than 20%, milk – by 21.8%, eggs – by 78%, sunflower oil – by 15.1%, buckwheat – by 44.7%, sugar – by 30.1%, potatoes – by 1.2% and pork – by 35.4% (*How the life…,* 2023).

The war in Ukraine showed certain, rather interesting, interdependencies of a political and economic nature:

1. The countries that unconditionally support Ukraine in the war with Russia are the USA, Canada, Great Britain, Scandinavian countries, Australia and Japan, which are united by the Protestant religion, high standards of democracy, low corruption and the highest GDP per capita; these are developed rich countries. The Baltic countries and Poland, which also unconditionally and almost the most support Ukraine, are not rich countries as a result of the Russian occupation of Latvia, Estonia and Lithuania from 1940 to 1991, and Poland – from 1945 to 1989 (Lemko, 2022a).

2. The sympathisers of the Kremlin and Putin in developed rich countries mostly represent the poor and poorly educated electorate. Trump is the leader of the poor "cowboys" – the inhabitants of the deserts and prairies; on the other hand, almost one hundred percent of the American professoriate, scientific, creative, artistic and business elite are always in favour of democracy. "Yellow vests" in France, "Alternative for Germany" and "Jobbik" in Hungary are areas of low income and low education (Lemko, 2022a).

3. Half-rich countries also "half" help Ukraine and still are a "semi-helper" towards Ukraine – even now, their aid is not commensurate with the help of the USA or Great Britain.

4. "The world's largest democracy", India, is in no hurry to condemn Russian aggression against Ukraine, does not join the free world's sanctions against Russia and was tempted by cheap Russian oil – because this almost one-and-a-half-billion-strong country, even exporting software for an amount greater than Russia's oil exports, still belongs to the poor world.

5. In general, the moral, educated, inventive and enterprising "golden" billion of the population is opposed to the generally impoverished and immoral, not even "gilded", six billion. Of course, one cannot claim that certain nations are

100 percent moral or immoral; nevertheless, there is today a polarisation of the countries of the world into two groups: on one hand, the advanced Euro-Atlantic civilisation that has contributed significantly to the world, and on the other hand, a group of immoral, insidious and hopelessly envious countries, where rampant corruption prevails, the majority of the population suffers from severe pathological poverty and there is an absence of an open civil society. We can now confidently include Russia in this latter group (Lemko, 2022b).

According to the survey conducted by the Kyiv International Institute of Sociology (KIIS) on October 21–23, 2022, the majority of Ukrainians believe that in ten years Ukraine will be a successful country within the EU. 96% of respondents are ready to endure material difficulties for 3–5 years (*Ukrainians...*, 2022). That is, the issue of poverty in Ukraine today is less important for people than it was in peacetime, and the completion of the country's European integration is now the most important priority – the prerequisite for which is an absolute victory over Russia and punishment for the damage and loss of life.

It is impossible to eliminate poverty in general. "We can hardly count on the eradication of poverty in Ukraine. Rather, the task consists in reducing the number of the poor" (Libanova, 2020, p. 11). The prospects for reducing the level of poverty in Ukraine depend on the duration of the war, the level of destruction of the country's economy and the quality of development of the country's economy and its population at a new level. The latter will crucially depend on the degree of inclusiveness of the new economic and political institutions. It is clear that a purely objective condition for the successful operation of the mentioned factors is the economic and political support of Ukraine by partner countries.

Based on the current situation and evolving trends, certain positive developments are predicted for the near future, despite the ongoing challenges of the war. In particular, by April 1, 2024, the minimum wage in Ukraine is expected to increase by more than 19% compared to the current level. Consequently, business expenses for maintaining each employee at the minimum wage will rise by a similar percentage, approaching nearly ₴10,000. The government plans to raise the minimum wage on April 1 to ₴8,000 (Kruglikov, 2023). This increase is likely to encourage the growth of average wages, which may ultimately contribute to the stabilisation or even reduction of the poverty level among the population of Ukraine; however, this will depend on the success of the Armed Forces in the conflict with Russia.

Final remarks and conclusions from the research

Despite the high popularity of the topic of poverty in scientific research, there is no single definition or understanding of the concept of poverty. Only its relative nature and the fact that the essence of poverty depends on a country's

economic development are precisely known, since the poor population of a highly developed country will be considered quite wealthy in countries with low economic development. Poverty is characteristic of all countries, regardless of their level of development and income of the population. The main causes of poverty are a level of income lower than the minimum defined by society or its complete absence, which causes the exclusion of an individual from social life.

Due to economic, political and social reasons, Ukraine had a fairly high level of poverty even before the beginning of Russia's large-scale aggression, which, however, showed a downward trend. The key cause of poverty in Ukraine before the war was a high level of monopoly and a rent-seeking model of the economy, which caused a low level of social benefits as a result of low earnings and, therefore, deductions to the relevant budgets and funds; a significant economic burden on the working population; high rates of inflation; and a low estimate of labour costs.

The war sharply worsened the state of the country's economy in qualitative, quantitative and structural terms, which was reflected in the level of the population's income and indicators of its poverty level – the number of poor people increased significantly.

Based on the level of inflation, the rate of wage growth and the dynamics of social benefits, we can draw the same conclusions about the level of poverty in Ukraine as the World Bank does. At the same time, this institution is unable to assess the true picture of the lives of Ukrainians, where family and shared incomes are widely developed, informal part-time work and receiving financial assistance from children and grandchildren are common. The World Bank usually does not try to understand other countries' economies and operates with clichés. In Ukraine, the number of poor people has definitely increased – nothing good is expected from the war in this regard. However, a significant number of Ukrainians, even despite the war, have jobs and income. True, prices have increased significantly, but in times of war, it is not and cannot be otherwise.

For Ukraine, which suffers under the blows of the aggressor who is waging war to destroy this country, the issue of poverty does not make economic sense and is not a priority for the population at the moment. Rather, it has political and social significance. In order to reduce the level of poverty, it is necessary to fight not with the consequences, but with the causes of poverty; otherwise, the struggle can continue indefinitely. In the case of Ukraine, the main cause of population poverty today is the war and Russian military aggression. Accordingly, the first task is the end of the war and the absolute victory of Ukraine, which corresponds to the interests of all civilised humanity.

From a political point of view, it is very important that the formula "war – destruction – poverty" is not an abstract concept, but a reality in which a huge European country is falling under the influence of external aggression and the whole world is suffering. It is a pity that not everyone stubbornly realises this.

In addition to the economic and political aspects, there is also a philosophical perspective on the problem because in addition to quantitative criteria, poverty has qualitative criteria. People who defend their country lose a great deal materially, but they gain incomparably more spiritually, morally, valuably and mentally. This is a guarantee of future victory and further reconstruction and prosperity of the country.

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Summary

The purpose of this study was to establish the real level of poverty in Ukraine and to determine its meaning and factors of its formation in the specific conditions of Russian military aggression in the country and to form a vision of the nearest prospects of its dynamics. The methodology of the conducted research was formed on the basis of a dialectical approach to the study of socio-economic phenomena in an organic combination with the methods of analysis and synthesis as well

as induction and deduction using the method of scientific abstraction and the analytical-descriptive method. The tool for determining the prevalence of poverty and the degree of impoverishment of the population is the poverty line. Two main methods of its definition are used: normative and relative (statistical). It has been established that the war has caused catastrophic damage to the country's economy and is the main factor in the sharp increase in the poverty level of the population. At the same time, the issue of poverty is not a priority for the population of Ukraine at present. Purely objectively, for a country under the blows of an aggressor who is waging war to destroy it, the poverty rate makes no economic sense; rather, it has political and social significance. The first task is to end the war in an unambiguous version – the absolute victory of Ukraine, which corresponds to the interests of all civilised humanity. The prospects for reducing the level of poverty in Ukraine depend on the duration of the war and the level of destruction of the country's economy, as well as the quality of development of the country's economy and its population at a new level. The latter will depend on the degree of inclusiveness of the new economic and political institutions. It is clear that a purely objective condition for the successful operation of the mentioned factors is the economic and political support of Ukraine by partner countries.

Keywords: war, Ukraine, poverty, welfare, victory.

Ubóstwo ludności Ukrainy w wyniku rosyjskiej agresji militarnej

Streszczenie

Celem niniejszego badania było ustalenie rzeczywistego poziomu ubóstwa na Ukrainie oraz określenie czynników jego kształtowania się w specyficznych warunkach rosyjskiej agresji militarnej na ten kraj oraz sformułowanie wizji najbliższych perspektyw jego dynamiki. Metodyka prowadzonych badań uwzględnia dialektyczne podejście do badania zjawisk społeczno-ekonomicznych w organicznym połączeniu z metodami analizy i syntezy oraz indukcji i dedukcji z wykorzystaniem metody abstrakcji naukowej oraz metody analityczno-opisowej. Narzędziem służącym do określenia rozpowszechnienia ubóstwa i stopnia zubożenia ludności jest granica ubóstwa. Stosowane są dwie główne metody jego definiowania: normatywna i względna (statystyczna). Ustalono, że wojna wyrządziła katastrofalne szkody w gospodarce kraju i jest głównym czynnikiem gwałtownego wzrostu poziomu ubóstwa ludności. Jednocześnie problem ubóstwa nie jest na razie priorytetem dla ludności Ukrainy. Czysto obiektywnie patrząc, dla kraju znajdującego się pod wpływem agresora, który prowadzi wojnę, aby go zniszczyć, wskaźnik ubóstwa nie ma sensu ekonomicznego, ale ma znaczenie raczej polityczne i społeczne. Najważniejszym zadaniem jest zakończenie wojny w wersji jednoznacznej – absolutnym zwycięstwem Ukrainy, co odpowiada interesom całej cywilizowanej ludzkości. Perspektywy zmniejszenia ubóstwa na Ukrainie zależą od czasu trwania wojny i stopnia zniszczenia gospodarki kraju, od jakości rozwoju gospodarki kraju i jego ludności na nowym poziomie. To ostatnie będzie zależeć od stopnia inkluzywności nowych instytucji gospodarczych i politycznych. Jest oczywiste, że czysto obiektywnym warunkiem pomyślnego działania wymienionych czynników jest wsparcie gospodarcze i polityczne Ukrainy przez kraje partnerskie.

Słowa kluczowe: wojna, Ukraina, ubóstwo, dobrobyt, zwycięstwo.

dr Marcin Złoty[1] (iD)

Department of International Finance and Investments
Faculty of Economics and Sociology, University of Łódź

The "Sheep Rush" phenomenon and the level of social trust during the financial crisis 2008+, the COVID-19 pandemic and chosen armed attacks in the 21st century[2]

Introduction

The aim of the article is to show the impact of the sheep rush on the economy and the level of social trust during the 2008+ financial crisis and the COVID-19 pandemic. A complementary examination will focus on the impact of herd behaviour during the war between Russia and Ukraine and the military actions between Israel and Hamas in 2023, which have spread throughout the world. The impact will be examined in the areas of property, oil and gold markets. The period under study is 2006–2023. The research hypothesis is that the analysed crises and the behaviour of the sheep drive multiply the increase in the prices of property, oil and gold. The detailed hypothesis states that the level of society's trust in the market environment determines the scale of the sheep market. The research method is a comparative analysis of literature on the subject and macroeconomic data. An overview of the process of economic, pandemic and military turmoil along with its consequences will illustrate the described issues related to the creation of the phenomenon of herd and market panic. The examined issues are extremely crucial from the point of view of social inequalities in the event of sudden changes in social trust and also economic changes in terms of prices of key investment assets.

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[1] Correspondence address: ul. POW 3/5, 90-255 Łódź; tel. +48 42 635 53 16; e-mail: marcin.zloty@uni.lodz.pl. ORCID: 0000-0002-9260-0083.

Financial crisis

The term crisis comes from the Greek language – crisis, which means a turning point, a breakthrough or a decisive moment (Kopaliński, 1994, p. 289). In economic terms, a crisis is an economic phenomenon consisting of a downturn expressed as a decline in production, investment, consumption, decreasing national income, rising unemployment, shrinking markets and people's standard of living (Siwiński, 2011, pp. 11–12).

The most important financial crises of the 20th and 21st centuries include:
1. The Great Depression (1929–1933);
2. The currency crisis in Mexico, Argentina and Brazil (1970s and 1980s);
3. The Asian financial crisis (1997);
4. The global financial crisis (2008–2011).

The recent economic crash, which greatly shook the global financial markets, caused disturbances and increased uncertainty throughout the global economic system (Mitręga-Niestrój, Puszer, 2008, p. 5). Despite the economic collapse occurring in the United States, the crisis turmoil spread to other continents at a very fast pace. The emergence of an economic crisis can have many origins. Referring to the example of the recent crash, a pattern of negative turmoil can be presented based on five elements.

These include (Jóźwiakowski, 2015, p. 9):
1. the emergence of new proposals/investment offers;
2. expansion of credits;
3. speculation;
4. the emergence of a dangerous situation;
5. economic collapse.

At the beginning of the 21st century, the Federal Reserve System lowered the interest rate from 6% to 0.25%. Such a colossal change in the price of money on the market was a key element in the emergence of the crisis. The indirect message about the low cost of mortgage loans had a very quick impact on citizens' actions. Federal Reserve Chairman Alan Greenspan's credit expansion was expected to have a positive impact on the economy. However, this did not happen. The reform only helped politicians, who were able to increase social benefits for citizens for a short period of time to gain their support in elections.

The analysed problem is so serious that the pressure of low interest rates and the potentially high availability of mortgage loans has influenced inflation and the creation of a bubble in the speculative property market. The situation in the American property market has been replicated like a domino effect in other markets, including Poland. The consequence of the low reference rate (i.e., less and less valuable money) has contributed to the increase in property prices in many cities, including Poland. The transaction price of 1 square metre of property on the primary market is presented in Figure 1.
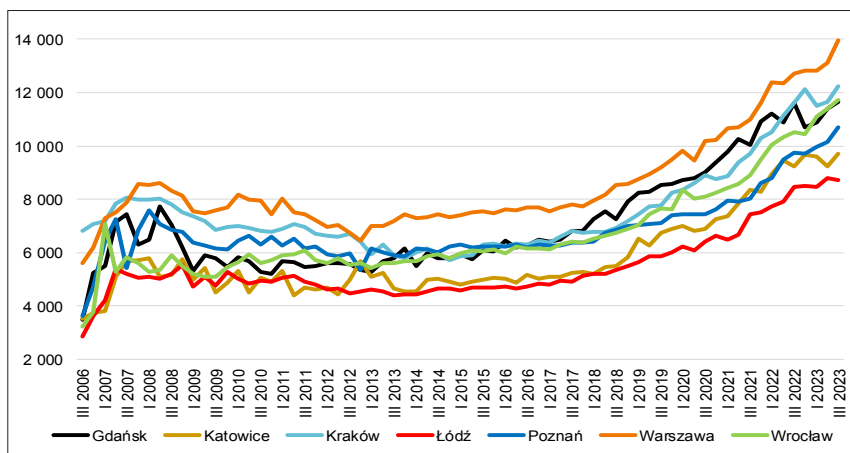
Figure 1. Price per square metre of residential property on the primary market in the 7 largest cities in Poland in the period from 2006 to 2023 (PLN)

Source: own work based on the website of the National Bank of Poland.

The expansion of mortgage lending before the outbreak of the financial crisis led to a long-term trend of rising prices. Despite slight declines in property prices in many markets in 2009, the following years (from 2012) saw a continuation of inflationary pressures. The significant appreciation was not offset by the interest rate hike in 2021 (see Figure 2).
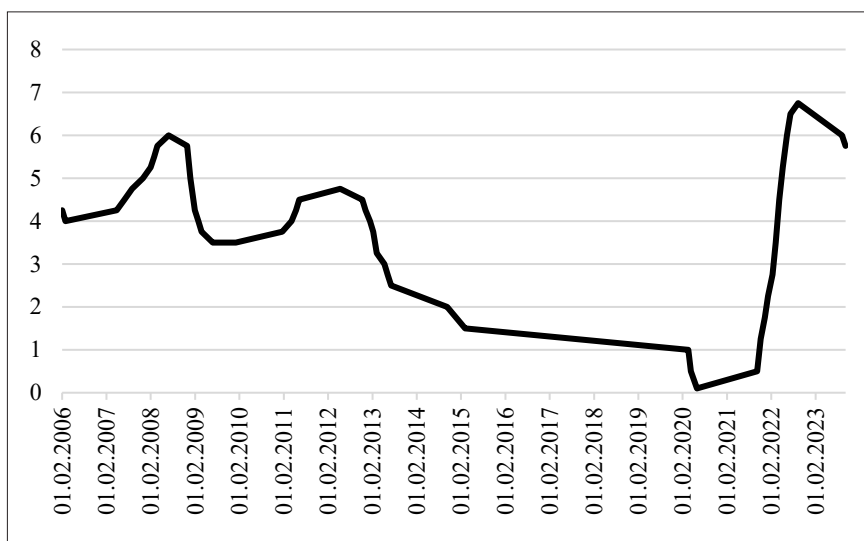
Figure 2. Reference rate in Poland in the period from 2006 to 2023 (%)

Source: own work based on the website of the National Bank of Poland.

The lowering of the requirements for obtaining loans has led to the unleashing of a speculative spiral. The mass acquisition of property has intensified the increase in the prices of these assets. In the press and media, an ironic slogan describing the expansion of mortgage loans (i.e., NINJA – *No Income, No Job or Assets*) (Jodko, 2014, pp. 57–58), which emphasised the lack of higher requirements in the possibility of obtaining financing for the purchase of property, became popular. The inability of the government sector to provide further assistance led to the collapse of one of the largest banks in the United States – Lehman Brothers (Ezrati, 2018). As the literature on the subject often indicates, the banking sector is a frequent channel for spreading crisis impulses (Olbrys, 2021, p. 1).

The context of economic crises is closely related to the concept of moral hazard. The term refers to economic operators who take risks at a high level because they are aware that the possible negative consequences of their wrong decisions will not be borne by them (Roubini, Mihn, 2011, p. 93). The presented definition refers to risky investment activities in which, among others, banks – and more precisely the entities managing them – were aware that the government sector would have to intervene in the event of problems according to the too big to fail principle (Onaran, 2017). In general terms of the crisis, it is worth noting the workings of globalisation. The unification of markets and the faster flow of capital and information until the outbreak of the recession were understood as synonymous with the structural development of the economy. The economic crash decisively changed the perception of the merging of economies into a single entity (Wojtyna, 2011, p. 23). The excessively rapid dynamics of the unification of individual sectors of the economy are now prone to create a domino effect. Turbulence in one market segment is rapidly replicating in other parts of the world. It is worth emphasising that the pandemic and military crises presented below are also determinants of the financial crisis or economic recession.

Pandemic crisis

The pandemic crisis is a paralysis of the global economy, resulting in an economic recession caused by a significant incidence of disease. Pandemic-related infectious diseases impact people's health and lives, as well as economic and political changes. By their nature, they also influence the development of biological and medical sciences (Krajewska, 2020). Table 1 provides a summary of the most important pandemics in history.

Table 1. Pandemics in history

Year	The name of the pandemic
541–543	The Plague of Justinian
1347–1351	Black Death
1817–1824	The First Cholera Pandemic
1827–1835	The Second Cholera Pandemic
1839–1856	The Third Cholera Pandemic
1863–1845	The Fourth Cholera Pandemic
1881–1886	The Fifth Cholera Pandemic
1889–1893	Russian Flu
1899–1923	The Sixth Cholera Pandemic
1918–1919	Spanish Flu
1957–1959	Asian Flu
1961–present	The Seventh Cholera Pandemic
1968–1970	Avian Influenza
2009–2010	Swine Flu
2019–2023	COVID-19

Source: own work based on (Piret, Boivin, 2020, p. 2).

In the new era, pandemics have occurred very often and have become a permanent part of human history. The most dangerous are the plague epidemic of the fourteenth century and the repeated cholera epidemics. Since 2019, the global economy has been struggling with the COVID-19 epidemic, which is a dangerous respiratory infectious disease caused by the SARS-CoV-2 virus (WHO, http). As a result of the coronavirus epidemic in 2020–2021, about 360 million people fell ill worldwide and more than 5.3 million died (Refinitiv Eikon). Counteracting the epidemic can be inhibited by appropriate medications and specific temporary restrictions (quarantine, isolation, restriction of movement of people, etc.). A substantive dialogue between national ministries of health and citizens should be an important part of crisis management. In terms of trust in the national executive, it is very important to ensure access to preparations that can prevent the spread of the epidemic. At the turn of 2020 and 2021, two types of vaccines were available – vector vaccines (produced by Johnson & Johnson and AstraZeneca) and mRNA vaccines (Pfizer & BioNTech and Moderna) (WHO). Equally important as the provision of medicines is a continuous dialogue with citizens and an attempt to respond to the dilemmas associated with the introduction of countermeasures. Communication on the pandemic crisis should objectively present up-to-date information related to the threat (scale of the problem, possible threats and current situation) and ways to prevent the crisis. At press conferences, the government should present essential actions it intends to take to prevent the

spread of the epidemic. Clear and comprehensible messages are an important aspect of building trust and peace of mind during crisis situations.

The occurrence of the pandemic serves as a specific test of society's trust in government sector units. In this context, trust is influenced by the speed of decisions made by the authorities and the extent of restrictions on public life and economic activities. The perception of risk related to the pandemic is lower when societies have greater trust in the government and higher when they have less trust in doctors and scientists (Devine et al., 2020, pp. 275–277). Home isolation and restricted movement during the pandemic have significantly impacted global economic productivity. The cessation of economic activity greatly exacerbated the crisis, leading to the bankruptcy of many enterprises and a rise in the unemployment rate. The decline in the World Gross Domestic Product during 2020–2021 exemplifies the significant impact the pandemic had on the economy (Adamowicz, 2021). The COVID-19 pandemic, unlike the financial crisis, has many more consequences, including changes in social, political, educational, economic and human security (Abodunrin et al., 2020, p. 13).

The pandemic period is a special time when the rationality of decision-making, coupled with growing anxiety, significantly dissipates citizens' trust in government and local government units. The increasing number of illnesses and deaths has had a significant impact on the cognitive assessment of government institutions, making them a lifeline. According to Dominik Schraff, the effect of fear is strongly related to political trust and the assessment of the economic condition during the spreading pandemic (Schraff, 2020, p. 1007). As the pandemic situation stabilises, the rationality of assessing the economic situation and the measures taken by government units increases.

Prudent management of crisis situations during the COVID-19 pandemic is also an opportunity to change citizens' attitudes towards government and local government authorities. In South Korea, during the pandemic, the tools and solutions introduced to combat the COVID-19 virus contributed to an increase in citizens' trust in the authorities, which was quite low in the country in general (Kye, 2020, p. 1).

Economic indicators of social trust and crises

A good barometer of calm and sentiment in the economy is the price of gold. In situations of financial crises and epidemics, the price of this metal increases significantly. This is due to the lack of trust in paper money, securities or cryptocurrencies. According to many economists, the decision to buy gold is related to behavioural biases, the history of gold as a currency, a safe haven and a storage function (Baur, McDermott, 2016, p. 63). The price of gold is not only

a reflection of geopolitical events, but also reflects global economic measures such as interest rates, inflation and the valuation of stock exchange indices (Madhika et al., 2023, p. 1255). The public acquires large quantities of bullion in a short period of time, which causes its price to rise rapidly; see Figure 3, which illustrates the market panic associated with the financial crisis, the COVID-19 pandemic and the war between Ukraine and Russia.

Figure 3. Gold price from 2006 to 2023 (USD/ounce [oz])

Source: own work based on (Refinitiv Eikon, http).

The first major increase in gold prices is related to the collapse of Lehman Brothers in 2008. From 2008 to 2012, the price of the raw material increased by over a $1,000 (USD) per ounce. During this time, confidence in international finance weakened significantly (Beckmann et al., 2018, p. 663). In the short time since the first cases were announced in Wuhan (November 17, 2019), the price of gold rose from around $1,400 (USD)/oz to over $2,000 (USD)/oz. The decline in the price of this precious metal in the following months was synonymous with an improvement in the epidemic situation. The outbreak of the war in Ukraine in February 2022 led to a corresponding increase in the price of gold, demonstrating how strong a protective asset gold is. A return to the appreciation of the gold price could also be observed at the end of 2023. The situation was caused, among other things, by the outbreak of Israel's war with Hamas, which began in October 2023. An indirect determinant of the situation described was, of course, the tightening of monetary policy in the world's largest economies (Financial Times, 2023).

Another example of a herd during the recent pandemic was the significant decline in the price of crude oil and commodity futures. The lack of demand for oil at the beginning of the pandemic, combined with a sharp slowdown in the

global economy, led to a significant anomaly. Crude oil futures contracts with the obligation to physically collect the commodity (contracts with delivery in May 2020) had a negative price (Ahonen et al., 2022, pp. 1–3). The problem with the storage of the raw material and the low demand for crude oil led to a situation where the owners of the analysed futures contracts had to pay nearly USD 40 extra for each barrel in order to sell them (see Figure 4).
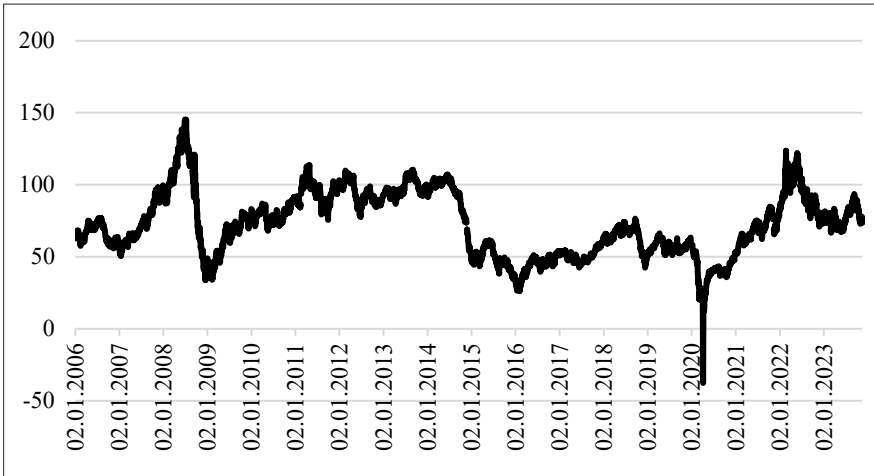
Figure 4. Crude oil futures price from 2006–2023 (USD/barrel)

Source: own work based on (Refinitiv Eikon, http).

This situation exposed significant speculation on oil by people who are not interested in the physical commodity and the strength of the herd of sheep, which was expressed in a negative selling price. In the history of the world economy, there has never been a time when the price of a commodity could be negative.

Social communication and trust as the basis for the development of society

The level of trust is not solely a determinant of life satisfaction or the level of happiness experienced (Xu et al., 2023, p. 1). Creating an environment based on trust is extremely important in the context of feeling safe. Trust is a capital as important as financial resources. Social relations are an important component of social connections and the economic level. Communication is the transmission of mental, intellectual and emotional content. It is an important social process, determined by the number and nature of the participants in the process (Kudra, Olejniczak, 2014, p. 11). A specific type of communication is the contact between

government bodies and citizens. It is very sensitive to the content, contrast and character of the statements. The importance of this message is crucial in the context of trust during crises (economic or epidemic). Communication between the two parties is an important component of building trust. It is also impossible to clearly say whether a high or low level of trust is good or bad. According to some researchers, people trust even when their profit expectations fall below their risk tolerance level (Dunning et al., 2012, p. 686).

Despite the common belief that one should be very careful in one's relationships with other people, the majority of society places a lot of trust in the people who belong to their immediate environment and with whom they have daily contact. According to Francis Fukuyama, trust is a culturally determined value. The level of trust in a society characterises the level of prosperity of a given country and its ability to achieve its goals. It follows that countries with a low level of trust tend to achieve a lower economic result than countries with a high level of confidence. Trust can be characterised as a social value that has many functions, among others (Miłaszewicz, 2016, p. 86):

1. plays a role in most interpersonal relationships;
2. is the foundation necessary for the creation of social relations;
3. social integration, stability and democratic development;
4. is a social good to be protected and cared for;
5. is an essential factor for the coordination of human actions.

In addition, R. S. Dwivedi emphasises that trust affects the effectiveness and efficiency of all processes carried out in a given organisation (Bugdol, 2006, p. 30). This is an extremely important element in the era of globalisation, which exerts pressure to maximise the productivity of market actors.

Piotr Sztompka characterises trust in a very essential way. According to him, trust is the most valuable type of social capital (Sztompka, 2007, p. 71). Trust, especially generalised and institutional trust, must be treated as a common asset that has the character of a public good. It is the basis of social life, ensuring the efficiency and effectiveness of activities aimed at the good of society (Miłaszewicz, 2016, p. 86). Trust in government entities or financial institutions in society is variable and depends on the economic and social situation. In Poland, high inflation meant that in 2022 there was a lack of trust in the Central Bank among 52% of respondents, and when the macroeconomic situation stabilised, the lack of trust fell to 39% of respondents in 2023 (CBOS, 2023).

Social trust is an important component of life that holds society together. There are two types of trust: specific and generalised (Schilke et al., 2021, p. 239). Both are important and create bonds of interpersonal relationships. The level of trust is tested during various types of crises. Strengthening social trust is possible in many ways. Literature research shows that reducing inequality is key to establishing the rule of law and facilitating interpersonal understanding (Knack, Zak, 2003, p. 91).

Social communication between citizens and the government sector plays an important role. The scope of communication in public administration includes four basic levels (Serafin, 2013, pp. 136–137):

1. communication with the environment;
2. internal flow of information;
3. collecting, processing and archiving messages;
4. how messages are made available to citizens.

In social communication, in the context of crises, it is extremely important that the information provided to citizens is reliable, true and presented on an ongoing basis. Misleading the public can have a negative impact on the economy and citizens' confidence. The Greek government, by misrepresenting information about the state of public finances, led to the financial crisis of 2008 and a decline in the confidence of many investors. From an economic point of view, the ability to raise capital by issuing bonds in such a situation is seriously hindered.

In the context of crises, it is also important that pejorative information is communicated with reason and calm. Countering panic is just as important as mitigating the effects of the crisis itself. Crisis hysteria can disrupt proper communication and undermine trust in government entities.

Changes in public trust in governments and politicians are spreading across almost all industrial democracies. The cyclical nature of this state of affairs most often occurs among people with high education and a relatively higher social status (Dalton, 2005, p. 133). The level of trust in business entities depends on one's function in society. In general, the public should be inclined to trust the so-called "entities of public trust". The list of professions concerning this group by way of a statute is presented in the Constitution of the Republic of Poland. It includes such professions as lawyers, doctors, nurses and psychologists (Constitution of the Republic of Poland, 1997). Financial institutions, such as banks, are also entities that are endowed with social trust to a greater extent than other commercial entities. However, as a result of the strong development of capitalism, globalisation and financialisation, these structures are subject to transformation. The occurrence of economic crises caused by excessive consumerism, maximisation of profit at all costs or disregard for the risk of undertaken operations affects the level of trust in economic and governmental entities. The current situation shows that improperly used credit of trust granted from time to time to public commercial institutions or political entities may become a non-repayable loan that destroys the economy and social relations. Often, the short-term desire for profit of such entities is not combined with the long-term concern for sustainable economic growth and minimising the risk of a global crisis.

Trust, in the context of economic or pandemic crises, is expressed in a sense of security. Security is one of the basic human needs (Maslow, 1943, pp. 370–396). The state and its representatives, such as the Council of Ministers, should be

the foundation for the protection of citizens in the event of an emergency. The lack of influence or control of state authorities over crisis situations contributes to the growth of frustration and uncertainty in a given country. Therefore, communication between the two parties is very important. Taking into account the nature of the message from government institutions and one of the features of interpersonal communication (i.e., irreversibility) (Frączek, 2012, pp. 119–121), it should be emphasised that well-thought-out and logical message transmission is crucial.

THE LEVEL OF TRUST IN THE CONTEXT OF CRISES

Trust can be considered on many levels. It is extremely important to define mutual trust between the citizens of the state and the governmental and economic spheres. The focus of this approach is the level of the business cycle, which determines the level of changes in the values and resources in question.

Crises have an indirect impact on the decrease in citizens' trust in state or political institutions (Zdyb, 2009, p. 800; Cole et al., 2021):

1. inefficiency of financial and economic supervisory authorities, law enforcement authorities, consumer protection and competition authorities;
2. poor condition of the health service, lack of protection for life and health;
3. ineffective prevention of the spread of crises;
4. ineffective measures to counteract the effects of crises (unemployment, inflation, an increase in the number of infected individuals);
5. involving financial entities, such as banks, in an attempt to maximise profits at all costs, often undertaken at high risk;
6. difficulties in ensuring access to medicinal preparations;
7. inability to systemically regulate legal solutions in relation to state and commercial institutions;
8. ineffectiveness in protecting individuals using the services of financial institutions;
9. a lack of effective recovery plans after the crises have subsided.

Among the key elements that have been mentioned, attention should be paid to the level of security of citizens and their assets. In the context of security, effective healthcare and a stable pension policy are highlighted. The lack of effective action at the beginning of the coronavirus pandemic in many countries resulted in frustration, helplessness and fear among societies. In such situations, the level of trust in state institutions decreases very quickly.

Financialisation, understood as the growth of the financial sector in relation to other areas of the economy, contributes to reducing the level of stability of the world market (Davis, Kim, 2015, p. 203). The enormous dynamics of the emergence of new financial instruments only seem to increase the possibilities of risk redistribution. The high rates of return offered encourage investors to place

their wealth in a variety of assets. CEOs of financial institutions want the flow of financial assets to be as high as possible, which is why they allow the introduction of various instruments, including high-risk ones. Citizens, trusting government institutions that by definition should take care of the availability of safe instruments and not be subordinated to the lobbying of international institutions (which only want the highest possible volume of transactions), often invest in assets that later become the subject of speculation. This was evident in the 2007 crisis. Mortgages, which became toxic instruments, had a devastating impact on the entire financial and economic system (Barret, Maloney, 2018). The collapse of the banks resulted in the loss of assets placed as deposits by citizens. Insufficient guarantee systems have contributed not only to the multiplication of household losses, but also to a decline in trust in the state, government institutions and businesses (Frejtag-Mika, 2015, p. 44). According to many researchers, social trust is subject to changes along with institutional changes. Social trust may influence decisions regarding high-risk financial assets (Ma, 2024, p. 174).

It should also be remembered that when describing the recent economic crisis of the early 21st century, one cannot only mention the danger of mortgage loans. In parallel to speculation on the property market, risky derivatives have also been created. A large number of investment funds have decided that the great demand for loans is also an opportunity to interest clients in other assets – including toxic ones. Options, futures, swaps and hybrid instruments constituted successive levels of financial pyramids (Jodko, 2014, p. 58). The situation described has multiplied the feeling of a lack of interference by government institutions or political groups in the growing risks faced by the economy.

A situation in which the state, which is the foundation and synonym of security, does not protect its citizens but contributes to their impoverishment and bankruptcy has a very negative impact on interpersonal relations, social integration, the perception of democracy and attitudes towards one's country. The occurrence of an economic crisis devalues relationships based on trust and a sense of security for government authorities (Cowen, 2012). The presented problems, dependencies and consequences of the impact of the economic crisis on the level of trust in economic institutions or political institutions constitute an area for further analyses and attempts to perceive the matter of trust.

The end of an economic or pandemic crisis is not currently synonymous with an increase in production, employment, investment or other inherent economic indicators. An essential element of the recovery from the economic meltdown is rebuilding trust and ensuring the health and safety of citizens. Recreating authority for economic and financial institutions, state bodies or public trust entities is an overriding challenge for the entities presented (Zdyb, 2009, p. 800). Without fundamental changes in the areas presented, we cannot talk about the development or flourishing of the economy.

When analysing the level of social trust, it is extremely important to take into account many factors such as cultural issues, religion or the level of reproductive development of a given country (Sakib et al., 2023, p. 1). The aforementioned elements can be important shock absorbers in the context of crises.

Since the end of 2019, the spread of the COVID-19 epidemic has had a significant impact on the level of security of citizens of most countries in the world. The difficulty of counteracting the new situation meant that the sense of anxiety and fear of losing one's health and life increased at a rapid pace. Trust in national authorities has been put to a severe test. The daily updating of data on cases and deaths made it difficult for governments to make rational decisions. The deterioration of the situation and the difficulty of solving the problem had a negative effect on the level of trust in government units. The sense of security of citizens is inherent from the point of view of economic moods, i.e. planning of investments and consumption. The uncertainty and fear of the future inhibit the possibility of rebuilding national economies after a recession caused by the economic crisis or the pandemic.

Social trust is a complex aspect of the dyadic relationship between two entities. Trust plays an important role as a channel for information flow (Adali, 2010, p. 150). In turn, the rationality of decision-making is as high as possible if the individual has as much knowledge about a given area as possible. Concealing information creates information asymmetry, which may be pejorative. There is also an important relationship between information asymmetry and the cost of financial capital (Lambert et al., 2012, p. 1). We can also point out a more significant relationship here, which includes information asymmetry and social capital.

In a crisis situation, the implementation of a proper information policy by governments is an important component of building trust. Inconsistencies between the messages and the actual state of affairs can have a devastating effect on the relationship between citizens and the government. Well-thought-out recovery plans, along with sensible government communication, are effective countermeasures in times of recession.

Consequences of a loss of public trust

The multitude of threats associated with economic and epidemic turmoil indicates an urgent need to take legislative action on health protection and the rules for the functioning of business entities. The lack of security in many spheres of economic activity leads not only to a decrease in the security and legal interests of citizens but also poses a huge threat to the economic order. It is not only about corporate governance issues in situations of various types of crises (Taylor, 2006,

p. 497). The idea is to rebuild trust in the entities responsible for creating economic growth and those supervising the functioning of the market as a whole.

In the era of globalisation and intensive movement of people, the occurrence of an epidemic state in one country can spread throughout the world. An example is the coronavirus pandemic, which began in Wuhan and quickly spread to all countries of the global economy (UNSD, http). Managing restrictions and counteracting the epidemic is extremely important. The lack of appropriate tools can lead to the tragic consequences that took place in the past (e.g., the death of two-thirds of the inhabitants of Europe during the plague epidemic in the 14th century).

Contemporary economic crises indicate that the belief in the rational and honest behaviour of economic entities is overly optimistic and is a far-reaching simplification (Zdyb, 2009, p. 804). Irrational behaviour in the economic sense occurred as early as the seventeenth century. An example of such an event was Tulipomania. The process involved intensive trading in tulip bulbs, which led to the creation of speculation (Garber, 1989, p. 535). The demand for these plants in the Netherlands grew rapidly from 1636. Along with the dynamics of demand for flower bulbs, the price increased. The precedent was so great that the price of onions was equal to the value of property. The speculative bubble burst when the price of tulips was unable to rise further (van der Veen, 2012, p. 4). A very large number of investors recorded colossal losses, squandering their fortunes or life savings, having only tulip bulbs that were no longer worth anything. We are dealing with analogous behaviour reminiscent of a herd of sheep, full of unreasonable and quick decisions. The desire to make a profit at all costs overshadows a common-sense approach to risk, investments or capital allocation. The origins of speculation lie in the similar behaviour of a large part of society, causing speculative bubbles in which an increase in price is not accompanied by an increase in the value of assets (Kaldor, 1939, pp. 1–2). An example of analogous behaviour in the 21st century is investments in cryptocurrencies. In such situations, it is extremely important that economic entities can be protected by established regulations, safeguards and the active involvement of government entities, whose priority should be economic stability and governance. Unfortunately, it must be stated that deliberate dishonesty of financial or economic institutions is increasingly often the cause of economic crises. The greed of CEOs or directors of huge corporations, combined with the frequent passivity of state authorities, creates an environment of economic dishonesty. Moreover, the occurrence of crises in the economy does not eliminate the repetitiveness of the presented behaviours. Very often, after the market situation stabilises, financial institutions are not willing to change their decisions and goals, again being characterised by moral hazard. Maximising profit at all costs is a permanent goal of most large financial institutions.

Conclusions

Trust is one of the most vital values that unites society and a sense of security. Social communication between the market environment and citizens is a key determinant of building trust. Economic and pandemic crises, together with military actions, constitute a strong cause-and-effect link between the loss of trust in economic institutions and national authorities. The types of crises presented are determinants of fear, which is often expressed in mass, similar actions constituting a domino effect. From an economic point of view, ineffective management of such situations leads to appreciation trends in key investment assets (property, gold and crude oil). Poor communication between the government sector and citizens contributes to the deepening of crisis situations and the difficulty of recovering from recession. Changes in the level of social trust as a result of various types of crises vary and depend on factors such as education and wealth. The awareness of economic or government entities about the possible consequences of dangerous activities, such as co-creating speculative bubbles or releasing toxic assets, is a serious obstacle to creating trust between the government sector, business and society. The occurrence of a pandemic crisis or warfare, in addition to the health effects, results in most cases in the same consequences as in the case of an economic crisis. The process of losing trust in government entities is also analogous. The effectiveness of crisis management and guaranteeing the health and life of citizens are the main determinants of maintaining public trust in the state. The sense of security of citizens is crucial from the point of view of economic sentiment regarding consumption planning and investment. The lack of stability in this respect is evident in the significant price amplitudes of, among others, oil and gold.

In crisis situations such as economic recession, the COVID-19 epidemic or wars, society largely acts on its own, trying to save its assets. At this time, the safe-haven asset is gold, the price of which is a barometer of the situation. On the other hand, the decline and stabilisation of the price of gold indicates the stabilisation of the situation and the return to the norm from before the unrest. Proper communication between the government and citizens is at the core of post-crisis recovery. The way out of the economic or pandemic crisis is not only about actions aimed at increasing production, investment, trade, employment or the quality of healthcare. It is much more important to rebuild citizens' trust. This is not an easy task and requires more time than the increase in the productivity of the economy. A good final summary of the issues discussed is a quote from the Polish writer, Karol Bunsch – "It is easier to rebuild a destroyed city than a destroyed trust" (Bunsch, 1971, p. 27).

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Summary

Economic and pandemic crises, along with military actions, constitute a strong cause-and-effect link between the occurrence of society's loss of trust in the market environment in the 21st century. The occurrence of unfavourable situations is often related to the "Sheep Rush" phenomenon. The lack of regulations and effective tools to prevent and counteract market turmoil increases the mood of anxiety. Many consumers and investors, in a situation of ignorance and chaos, begin to imitate emerging market trends. In times of crisis, many citizens begin to buy gold, which increases in value with high demand, highlighting the scale of the unfavourable situation. The gold market responds to social unrest related to various types of crises. In this case, the appreciation of gold is sudden and the price trend is not short-term. The occurrence of a negative price on the crude oil futures market during the COVID-19 epidemic in May 2020 or the exceeding of the maximum historical limit of $2,100/ ounce of gold in December 2023 illustrates the extremes of herd behaviour, which is based on panic. In turn, the inappropriate monetary policy of the United States based on a low interest rate in 2006 caused a global financial meltdown and continues to exert strong inflationary pressure on the property market around the world, including in Poland. The description of macroeconomic events in the 21st century well illustrates how important it is for market entities to trust each other and the market, as well as to make reasonable decisions. Otherwise, we usually deal with a market collapse and a domino effect. The sheep rush process is vital from the point of view of social and economic inequalities due to the impact of such behaviour on the prices of analysed goods and the level of international trust.

Keywords: financial crisis, gold, epidemic, sheep rush, social trust.

Zjawisko owczego pędu a poziom zaufania społecznego podczas kryzysu finansowego, pandemii COVID-19 i wybranych działań militarnych w XXI wieku

Streszczenie

Kryzysy gospodarcze i pandemiczne wraz z działaniami militarnymi są ściśle powiązane z utratą zaufania społeczeństwa do otoczenia rynkowego w XXI wieku. Niekorzystne sytuacje wywołują często zjawisko owczego pędu. Brak regulacji i efektywnych narzędzi do zapobiegania i przeciwdziałania zawirowaniom rynkowym wzmaga nastroje niepokoju. Duża część konsumentów i inwestorów w sytuacji niewiedzy i chaosu zaczyna naśladować tworzące się tendencje rynkowe. W sytuacji kryzysów wielu obywateli zaczyna nabywać złoto, które z dużym popytem zyskuje na wartości, ukazując skalę niekorzystnej sytuacji. Z kolei działania militarne wiążą się z nagłą aprecjacją ceny nie tylko złota, lecz i ropy naftowej. Wystąpienie na rynku kontraktów terminowych ropy naftowej ujemnej ceny w trakcie epidemii COVID-19 w maju 2020 roku czy przekroczenie maksymalnej historycznej gra-

nicy 2100 USD za uncję złota w grudniu 2023 roku pokazuje ekstrema zachowań stadnych, których fundamentem jest panika. Z kolei niewłaściwa polityka pieniężna Stanów Zjednoczonych oparta na niskiej stopie procentowej w 2006 roku wywołała światowy krach finansowy i stanowi ciągle silną presję inflacyjną na rynku nieruchomości na całym świecie, także w Polsce. Opis makroekonomicznych zdarzeń w XXI wieku dobrze ilustruje, jak ważne jest zaufanie podmiotów rynkowych do siebie i rynku oraz zdroworozsądkowe podejmowanie decyzji. W przeciwnym wypadku mamy do czynienia zazwyczaj z załamaniem rynku i efektem domino. Analizowany proces owczego pędu jest ważny z punktu widzenia nierówności społecznych i gospodarczych w kontekście wpływu takich zachowań na ceny badanych towarów i poziom zaufania między jednostkami.

Słowa kluczowe: kryzys finansowy, epidemia, owczy pęd, złoto, zaufanie społeczne.

JEL: G01, G11,G18, G15.

dr Kamil Waligóra[1] ⓘ

Department of Economic and Social Development
Division of Local Development and Spatial Planning
University of Bialystok

Is the development of the eastern part of Poland at risk? The role of universities in the absorption of human capital

Introduction

The experience of eastern regions, not only in Poland but also in other European Union countries, shows that human capital emigrates from them, leaving numerous problems (Atoyan, 2016, pp. 30–34). The brain drain process is a particular challenge for developing regions. It concerns a significant part of the population: characterized by high mobility, at the age of highest productivity (Kaempf, Singh, 1987, p. 5). The emigration process indirectly leads to the loss of historical financial outlays spent on education, and, in the future, to a direct loss of knowledge potential necessary on the local labour market. With the extension of human life measured in years, and the increasingly lower fertility rate of European societies (which does not guarantee the replacement of generations and does not meet the needs of the labour market), and thus the observed process of aging of societies, this will lead to a regression of regions with lower competitiveness in terms of acquiring and maintaining human capital.[2]

An important task was to identify the endogenous and exogenous factors responsible for the ability to "attract" high school graduates who, at the regional

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[1] Correspondence address: Faculty of Economics and Finance, ul. Warszawska 63, 15-062 Białystok; e-mail: k.waligora@uwb.edu.pl. ORCID: 0000-0003-2034-4727.

[2] In 2019, as part of the report on the global competitiveness of national economies published by the World Economic Forum, countries in the eastern and southern parts of the European Union were at the bottom of the ranking in terms of their ability to retain talent; more in: (World Economic Forum, http).

level – within a provincial city or university – will receive appropriate education, acquiring the necessary value for the development of a given region. The aim of the article was to determine the role of the university in "attracting" human capital to selected geographical areas, as well as to create recommendations resulting from the survey and interviews with students.

Assuming that the most important factor in the sustainability of socio-economic development is human capital, the following assumption was made: the development of Polish regions (understood by the administrative boundaries of voivodeships) will depend on the ability of universities to acquire human capital both from the area of a given voivodeship, and the ability to compete for secondary school graduates from all over the country. Competition results directly from demographic changes, which lead to a reduction in the rate of population growth in regions, forcing it to be acquired externally.

Spatially, the analysis was narrowed down to the capitals of voivodeships in eastern Poland, i.e. Olsztyn, Białystok, Lublin, Rzeszów. Due to their location, peripherality compared to the EU and Poland, and the level of socio-economic development, they are model examples of areas subject to loss of human capital, as well as reduction of the potential of the natural resources, i.e. villages and smaller towns in the regions. In such cases, universities become one of the most important factors in the absorption of people starting their adult life (including professional life).

The article consists of an introduction, three substantive parts and a conclusion containing selected recommendations. The first part discusses the problem of the loss of human capital, and then presents forecasts regarding the change in population in the studied group of cities. The literature review also allowed us to emphasise the importance of human capital for regional development. The next part focuses on the role and impact of (selected) universities – universities from voivodeship capital cities in the eastern part of Poland. Their potential was determined and external factors were also indicated, including: the field of science management in Poland, which make it difficult to acquire human capital. In addition to statistics, the role of universities in shaping labour resources in the region was also determined. The third part was dominated by the issue of human capital migration. During the analysis, fragments of our own research on student mobility were used, which allowed us to formulate recommendations regarding the creation of relationships between universities and high school graduates.

The article uses Polish and foreign literature on demography, with particular emphasis on issues of migration, depopulation, and regional development. The literature review served to confirm the importance of human capital in the economic development of regions. The aim of the statistical analysis was to show the problem of loss of human potential, especially in the voivodeships of eastern Poland.

The literature review was supplemented with conclusions from our own research, conducted since autumn 2018 (cyclical examination; 10 reps so far, to

late autumn 2023); undertaken with students of the first and fifth year of studies (1st year of bachelor's studies and 2nd year of master's studies, respectively; 1376 surveys) at the University of Białystok, in order to determine, among others, decision-making attitudes regarding education and susceptibility to specific spatial, social and financial factors in terms of their mobility. Ultimately, the literature review and, above all, the survey research, lead to the answer to the research question: what actions should universities take and in which geographical area to intensify the absorption of high school graduates from voivodeships other than the home voivodeship of a given university?

EMIGRATION AS A KEY PROBLEM OF THE EASTERN METROPOLISES OF POLAND

One of the key factors determining the competitiveness of a country, region or city (as a highly urbanised area) is the relatively large share of people with high and diversified qualifications in the population. Many economists pointed out that the level of qualifications and the number of people of working age correlate with the rate of economic growth (Domański, 1993; Herbst, 2007; Gołaszewska-Kaczan, 2014). These types of statements dominate primarily in the literature on endogenous growth (Rogowski, 2006; Bugowski, 2020).

The problem turns out to be the shortage of human capital, which is the result of depopulation of selected geographical areas, and concerns virtually every country (Piontek, 2019, pp. 523–542). The demographic effects of depopulation, i.e. the permanent and systematic reduction of the population in a given area, imply numerous problems in a given time horizon. It directly leads to intensive qualitative and quantitative changes among the inhabitants of the territorial unit covered by this process. Its main measures include, for example, the number of births and deaths and migration balance. The key aspect seems to be the absolute, negative change in the population size, leading to, among others, loss of demographic potential due to, for example, the aging of the population, i.e. with the change in the age and gender structure of citizens (Hrynkiewicz, 2020, p. 19).

Depopulation concerns, for example, areas outside the centres of regional growth – the largest metropolitan cities. According to W. Gaczek, it should be stated that "most large cities in Poland function as growth poles, at least some large cities function as development poles, and some metropolises may also be integration poles" (Gaczek, 2010, p. 90). The studied entities can be classified into the first of the above-mentioned categories, but it is difficult to find grounds for recognizing them as poles of development. For this reason, there are growing disproportions in social assessments of Polish provincial cities.

The problem of population aging and migration of human capital in the coming decades, not only in Poland but also in the entire European Union, will probably be one of the greatest challenges (Tzouganatou, 2022, pp. 207–208). As already mentioned, less developed, border regions located in the eastern part of Poland are particularly susceptible to this process.

Table 1. Białystok, Olsztyn, Lublin, Rzeszów – population change forecast (2022 and 2060)

Voivodeship capital	Number of inhabitants in 2022	Forecast of the number of inhabitants in 2060	Change in population size in 2060 compared to 2022
Białystok	292600	243191	-16.9%
Olsztyn	168212	126502	-24.8%
Lublin	331243	273892	-17.3%
Rzeszów	197181	202961	2.9%

Source: (GUS, 2023b).

In the case of three out of four cities examined by GUS, the loss of human population will most likely reach between 17% and 25% of the total population as of 2022. The situation in Rzeszów is different (Table 1). It is worth noting that in the last two decades, the territorial expansion of this city (inclusion of neighbouring communes) had a significant impact on the population growth. In 2005, Rzeszów had 159,000 inhabitants and 53.7 km^2 of area. However, at the end of 2021 it was already 198,000 inhabitants and 128.5 km^2 of area, i.e. 24.5% and 139% more than in 2005 (*Jak rosło…*, http). Taking into account immigration from the east (including Ukraine), Rzeszów is the only city – the capital of the Polish border voivodeship – which by 2060 will probably (slightly) increase the number of inhabitants.

Table 2. Białystok, Olsztyn, Lublin, Rzeszów
– forecast change in the number of population aged 0–18 (2022 and 2060)

Voivodeship capital	Number of inhabitants in 2022, aged 0 to 18	Projected number of inhabitants in 2060, aged 0 to 18	Difference in population size at the studied age between 2060 and 2022
Białystok	54752	44189	-19.3%
Olsztyn	30009	19444	-35.2%
Lublin	59151	47153	-20.3%
Rzeszów	39426	36801	-6.7%

Source: (GUS, 2023b).

The key part of the population, which reflects the prospects of a given LGU (local government unit), are people of pre-working age. Table 2 shows the

population ratio of selected cities in the forecast for 2060 compared to 2022. Each of the studied entities will probably experience a loss of potential. Therefore, it seems necessary to create a strategy for implementing external human capital. Competition between provincial cities therefore seems inevitable.

In the coming decades, eastern voivodeships, apart from regional capitals, will be subject to the same trends, with relatively higher intensity. The natural "resource" for provincial cities may turn out to be a "drying well" that will not provide the quantity and quality of human capital expected by the labour market. Without an influx of people with secondary and vocational education who could be educated and professionally activated, it is doubtful that the growth rate will be maintained.

Ł. Bugowski draws attention to the fact that endogenous factors, including human capital, play a key role in regional development. They are the guarantee of economic growth. He treated the exogenous inflow of human capital as a complement to internal shortages (Bugowski, 2020, pp. 119–120). However, regional forecasts indicate that the shortage will increase. Coordination of the activities of local government units with the offer and promotion of universities may allow us to fight for human capital.

THE ROLE OF THE UNIVERSITY IN ATTRACTING AND IMPLEMENTING HUMAN CAPITAL

The presence of universities in regions as factors creating competitiveness was indicated by, among others, B. Winiarski (1999, p. 51). Similarly, D. Strahl recognized the size, diversity and availability of the labour force, as well as the possibilities of its education in the region, as key development factors (Strahl, 2000, p. 21). The role of higher education is the axis of the concept of a "learning region" – a store of knowledge, innovation, and a generator of growth (Florida, 1995, pp. 255–277). However, G. Boucher, C. Conway, and D. Meer emphasized that universities are, among others, knowledge factories, institutions forming human capital (Boucher, 2003, pp. 887–897). The dominant view in Polish literature on the subject is that higher education primarily creates soft factors of the region's development, i.e. it provides labour resources to the market (Piotrowska-Piątek, 2014, p. 42). "Creating new knowledge is the most traditional type of benefit that a region or city can derive from the presence of a university in its area (...)", according to M. Szmit (2012, p. 229).

Polish universities, and specifically public academic institutions of higher education (MEiN, Wykaz…, http), can be divided into at least two groups (following the example of the Ministry of Education and Science): leading centres/

research universities and regional universities. At the end of 2019, the Ministry responsible for higher education designated ten units that were called "research universities", providing increased funding for 2020–2026 (MEiN, Bohaterowie konkursu IDUB…, http). All the above universities are located in the central part of Poland, from north to south. The Ministry of National Education categorized universities in the eastern part of the country as regional centres. This makes their functioning more difficult (e.g. reduces the level of subsidies) and also lowers their prestige, leading to difficulties in attracting secondary school graduates.

Leading centres, thanks to the brand developed over decades and their absolute size, are characterized by consistently high interest among high school graduates. Universities from eastern Poland occupy places outside the top 20 in the rankings (Figure 1).
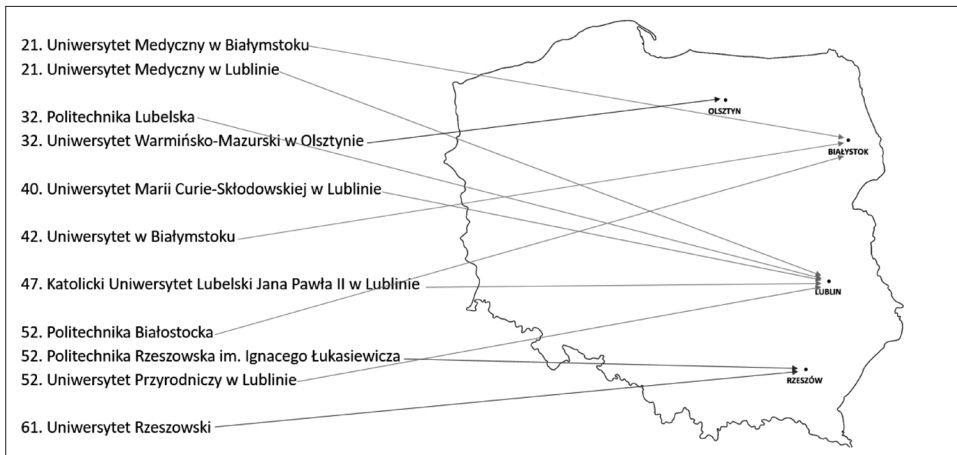
Figure 1. Selected Polish universities in the National Academic Ranking 2022

Source: own elaboration based on: (Ranking Uczelni Akademickich, http).

Demographic challenges will intensify competition between universities. While the number of students has stabilised at approximately 1.2 million since 2018 (GUS, BDL), the number of high school graduates who passed the "matura" examination, obtaining the right to study at a university in 2020, decreased by 1/3 compared to 2010 (GUS, 2023a). In support of the national urban policy, it should be stated that in the case of voivodeship capital cities of the so-called Eastern Poland (dominated by regional universities), the inflow of people to their suburban zones in 2004–2020 from other voivodeships was relatively small (several percentage points). The share of people moving to Urban Functional Areas (Busłowska, 2022, p. 70) from the same voivodeship is much higher (depending on the city – between 25–35%). In the rest of the country, the proportions are

opposite (MFiPR, 2022, p.33). This demonstrates the limited regional capability to acquire human capital.

"Educational migration" is characterized primarily by young people of post-secondary age. This type of migration also becomes the final migration for a significant part of people coming from rural areas or smaller towns far from growth centers (Jończy, Dolińska, 2016, p. 52).

Migration of the young – mobility as an opportunity for socio-economic development of Poland's eastern voivodeships

Migration – according to E. Lee – is "a permanent or semi-permanent change of place of residence, with no restrictions as to the distance of movement, its forced or voluntary, internal or external nature" (Górny, Kaczmarczyk, 2003, pp. 17–22; Lee, 1966). It should therefore be stated that the movement of people from the areas of rural and urban communes surrounding a university city, or from a given voivodeship, as well as from outside it, fits into the above classic definition of this phenomenon. The activating factor here is spatial mobility, defined as moving around, e.g. changing one's place of residence (Herbst, Sobotka, 2014, p. 11).

Taking up education and professional activity is correlated with the level of mobility of society, which is not homogeneous. Research including, among others, Central Statistical Office (GUS) confirmed that people aged 18–49 were more mobile. Moreover, it was confirmed that people with higher education were characterised by the highest tendency to migrate for work (compared to people with a lower level of education). Residents of the Podlaskie Voivodeship were least likely to be willing to travel outside the commune for work in 2016–2020. The highest mobility according to the tendency to commute to the workplace (so-called long commute) was characterised by people aged 18–34 (GUS, 2021, pp. 54–57), and in the case of foreign migration, within the EU (in 2022), the dominant category were people aged 35–49 (European Commission, 2023, p. 3).

The key category of people analysed in this article were adults obtaining a "matura" certificate. This is a relatively young part of society, with little professional experience, looking for their life path and at the stage of planning and creating their future professional path. Based on our own research conducted on students of the 1st and 5th year of studies, i.e. people with at least a "matura" certificate, it was found that: the level of declared (national) mobility within a voivodeship/country increases with age and completed level of education of students. Interestingly, it concerned primarily the area of the home country, i.e. Poland. A different opinion was given in the case of working abroad. Younger students were more willing to declare the possibility of working outside Poland (approx. 16%); at the end of their studies, less than 5% of students considered this option.

From the point of view of this article, the section of the study regarding the place of study is important. Students from the Podlaskie Voivodeship were more likely to choose a university in Białystok. The University of Białystok was the first choice for less than 1/3 of high school graduates from Białystok, and approximately 4/5 among the rest. Distance (measured by commute time) turned out to be crucial for the second group (among the "pull" factors). Students from the Podlaskie Voivodeship and other voivodeships, declaring in the surveys a commute time exceeding 60 minutes, more often indicated: job potential [size of the labour market (56%), level of earnings (69%), diversity of job offers (82%)], and further: availability of accommodation, entertainment and recreation aspect of a larger city than the home city, possibility of becoming independent. In spring 2023, "room availability" was indicated by 19 percentage points more first-year students than a year earlier.

During the in-depth study (from autumn 2021 – group discussion with approximately 5–10% of survey respondents/annually), it was also found that for 5th-year students declaring: "I'll stay in the place of study after finishing education", a decisive role was played by obtaining employment during studies/ confidence in finding a job after graduation. In this case, approximately 4/5 of the students declared they would stay in the provincial city where they studied. This confirms that a flexible approach to studying, i.e. the ease of obtaining an individual course of study or conducting classes in the evening rather than in the morning, may constitute an advantage of the university. Moreover, they pointed out the importance of the university building relationships between employers and students. They referred to examples from other universities when business representatives attended classes, or when solving specific case studies provided the opportunity to start paid internships.

During interviews, first-year students drew attention to the importance of becoming independent, which they achieved by leaving their hometown. They consciously chose a university outside their current place of residence, although geographically as close as possible. This may suggest that the promotion of the university in the city of its location is not relevant for high school graduates choosing a place to study.

Students were also asked about non-university factors pushing them out of the region. Among others, availability of apartments (rental/purchase costs in relation to wages), availability of work in relation to skills and qualifications, spatial accessibility of the university (ease of access/costs), and possibility of continuing education (2nd cycle; postgraduate studies) were pointed out. Interviews with some respondents also confirmed the importance of direct marketing – promotion of universities in schools located in the home voivodeship (away from the voivodeship centre) and outside it; On average, 23% of students annually indicated that it had a significant impact on the decision to choose a university.

Conclusion and recommendations

The whole of Poland is affected by the problem of demographic decline in the coming decades. The most important challenges of the largest Polish cities include the decreasing overall population (GUS, 2023b, pp. 30–32), in extreme cases leading to depopulation and shrinking of cities (Häußermann, Siebel, 1988, pp. 79–93). Combining emigration from the less developed eastern regions of Poland with the aging of the population and declining fertility rates, it turns out that the ability to attract human capital is important.

The condition for a higher ability to attract human capital is, among others, perceived competitiveness of urban space, i.e. "the ability of cities to continuously improve their business environment, skills base and physical, social and cultural infrastructure in order to attract and retain fast-growing, innovative and profitable companies and an educated, creative and entrepreneurial workforce, so as to achieve high productivity rates, high employment rates, high wages, high GDP per capita and low levels of income inequality and social exclusion" (Martin, Simmie, 2008, pp. 333–351). The competitiveness of cities is determined by, among others, universities. They are a place to create human capital with specific skills, qualifications and knowledge. Well-educated people are not only responsible for creating innovations, but also independently determine the innovative potential of the region (Proniewski, 1996, p. 34).

The author's study allowed to outline conclusions that may contribute to the inflow of human capital to voivodeship university centres, and these are:
- promotion of the university outside its direct impact zone, i.e. daily mobility (approx. 60 km ~ approx. 1 hour's drive from the university),
- stronger integration of universities and enterprises; universities as an intermediary between students and employers on the labour market,
- intensifying the university's visibility in social media dedicated to high school graduates,
- "be with students" – support their passions, direct the message about them to their former schools.

University cities in eastern Poland will be the first to feel the negative trends. However, the problems concern the entire country, which requires a change in perspective regarding the role of universities in attracting and absorbing human capital.

The future of the metropolis is inextricably linked with universities. It is the synergy of these two entities that may enable the creation of a mechanism for capital substitution. The value of a city can lead to attracting young people to university and vice versa; universities can be a magnet that will enable you to establish relationships with a potential future resident of a given municipality. The study will continue. The problem still exists and so does the need to solve it.

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Summary

The aim of the article was to determine the role of universities in "attracting" human capital to selected geographical areas, as well as to indicate recommendations in the area of university marketing.

Assuming that the most important factor in the sustainability of socio-economic development is human capital, it was concluded that the development of Polish regions will depend on the ability of universities to acquire human capital both from within a given voivodeship, and the ability to compete with other academic units for secondary school graduates in the country. The need for competition results directly from demographic changes, which lead to a reduction in the rate of population growth in regions.

Spatially, on a theoretical basis, the studied entities will be the capitals of the voivodeships of eastern Poland, i.e. Olsztyn, Białystok, Lublin, Rzeszów. Due to their location, peripherality compared to the EU and Poland, and the level of socio-economic development, they are model examples of areas subject to the loss of human capital.

During the work, a review of Polish and foreign-language literature was used to verify the assumption about the essence of higher education among the endogenous factors of regional development. Then, based on statistical studies, including: The Central Statistical Office and the relevant Ministries, the author compared research entities and the local government units in which they are located. Surveys and interviews allowed for the assessment of young people's mobility.

It was found that universities play a key role in the absorption of human capital with a relatively high tendency to migrate. Additionally, recommendations were prepared regarding the scope of university promotion to meet the expectations of high school graduates as much as possible.

Keywords: depopulation, promotion, education, innovation, development.

**Zagrożony rozwój wschodniej Polski?
Rola uniwersytetów w absorpcji kapitału ludzkiego**

Streszczenie

Celem artykułu było określenie roli, jaką pełni uniwersytet w ogóle czynników „przyciągania" kapitału ludzkiego do wybranych obszarów geograficznych, jak również wskazanie rekomendacji z zakresu marketingu uczelni.

Przyjmując, że najważniejszym czynnikiem trwałości rozwoju społeczno-gospodarczego jest kapitał ludzki, założono, iż rozwój polskich regionów będzie zależał od zdolności uniwersytetów do pozyskiwania kapitału ludzkiego z obszaru danego województwa, jak i zdolności do rywalizacji z innymi jednostkami akademickimi o absolwentów szkół średnich w kraju. Potrzeba rywalizacji wynika bezpośrednio ze zmian demograficznych, które prowadzą do ograniczania tempa przyrostu liczby ludności w regionach.

Przestrzennie, na kanwie teoretycznej, badanymi podmiotami są stolice województw wschodniej Polski, tj. Olsztyn, Białystok, Lublin, Rzeszów. Ze względu na swoje położenie, peryferyjność na tle UE i Polski, poziom rozwoju społeczno-gospodarczego stanowią modelowe przykłady obszarów doświadczających utraty kapitału ludzkiego.

W trakcie prac wykorzystano przegląd literatury polskiej i obcojęzycznej celem weryfikacji założenia, że edukacja wyższa należy do czynników endogenicznych rozwoju regionalnego. Następnie na podstawie opracowań statystycznych m.in. Głównego Urzędu Statystycznego i właściwych ministerstw dokonano porównania podmiotów badawczych i JST, w których są zlokalizowane. Badania ankietowe i wywiady pozwoliły na ocenę mobilności młodych osób.

Stwierdzono, iż uniwersytety odgrywają kluczową rolę w absorpcji kapitału ludzkiego o relatywnie wysokiej skłonności do migracji. Ponadto przygotowano rekomendacje dotyczące zakresu promocji uczelni, tak by w jak najwyższym stopniu odpowiadały oczekiwaniom maturzystów.

Słowa kluczowe: depopulacja, promocja, edukacja, innowacje, rozwój.

JEL: H70, I23, I24, I25, J11, J13, J18, O15.

dr Anna Busłowska[1]

Department of Socio-Economic Development
Department of Local Development and Spatial Management
Faculty of Economics and Finance
University of Bialystok

Experiences and challenges of cooperation in functional urban areas of voivodeship centres in Poland

INTRODUCTION

With the start of the implementation of the Integrated Territorial Investments instrument (ITI) as part of the EU cohesion policy for the 2014–2020 perspective, ITI unions[2] were established to manage the development of the functional urban area (FUA). Functional areas were obligatorily delimited for voivodeship centres, the capitals of these regions, pursuant to Article 30 of the Act on the principles of implementing cohesion policy programmes financed in the 2014–2020 financial perspective (Dz. U. 2014 poz. 1146) and are continued from 2021–2027. The functioning of these ITI unions and the cooperation processes that take place are a current research problem. FUAs are an important stakeholder of urban and regional policy. Principles of FUA development management within EU policy include supporting the development of cooperation and integration in the functional area, promoting a partnership model of cooperation between administrative units in urban functional areas and implementing integrated

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[1] Correspondence address: Anna Busłowska, ul. Warszawska 63, 15-062 Białystok; e-mail: a.buslowska@uwb.edu.pl. ORCID: 0000-0003-2581-380.1.

[2] ITI unions is a common name used in Polish programming documents for cohesion policy for institutionalised forms of cooperation between local government units within FUAs, which in the EU perspective 2014–2020 were established to implement the ITI instrument. In the 2014–2020 perspective, two forms existed: associations (entities independent of the organisational structures of local governments) or agreements of local government units (the role of the leader of this partnership is played by the FUA's core city (the capital of the voivodeship)). In the 2021–2027 perspective, the forms of ITI unions have been extended to include the possibility of creating also inter-municipal unions, poviat or poviat-municipal unions, as well as metropolitan unions. Therefore, in this work, a common name for these different forms is used – ITI unions. (More: MFiPR, 2023).

projects that respond comprehensively to the needs and problems of cities and their functional areas (MFiPR, 2023). Therefore, monitoring various aspects and challenges of this cooperation is important from the point of view of the success of the FUA development policy.

In particular, studies in the literature on cooperation in FUAs focus on aspects of inter-local government relations, with less analysis of the role of the ITI union offices themselves in the process of FUA management and development. Therefore, the author of this study aimed to present an assessment of cooperation in FUA and its main problems and challenges from the point of view of directors of ITI union offices. The study was conducted in September 2023 using the CAWI survey method and covered 18 FUA VCs in Poland.

The role and models of cooperation in functional urban areas based on literature research

The issue of functional urban areas and their development has been discussed for several decades. In foreign literature, this topic includes research on delimitation, the role of FUAs and various socio-economic interactions, particularly commuting between the core city and its functional zone (Karlsson, Olsson, 2006; Sykora, Mulicek, 2009; Hu, Han, 2019; Gu et al., 2015; Dijkstra et al., 2019; Castells-Quintana et al., 2020; Chen, Yeh, 2022). In Polish literature, the topic of functional urban areas has gained particular importance in the EU perspective for 2014–2020, when, in connection with the Integrated Territorial Investments (ITI) instrument, FUAs were delineated within the country's territorial structure, and ITI unions were established to implement this instrument. Key researchers in Poland focusing on the delimitation, conditions and differentiation of socio-economic development within FUAs include P. Śleszyński (2013), W.M. Gaczek (2015), E. Szafranek (2017; 2018), E. Szafranek and D. Kociuba (2018), A. Nowak (2018), D. Kociuba (2015; 2018), D. Perło (2020), A. Busłowska (2022; 2023) and P. Churski et al. (2023). In particular, research on models of FUA cooperation, its conditions and effects has been conducted by researchers such as J. Sellers and V. Hoffmann-Martinot (2008), F. Kuźnik (2015), J. Krukowska and M. Lackowska (2016), T. Kaczmarek (2017), T. Kaczmarek and D. Kociuba (2017), T. Potkański and L. Wanat (2017), K. Janas and W. Jarczewski (2017), Wolański et al. (2018), K. Kuć-Czajkowska (2019), E. Szafranek (2019) and A. Noworól (2021).

FUA definitions are usually very general, even intuitive. In the context of the topic of cooperation discussed in this article, it can be pointed out that FUA is an area covering geographical units consisting of various interconnected elements. These elements are rationally arranged in space and interconnected by various

flows of people, materials, capital and information, as well as providing conditions for living, production, human recreation and economic activity. The role of strong, centripetal connections between settlement units, the occurrence of common development challenges of a supra-local nature and the great opportunities for cooperation at the level of existing institutions and initiating joint development projects are also emphasised (Kuźnik, 2015, p. 12; Gaczek, 2015, p. 12; Kuć-Czajkowska, 2019, pp. 11–12; Hu, Han, 2019, p. 2).

The definition and delimitation approach of FUA naturally implies the possibility of cooperation among various stakeholders. The goals of such cooperation primarily include the effective allocation of resources, improving the availability and quality of public services, increasing competitiveness, strengthening the development conditions of FUA and, consequently, enhancing the quality of life for residents (Janas, Jarczewski, 2017, p. 8).

The literature on integration and cooperation within metropolitan unions is quite rich; however, with regard to FUAs themselves, this problem is not very well-developed. In particular, there are two general models of cooperation in FUAs: bottom-up and top-down (Kaczmarek, Ryder, 2015; Krukowska, Lackowska, 2016; Kaczmarek, 2017; Kaczmarek, Kociuba, 2017). The top-down model concerns cooperation according to a predetermined procedure based most often on mandatory rules. Often, this path of development towards integrated management of functional areas results from the weaknesses of this process in local structures. This model is represented, for example, by the implementation of the ITI instrument, which centrally determines the number of ITI beneficiaries (delimitation criteria) and the need to establish ITI unions. In the long term, this form of integration in the functional areas may turn out to be unstable, and centralism may lead to unsustainable development and generate internal inequalities. The bottom-up model is the recommended one. Here, the integration of functional area management takes place on the basis of existing development problems. Their accumulation creates a barrier to the development of the entire functional area, and then there is a need for cooperation and the selection of appropriate development policy tools. In this model, cooperation is perceived as an important element of effective functioning, both organisational and socio-economic (Krukowska, Lackowska, 2016, pp. 85–87; Kaczmarek, 2017, pp. 158–162; Kaczmarek, Kociuba, 2017, pp. 49–51).

The above-described models seem adequate to the conditions for creating FUA VC in Poland. In some of them, there were institutionalised forms of cooperation (as bottom-up initiatives), even before the implementation of the ITI instrument, within metropolitan areas of: Gdańsk, Gdynia-Sopot (since 2011), Poznań (since 2011) and Szczecin (since 2005). The other functional areas were created obligatorily in the period of 2013–2015, in connection with the implementation of the ITI instrument into cohesion policy (Kuć-Czajkowska, 2019, pp. 340–341).

Methodology

To achieve the research goal, a survey method was used by employing the CAWI (Computer Assisted Web Interview) questionnaire. The advantage of this method is sending the survey directly to specific groups of recipients, ensuring the anonymity of respondents (no so-called "interviewer effect"). Moreover, it is an economically effective method because it does not require interviewers or additional expensive tools. However, the disadvantages of this method include a high drop-out rate or deviation from representativeness (a lack of control over who fills out the survey) (SurvGo, 2023).

The survey was conducted between September 8 and 21, 2023, using a form created in Google. Then, a link to the survey was sent by e-mail to 18 directors of ITI union offices in the FUA VC in Poland with a request to complete the survey questionnaire. Each ITI union had to return one survey form. As a result, responses were received from 12 ITI unions (67%). The questionnaire included eight multiple-choice questions and a survey metric. Questions regarding the rating of the studied phenomena were formulated using a five-point Likert scale. The survey questions were developed based on the author's own experience working in one of the ITI unions and were verified with the participation of employees from this union. The questions aimed to assess the cooperation of ITI union offices, both with stakeholders of the FUA development policy and in its basic aspects. In Questions 1 to 4, respondents assessed cooperation with various entities and in various areas, as well as the main problems of cooperation in the past 2014–2020 EU perspective. Questions 5 to 6 focused only on the general assessment of cooperation between ITI union offices and the local governments forming the FUA. The last two questions were related to the assessment of challenges and directions of cooperation for ITI unions in the future.

Research results

Referring to the characteristics of the respondent group, it can be noted that the majority of survey participants (83%) were ITI union offices that began to operate due to the implementation of the ITI instrument in the 2014–2020 perspective. In 17% of cases, this cooperation had existed before, but in a different territorial or organisational scope. The majority of participants in the survey were ITI unions operating as associations (67%), while the others were unions operating as agreements. In some ITI unions during the 2014–2020 perspective, there was a different partnership model, and the ratio among respondents would have been 50:50. This shows that FUAs operating under agreements have evolved into separate institutions (e.g., FUA Lublin, Toruń). The majority of the respondents

(41%) were from FUAs with the number of local government units ranging from 10 to 20, 25% from the range of 21–30 units, and 17% from ranges above 40 units and up to 10 units in each FUA. Moreover, 67% of the surveyed entities employed up to 10 people in the ITI office, 25% had 11–20 employees and 8% had more than 20 people. It can, therefore, be concluded that the survey responses came from a diverse group of respondents, and the results can be considered reliable.

As a result of the survey, it was observed that the assessment of cooperation within the FUA VC by ITI union offices is mostly positive. At the beginning, respondents were asked to give an overall assessment of the level of cooperation of the ITI union office with various stakeholders and development policy actors in the 2014–2020 EU perspective (Figure 1). Analysis of the data shows that 75% of the survey participants rated this cooperation as good and 25% as very good. There were no negative or average ratings, indicating that the ITI union offices have a positive relationship with different stakeholders and a positive experience in this respect.
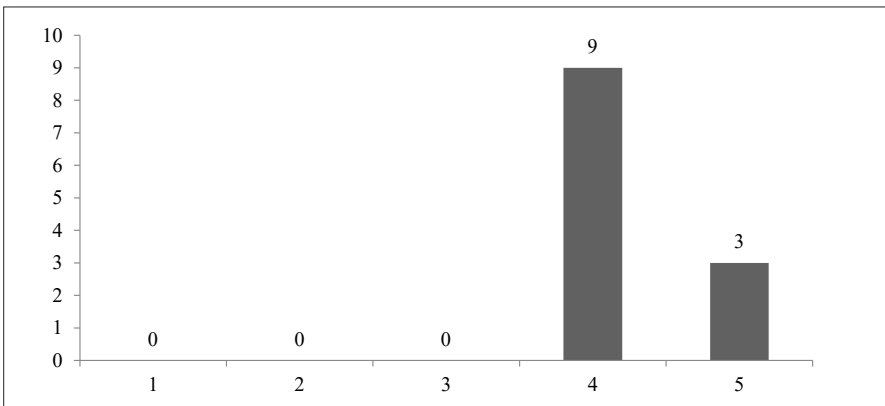
Figure 1. Number of responses assessing the level of cooperation between the ITI office and various development policy stakeholders

Legend: 1 – very bad; 2 – bad; 3 – medium (neither good nor bad); 4 – good; 5 – very good.

Source: own study.

Respondents were also asked to assess, in more detail, the cooperation of the ITI union office with the indicated development policy stakeholders in the frame of the 2014–2020 perspective, also on a scale from 1 to 5 (Table 1). Best of all, 100% of respondents gave very good ratings to cooperation with other ITI unions. This shows very good relations between these entities and great potential for further cooperation. ITI union offices are aware of common challenges and their role and create an active cooperation network, which can be considered a huge added value. The majority of respondents (75%) also assessed the cooperation

with the local government units that create FUA as very good. The worst rating was level 3, most people (50%) indicating cooperation with local entrepreneurs and residents of FUA. This may result from a relatively small number of activities carried out under the ITI instrument for these groups of recipients. In relation to the remaining stakeholders, the ratings were quite scattered between 3 and 5. In general, it can be summarised that ITI union offices assessed cooperation with the different stakeholders positively, as there were no negative ratings.

Table 1. Number of responses regarding the assessment of cooperation between the ITI union office and indicated development policy stakeholders

Scale/stakeholders	1	2	3	4	5	N/a
Local governments forming the FUA				3	9	
Other local governments and central government			2	6	4	
Managing and Intermediate Bodies of operational programmes			3	6	3	
Local entrepreneurs and business support organisations			6	2	1	3
Scientific and research institutions			2	5	2	3
NGOs			4	2	3	3
The FUA residents			6	3	1	2
Other ITI union offices					12	
Other stakeholders			1	6		5

Legend: 1 – very bad, 2 – bad, 3 – medium, 4 – good, 5 – very good.

Source: own study.

In the research study, respondents were also asked for an assessment of the importance of cooperation in various areas (Table 2). In this case, the ratings ranged on a full scale from 1 (not an important area of cooperation) to 5 (very important). The worst ratings, levels 1 and 2, were only single responses in some areas. However, most respondents (25%) indicated cooperation with other ITI unions in Europe as a little important, and almost 42% rated it as average (3), while only about 17% considered it very important and the same number indicated they did not cooperate. There is certainly a gap and future development potential here. The FUAs' problems and their scale in Poland and Europe may differ significantly, but the exchange of experiences in this area may prove to be a valuable opportunity for better development. On the other hand, the most important areas of cooperation (83% of respondents) were: cooperation with other ITI union offices in Poland, implementation of the FUA/ITI development strategy and acting as an Intermediate Body in the process of implementing the ITI instrument. The above shows that ITI union offices were most actively involved in the implementation of EU funds, and this was a very important area of cooperation for them.

Table 2. Number of responses assessing the importance of cooperation in selected areas

Scale/areas of cooperation	1	2	3	4	5	N/a
Preparation and implementation of the FUA development strategy/ITI strategy				2	10	
Cooperation with FUA local governments in areas not related to the implementation of the ITI instrument		1		6	5	
Cooperation at various levels between various stake-holders of the FUA development policy, also beyond the implementation of the ITI instrument				5	6	1
Joint implementation of partnership projects with local government units that form the FUA		1		4	7	
Supporting FUA local governments in obtaining external sources of financing (beyond ITI)	1	1	3	2	3	2
Exchange of knowledge and experience between FUA local governments and other partners		1		4	6	1
Cooperation with various ITI union offices in Poland				1	10	1
Cooperation with various ITI union offices in Europe		3	5		2	2
Acting as an Intermediate Body in the process of implementing the ITI instrument				1	10	1
Other			3	1	1	7

Legend: 1 – not important; 2 – a little important; 3 – medium importance; 4 – important; 5 – very important.

Source: own study.

In the next step of the research, respondents were asked to select and/or write the three most important problems related to cooperation under the FUA in the 2014–2020 perspective (Table 3). Half of the respondents indicated that the issues were bureaucracy and an overly complex system of legal regulations, as well as insufficient financing for the implementation of the tasks planned under the ITI strategy. A third of respondents also indicated difficulties in cooperation with Managing and Intermediate Bodies of operational programmes and challenges in reconciling the needs of various FUA stakeholders. No one reported problems with cooperation with the authorities of local government units belonging to the FUA; however, one response concerned the low motivation to cooperate among employees of the ITI union office and FUA local governments. Although this may not be a common problem, it is worth mentioning that in some FUAs, there is an institution of "coordinators". These are most often employees of FUA local government units who additionally perform tasks related to cooperation with ITI union offices. An overload of professional duties may result in low motivation and commitment among these individuals in their work.

**Table 3. Answers regarding problems related to cooperation in FUAs
in the 2014–2020 EU perspective**

Cooperation problems	Percentage of responses provided (12=100%)
A lack of or low commitment to cooperation among local governments (authorities) forming the FUA	0
A lack of or low commitment to cooperation among the Managing and Intermediate Bodies of the national and regional operational programmes	33
A lack of or low commitment to cooperation among other FUA development policy stakeholders	25
Difficulties in reconciling the needs of different stakeholders regarding the functioning of the ITI union and the implementation of the ITI strategy	33
Overly complex system of laws, guidelines and bureaucratic procedures in dealing with external institutions	50
Low motivation for cooperation among ITI union office staff and FUA local government units employees	8
Difficulties in organising the work of the ITI union office due to staff shortages	25
A lack of funding for all tasks within the ITI union office, including the implementation of the ITI Strategy	50
Other	0

Source: own study.

In the frame of research, respondents also rated the overall involvement of the local governments forming the FUA, in cooperation and joint action for the development of the entire functional area on a scale from 1 (no involvement) to 5 (very strong involvement) (Figure 2). In this case, the level of involvement was rated as good by half of the respondents, 33% assessed it as very good and 17% as medium. This can be considered a positive result, which shows an understanding of the objectives and a willingness to work together for the development of the FUAs.
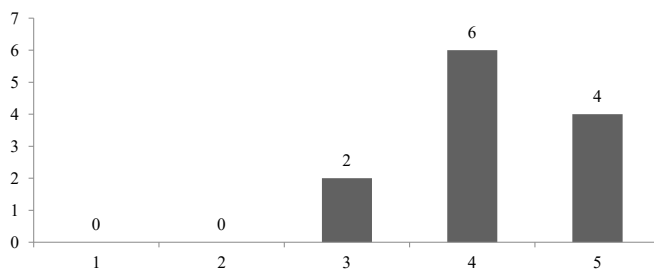
Figure 2. Number of responses concerning the assessment of the level of involvement of local governments forming the FUA in cooperation and joint activities for the development of the FUA

Source: own study.

Then, respondents were asked to rate the commitment to cooperation of the local authorities forming the FUA, but in some selected aspects (Table 4). Although in the previous question the involvement of local governments in cooperation was generally well-rated, in the case of specific areas of this cooperation, the results were more varied and ranged from 1 (no involvement) to 4 (strong involvement). There were no ratings of 5 (the best rating). The best rating and majority of responses concerned participation in the preparation of the territorial strategy for the 2021–2027 EU perspective and other FUA development programmes (75%), as well as providing support to ITI union offices in their contacts with Managing Authorities and Intermediate Bodies (58%). Half of the respondents rated their involvement in the planning and implementation of current tasks at the ITI union offices, as well as in jointly applying for external funding for projects and implementing partnership projects, as medium. Generally, it can be observed that local governments are most strongly involved in cooperation concerning the strategic activities of the FUA and in supporting contacts with the institutions financing the development of the FUA. On the one hand, this seems justified, but on the other, it can limit a wider field of cooperation in other aspects – such as the consolidation and networking within the FUA.

Table 4. Number of responses assessing the involvement of the FUA local authorities in various aspects of cooperation

Scale/areas	1	2	3	4	5	N/a
Support in contacts with Managing Authorities and Intermediate Bodies of operational programmes		1	4	7		
Participation in the preparation of the strategy for the 2021–2027 perspective and other FUA development programmes			3	9		
Participation in the planning and implementation of the ITI union office's current tasks	1	3	6	2		
Representing the interests and promoting the objectives of the ITI union in the national/international arena	2	4	5	1		
Joint application for external funding for projects (ITI union office and FUA local governments)	2	1	6	3		
Involvement in partnership projects (ITI union office and FUA local governments)		1	6	5		
Other	4		5			3

Legend: 1 – no commitment, 2 – weak commitment, 3 – medium commitment, 4 – strong commitment, 5 – very strong commitment.

Source: own study.

The next part of the research concerned challenges related to cooperation in the 2021–2027 EU perspective (Table 5). Here, the responses were quite diverse. The most frequently raised issue was obtaining external financial resources for both the implementation of the FUA development strategy (67%) and the operation of the ITI union offices themselves (58%). Half of the ITI unions also considered the implementation of integrated projects as part of the newly developed ITI strategies for 2021–2027 to be a significant challenge. Only 42% considered building partnerships within the FUA between different stakeholders to be the main challenge. In general, the answers to this question show that for ITI union offices, tasks related to the implementation of development strategies and securing financing for this purpose remain the main challenges. Other aspects seem less important, which may also indicate that the opportunities to deepen cooperation within the FUA are not being fully exploited. In the future, this may be particularly dangerous for those ITI unions, where the cooperation model was imposed top-down, rather than being bottom-up initiatives from local governments.

Table 5. Answers regarding the challenges related to cooperation under FUA in the 2021–2027 EU perspective

Challenges of cooperation	Percentage of responses provided (12=100%)
Obtaining external funding (outside the local government budget) to finance the ITI union offices	58
Obtaining external funding (outside the local government budget) to finance projects related to the implementation of development strategies, including the ITI strategy	67
Implementation of integrated projects within the ITI union	50
Organising a platform of cooperation for new members (local governments) of the FUA	17
Building partnerships and cooperation within the FUA between various stakeholders of development policy	42
Commitment to cooperation and exchange of experiences between ITI unions both in individual voivodeships and at the national and international levels	17
Supporting the competencies of institutions and organisations necessary to implement the FUA development strategy, including the ITI strategy	33
Other: own answer: obtaining financial resources for municipal coordinators	8

Source: own study.

At the end, ITI unions were asked to assess the durability of cooperation in the future and its directions by marking the sentences with which respondents agreed (Table 6). None of the respondents believed that the current state of

cooperation is sufficient, but one person stated that, in his opinion, the cooperation is not lasting and is implemented only because of the ITI instrument. However, the majority of respondents (75%) see the role of ITI union offices as coordinators of FUA development and the possibility of deepening this cooperation. Half of the respondents would also see a role for the ITI union offices as Intermediate Bodies, supporting the implementation of EU funds in the FUA. Slightly more than 40% of respondents also indicated that ITI unions of voivodeship centres should be the coordinators of cooperation for all FUAs operating in the voivodeship. Overall, therefore, it can be observed that the ITI unions see their main role further in the implementation of the ITI instrument, which continues to be the primary funding tool for FUAs.

Table 6. Answers regarding the evaluation of cooperation in the FUAs in the future

Cooperation perspectives in the future	Percentage of responses provided (12=100%)
I consider the current role, the tasks performed and the cooperation to be sufficient	0
I believe that our ITI union should be the coordinator of the cooperation of all FUAs in the voivodeship	42
I believe that our ITI union office should act as an Intermediate Body for European funds under the FUA development policy	50
I believe that our ITI union should focus more widely on tourism and economic promotion, as well as social activation of FUA residents	17%
I believe that the level of inter-local government cooperation in our ITI union is not durable and the union will cease to exist with the end of EU funding for the development of the FUA	8
Cooperation within our ITI union is developing very well and, in the future, the role of the ITI union office as coordinator of FUA development will become increasingly important	75

Source: own study.

CONCLUSIONS

Effective shaping of FUA development policy requires constant monitoring of relations and cooperation between different stakeholders. Such an assessment should be carried out not only in relations between local governments, but also in relation to entities and organisational structures established to manage this development, such as ITI union offices. The study conducted allowed for observation of how ITI union offices assess cooperation within the FUA. Among the basic observations and final conclusions, the following issues can be highlighted:

1) Overall, ITI union offices have positive cooperative relationships and experiences with other entities, which is an asset in shaping and deepening these relationships for further development of FUA in the future. ITI union offices should act as the "creator" and "initiator" of this cooperation.

2) Some of the best assessments concerned cooperation between ITI unions, offices of FUAs and VC. It was observed that they create an active partnership network. Together, they can be an important player in development policy not only at the FUA or voivodeship level, but also at the national one.

3) Among the different stakeholders, cooperation with the FUA local governments was also generally well-assessed. This is a positive sign, indicating a common understanding of the objectives of the FUA and its role. In general, it can be observed that local governments are most strongly involved in cooperation regarding strategic activities and providing support in dealing with the FUA's development funding institutions. They are less involved in other additional tasks of the ITI union. Furthermore, the implementation of the FUA development strategy/ITI strategy was identified as the most important area of cooperation. Moreover, for the respondents, the main challenges remain the implementation of the FUA development strategy/ITI strategy and ensuring adequate financing for this purpose. Other aspects seem less important, which proves that cooperation is limited primarily to activities related to obtaining EU financing in the frame of ITI. This is of, course, justified, but it may limit strengthening the foundations of cooperation in the future, for example in the case of a lack of EU funding. Other authors of similar empirical studies also draw attention to such a risk: Kuć-Czajkowska (2019), Janas and Jarczewski (2017), Krukowska and Lackowska (2016).

4) The lowest rating received was for cooperation with FUA entrepreneurs and residents. This is certainly an area for improvement, as these actors are important stakeholders in development policy and a pillar of development for the entire FUA. Furthermore, a certain gap in cooperation with other ITI unions in Europe can be observed. Some of the ITI unions have been in existence for a relatively short period of time (about 10 years), and it can be assumed that this has not been a priority for cooperation so far. In the future, however, a broader exchange of experience in this area and the use of European good practices could be considered.

5) An important element of cooperation for ITI unions was also acting as an Intermediate Body in the process of implementing the ITI instrument in FUAs in 2014–2020 (also see: Wolański et al., 2018, pp. 132–133), and, generally, the respondents see such a role in the future. Unfortunately, in the case of some ITI unions (e.g., in FUA Białystok), the potential built in 2014–2020 as

an Intermediate Body will not be used in the 2021–2027 EU perspective, due to a change in the funding model for ITI union offices. This can be evaluated negatively, as a huge waste of experience gained and developed procedures.

6) Another important observation is the fact that the length of cooperation influenced its better ratings. Those ITI unions that were established as bottom-up initiatives of local governments, before the implementation of ITI, assessed cooperation and its prospects better. Also, in general, the ratings in the survey were better when the ITI union operated as an association. In particular, in the case of assessments of the durability of cooperation, they were more optimistic. Similar conclusions were also found in other studies – for example, Wolański *et al.* (2018), Kuć-Czajkowska (2019).

In conclusion, it can be noted that cooperation within the FUAs has generally been assessed positively. In the light of the research, it can be concluded that in relation to the ITI union goals (*Programowanie perspektywy…*, 2024; MFiPR, 2023), these unions implement cooperation tasks sufficiently. It can be observed that there is a commitment to cooperation in various forms and with various stakeholders, which facilitates better creation of the FUA development policy and coordination of projects implemented in the frame of the ITI strategy. Additionally, it can be noted that the established ITI unions have the potential to become stronger leaders and creators of this cooperation, rather than just administrators of EU funding. Certainly, important here is the role of local governments cooperating in the FUA, which should not treat ITI unions as a mechanism for obtaining funding but should increase their potential as coordinators of FUA development.

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Summary

Functional urban areas (FUA) are an important stakeholder in urban policy. They were constituted in the institutionalised form of the so-called "ITI unions" (associations or local government agreements) in the 2014–2020 EU perspective, as the main entities for the implementation of the cohesion policy instrument – integrated territorial investments (ITI). Monitoring the role, various aspects and challenges of cooperation is important from the viewpoint of the success of an effective FUA development policy. Research in the literature on cooperation in FUA focuses mainly on aspects of cooperation between local governments, with less analysis of the role of the ITI union offices themselves in this process. Taking the above into account, the aim of this work is to assess the cooperation and its main problems and challenges from the perspective of the ITI union offices. Therefore, from September 8–22, 2023, a survey using the CAWI technique was carried out in 18 FUAs of voivodeship capitals in Poland. Feedback forms were sent by 67% of the respondents (12 unions). The results obtained mostly indicate good and very good assessments of the cooperation conducted by ITI union offices with various stakeholders and in different areas. The basic cooperation partners here, of course, remain FUA local governments, but also other ITI union offices in Poland. Cooperation is still focused mainly on aspects related to the implementation of the FUA development strategy (primarily the ITI instrument). The survey showed that ITI unions generally strive to build positive relationships with other stakeholders, which may provide potential for FUA development in the future.

Keywords: cooperation, functional urban areas.

Doświadczenia i wyzwania współpracy w miejskich obszarach funkcjonalnych ośrodków wojewódzkich w Polsce

Streszczenie

Miejskie obszary funkcjonalne są istotnym interesariuszem polityki miejskiej. Ukonstytuowały się w zinstytucjonalizowanej formie tzw. związków ZIT (stowarzyszenia lub porozumienia międzygminne) w perspektywie 2014–2020, jako główne podmioty do wdrożenia instrumentu polityki spójności – zintegrowanych inwestycji terytorialnych (ZIT), dedykowanego właśnie miejskim obszarom funkcjonalnym. Monitorowanie roli, różnych aspektów, wyzwań prowadzonej współpracy jest ważne z punktu widzenia skutecznej polityki rozwoju w ramach MOF. Dotychczasowe badania dotyczące współpracy w MOF koncentrują się głównie na aspektach współpracy międzysamorządowej, mniej analizując miejsce w tym procesie samych biur związków ZIT. Celem pracy jest zatem ocena prowadzonej współpracy i określenie jej głównnych wyzwań z punktu widzenia biur związków ZIT ośrodków wojewódzkich w Polsce. Aby pozyskać materiał do analizy, w dniach 8–22 września 2023 roku przeprowadzono badanie ankietowe techniką CAWI w 18 miejskich obszarach funkcjonalnych ośrodków wojewódzkich w Polsce. Formularze zwrotne nadesłało 67% grupy respondentów (12 związków). Uzyskane wyniki wskazują w większości na dobre i bardzo dobre

oceny prowadzonej współpracy przez te związki z różnymi interesariuszami i w różnych obszarach. Podstawowymi partnerem współpracy pozostają oczywiście samorządy danego MOF, ale też inne biura związków ZIT w Polsce, a koncentruje się ona dalej głównie na aspektach związanych z wdrażaniem strategii rozwoju MOF (przede wszystkim samego instrumentu ZIT). Ankieta pokazała, że związki ZIT generalnie budują pozytywne relacje z innymi interesariuszami, co stanowi potencjał do rozwoju MOF w przyszłości.

dr Błażej Suproń[1] ⓘ

Department of Economics, Finance and Accounting
West Pomeranian University of Technology in Szczecin

The impact of agriculture in Visegrad countries on CO_2 emissions using the FMOLS and DOLS methods in an empirical panel data study[2]

Introduction

The impact of agriculture on carbon dioxide emissions (CO_2) is a significant subject of scientific research and public debate amidst current environmental and climate change challenges. Climate change poses an urgent problem with far-reaching consequences for society, ranging from the economy and agriculture to health and cultural diversity. The relationship between natural sciences and socio-economic knowledge is fundamental in investigating climate change and its socio-economic outcomes (Danilov-Danil'yan et al., 2020).

The impact of climate change on productivity varies across economic sectors, with global warming and weather instability having a significant impact on agricultural productivity (Nath, 2020). Changes in atmospheric greenhouse gas concentrations, and changes in land structure that lead to climate change affect agricultural crops (Jones et al., 2022). Climate warming also directly and indirectly affects human health, leading to diseases, accidents, and negative psychological effects (Bunz, Mücke, 2017). Overall, tackling climate change is crucial for the sustainable long-term development and well-being of societies.

Excessive CO_2 emissions can cause an increase in temperature, which can lead to reduced plant and animal production, and increased social inequalities (Prandecki, Sadowski, 2010). Additionally, global warming may negatively impact the natural environment by reducing milk production, conception rates

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[1] Correspondence address: 71-210 Szczecin, ul. Żołnierska 47; tel. +48 91 449 69 00; e-mail: bsupron@zut.edu.pl. ORCID: 0000-0002-7432-1670.

in animals, appetite, and even increasing mortality (Cho et al., 2011). Changing rainfall patterns and growing seasons can lead to unequal production rates among farmers from different countries. According to Prandecki *et al.* (2020), global temperature increase negatively affects farmers' lives by causing water scarcity, reducing pasture availability, increasing feed costs, and raising expenses for maintaining appropriate building temperatures.

Agriculture is a significant contributor to greenhouse gas (GHG) emissions. The main sources of GHG emissions in agriculture are agricultural soil management, fertiliser application, livestock management, fossil fuel combustion and land use change (Zaman et al., 2021). In the European Union, the structure of agricultural GHG emissions in 2021 was dominated by enteric fermentation, agricultural soils, and manure management (Mielcarek-Bocheńska, Rzeźnik, 2021). Livestock farming is the largest sector of greenhouse gas emissions in EU agriculture, responsible for 70% of total emissions (Panchasara et al., 2021). The remaining 30% is generated by the fuel consumption of machinery, and the use of electricity in agricultural production, fertiliser use and soil exploitation (Caldwell, Smukler, 2020). Crop cultivation, land use change, and post-harvest residue burning are additional sources of agricultural GHG emissions (Jaiswal, Agrawal, 2020). To mitigate these emissions, climate-smart agricultural practices such as conservation tillage, use of cover crops and strategic use of fertilisers can be implemented (Fall et al., 2021). Efforts to reduce GHG emissions from agriculture are crucial to address climate change and ensure sustainable food production.

Agriculture plays an important role in the economies of the Visegrad Group (V4) countries[3], which consists of Poland, the Czech Republic, Slovakia and Hungary. These are diverse regions with a rich agricultural tradition, but agriculture has a significant impact on CO_2 emissions in these countries. At the same time, the V4 countries are striving to reduce greenhouse gas emissions by implementing international climate agreements, such as the Paris Agreement, or the EU's Green Transition Plan (Fit for 55)[4].

There are, however, challenges to achieving the targets set for reducing CO_2 emissions. Due to the constant economic transformation, low-carbon development is still an important issue in the V4 countries and efforts are being made to improve the quality of life while protecting the environment. These efforts include, among others, assessing the eco-efficiency of energy resources and technologies, promoting renewable energy sources and developing distributed energy systems (Dzikuć et al., 2021). The V4 countries also have different approaches and levels of energy transition, with Poland facing the greatest challenges due to its dependence

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[3] The Visegrad Group, also known as the Visegrad Four or the V4, is a cultural, economic, and political alliance of four Central European countries: the Czech Republic, Hungary, Poland, and Slovakia.

[4] Fit for 55 is a legislative package of legislation that is intended to be applied to greenhouse gas emissions by 55% by 2030 to the full extent set in 1990.

on coal production (Kochanek, 2021). Among the V4 countries, Poland has not even met its existing commitments to reduce greenhouse gas emissions (Tucki et al., 2021). In general, V4 countries are working on energy transition and GHG emission reductions, but there are different levels of progress and challenges within the group (Gostkowski et al., 2021).

Given the challenges of the energy transition facing the V4 countries, the study aims to answer the question: how do agricultural production, energy consumption, fertiliser usage, and cultivated land area collectively contribute to carbon emissions from agriculture in the Visegrad group countries?

With this research question in mind, this study aims to investigate the factors that contribute to carbon emissions in agriculture, with a focus on the Visegrad countries. Achieving the stated objective required investigating how agricultural production, energy and fertiliser use, and cropland area affect CO$_2$ emissions from agriculture. The study used empirical econometric modelling methods for panel data such as fully modified ordinary least squares (FMOLS), dynamic ordinary least squares estimator (DOLS) and Granger causality analysis based on the Juodis, Karavias and Sarafidis estimator.

An additional aim of the study is to provide information for policy makers in the formulation of zero-emission policies in agriculture and the adaptation of the economy to the Fit for 55 package.

Literature review

Most studies looking for a relationship between environmental pollution and economic development are based on the concept of the Environmental Kuznets Curve (EKC). It illustrates a hypothetical relationship between environmental quality, and the level of economic development (Selden, Song, 1994). According to the hypothesis underlying the EKC, various indicators of environmental degradation worsen with economic growth until per capita income reaches a certain point during development. Many studies consider in EKC model factors such as the economy's structure, energy consumption, environmental policy, or technological change in various countries and regions (Shahbaz, Sinha, 2019).

European and global CO$_2$ emissions are largely the responsibility of agriculture, which is also highly sensitive to climate change (Naseem et al., 2020). Econometric studies, to date, have shown that food crop production and livestock farming contribute to CO$_2$ (Caldwell, Smukler, 2020). The use of machinery, electricity and fossil fuels in agricultural practices such as ploughing, cultivation, and irrigation results in significant carbon dioxide emissions (Shakoor et al., 2022). In addition, the cultivation of certain crops contributes to increased greenhouse gas emissions.

Agricultural value added has been found to have a significant impact on CO_2 emissions in several studies. Some studies suggest a negative association between agriculture value added and CO_2 emissions, indicating that increased agricultural activities can reduce emissions due to the environmentally improving effect of the sector (Doğan, 2018). Research in China using the ARDL method also shows a negative relationship between industrial, agriculture, and services sector value-added and CO_2 emissions in both the short and long run (Huan et al., 2022).

In Pakistan, it was observed that in the long run, agriculture value added is negatively related to CO_2 emissions, indicating that the agricultural sector has the potential to mitigate it (Khurshid et al., 2022). Similarly, in a sample of middle-income countries, it was found that agriculture value added is negatively associated with per capita CO_2 emissions (Majewski et al., 2022). Additionally, in a panel of five North African countries, it was observed that an increase in agricultural value-added leads to a reduction in CO_2 emissions (Adedoyin et al., 2020). Similar observations were also obtained in Bangladesh (Rahman et al., 2020). These findings suggest that promoting sustainable agricultural practices and increasing agricultural value added can contribute to the reduction of CO_2 emissions in underdeveloped countries.

However, some studies conducted in developed countries have found different relationships. The increase in value added from agriculture to GDP has been identified as a driver of CO_2 emissions in developing and transition economies (Adedoyin et al., 2021). Long and Tang (2021) analysed the relationship between economic growth and agricultural carbon emissions in China using the EKC model. They found that economic growth and production growth are the main drivers of agricultural carbon emissions. Khan (2020) examined the determinants of environmental degradation and CO_2 emissions in developing and developed countries. He found that agricultural production has a positive impact on CO_2 emissions from liquid sources and a negative impact on the total CO_2 emissions.

Land use change, including deforestation and conversion of natural ecosystems to agricultural land, also generates increases in carbon emissions (Khan, 2020). Conversion of land for agricultural use, such as deforestation and peatland drainage, is a major contributor to CO_2 emissions (Tubiello et al., 2021).

Agricultural land use plays a significant role in CO_2 emissions and mitigation strategies. Studies have shown that the global technical mitigation potential from agriculture by 2030 is estimated to be around 5500–6000 Mt CO_2-eq, excluding fossil fuel offsets from biomass (Panchasara et al., 2021). The effects of forests and agricultural land on CO_2 emissions have been quantified using the Environmental Kuznets Curve framework, indicating a relationship between land use and emissions (Parajuli et al., 2019). Additionally, the FAOSTAT database

highlights that agriculture, forestry, and land use changes contribute up to 30% of anthropogenic greenhouse gas emissions (Tubiello et al., 2013).

The use of fertilisers in agriculture is another factor that contributes to CO_2 emissions. Some studies have shown that increasing atmospheric CO_2 concentrations can lead to a fertilisation effect, enhancing biomass productivity in non-agricultural areas (Amann, Hartmann, 2018). In addition, inappropriate fertilisation and intensive tillage practices can lead to loss of soil carbon and increased CO_2 emissions to the atmosphere (Li et al., 2014). Also, econometric studies indicate that the use of fertilisers to increase agricultural production can contribute to greenhouse gas (GHG) emissions, which have a significant impact on the environment (Wu et al., 2021).

The results of short-run study described that fertilisers usage in agriculture revealed a negative linkage to CO_2 emission in Bhutan (Rehman et al., 2022). The long-term evidence shows that fertiliser usage is positively and significantly associated with carbon dioxide emissions in Pakistan (Rehman et al., 2019). However, according to research by Khan *et al.* (2022), the consumption of chemical fertilisers in China does not show a significant association in the short or long term.

The relationship between energy, agriculture, and CO_2 emissions is intricate and influenced by various factors such as income levels, governance quality, and technological advancements. Studies have shown that there is a significant interplay between these factors in different regions (Ben Jebli, Ben Youssef, 2017). Saidmamatov *et al.* (2023) suggest that economic growth, water production, energy consumption, and electricity production are factors that tend to increase CO_2 emissions from agriculture. Qiao *et al.* (2019) examined the impact between agriculture and economic growth, and renewable energy and CO_2 emissions in G20 countries. They found that agriculture increases CO_2 emissions, while renewable energy use decreases them. Gokmenoglu and Taspinar (2018) tested the EKC hypothesis for agriculture in Pakistan and found that energy has a positive impact on CO_2 emissions. Ali *et al.* (2021) modelled the impact of income, agricultural innovation, energy use, and environmental degradation on CO_2 emissions in Nigeria. The study confirmed the significant impact of energy use on emissions from agriculture.

To date, a wide range of models have been used to investigate the relationship between CO_2 emissions and agriculture. To date, the Auto Regressive Distributed Lag model has been used (Zahoor, 2018), the VAR model (Gurbuz et al., 2021), quantile panel regression techniques (Nwaka et al., 2020), non-linear least squares estimation (Murad, Ratnatunga, 2013), vector error correction model, and Granger causality tests. Some studies have also used FMOLS and DOLS methods (Koshta et al., 2020; Chandio et al., 2020; Dogan, 2019).

In the global literature, the relationship between agriculture, broadly defined, and CO_2 emissions has been investigated using panel data analyses for different groups of countries and regions. The results show that income, economic integration, agricultural value added, and energy consumption are the main drivers of agricultural emissions in both the short and long term (Nguyen et al., 2021; Nwaka et al., 2020; Khan, 2020; Naseem, Guang Ji, 2021).

Several studies have also analysed models that assess the relationship between agricultural CO_2 emissions in the Visegrad countries. The analysis of GHG emissions in these countries showed that the agricultural sector plays an important role in contributing to CO_2 emissions (Wawrzyniak, 2020). Factors such as agricultural exports, cultivated area, agricultural production, agricultural imports, value added in agricultural production and fertiliser use have also been shown to influence CO_2 emissions in the agricultural sector (Simionescu, 2021). At the same time, no study examining the indicated factors, and using modern estimation methods such as panel data analysis or causality tests for the V4 countries, has appeared to date. The analysis aims to fill a gap in the research on this topic, as studies of this nature are infrequent even in European countries.

METHODOLOGY

The empirical study was based on the statistics from the World Bank (WDI) and the United Nations Framework Convention on Climate Change (UNFCCC). Time series for the Visegrad countries were examined for the period 1995–2020, covering the maximum available data range for the variables. The variables included in the study were: agricultural carbon emissions (ACO2), fertiliser consumption (F), agricultural energy consumption (AEC), agricultural value added per capita (AGDP), and agricultural land as a share of total land (ALS). Detailed characteristics of the studied variables are presented in Table 1.

Table 1. Variables and description of measurement

Variables	Full name	Unit	Source
lnACO2	Agricultural carbon emissions	tonnes per capita	UNFCCC GHG Data
lnAEC	Agricultural energy consumption	tonnes of oil equivalent per capita	UNFCCC GHG Data
lnAGDP	Agriculture value added	constant 2015 USD per capita	WDI World Bank
lnALS	Agricultural land	% of land area	WDI World Bank
lnF	Fertiliser consumption	kilogrammes per hectare of arable land	WDI World Bank

Source: author's calculation.

The empirical study used panel methods. Due to the relatively small number of cross-sectional units (number of cross-sectional units) of 4, the FMOLS and DOLS model estimation methods were used (Granger, 1988). The model used in the study is a modification of the models previously used by Dogan and Seker (2016), Saboori and Sulaiman (2013) and Zwane *et. al* (2023). However, the variables used in the current study differ from those used in the studies cited. The general form of the model is as follows:

$$ACO2 = c_{0t} + \beta_1 AEC_{it} + \beta_2 AGDP_{it} + \beta_3 ALS_{it} + \beta_4 F_{it+} \varepsilon_{it} \qquad (1)$$

The coefficients β represent the values of the model variables, t the variation of the variables over time and the error term ε_{it}.

This paper conducts an empirical analysis of the impact of agricultural activity variables on CO_2 emissions. The study utilised the dynamic least squares (DOLS) method and the fully modified method of ordinary least squares (FMOLS) to determine their long-term relationship. Following the panel data testing methodology, stationarity tests were performed first, succeeded by a cointegration test between variables.

The unit root tests in the study were based on the Im, Pesaran and Shin (IPS) tests (Im et al., 2003). The optimal number of lags was determined using the Akaike information criterion (AIC). Since there was no statistically significant trend in the observations, the tests were conducted for the variant with an intercept point.

Two tests were conducted to identify long-term (cointegration) relationships. Pedroni's residual cointegration test (2004) and Kao's cointegration tests (1999).

Due to the study's relatively small number of cross-sectional units, the FPW estimation method using pooled weight FMOLS was employed. The following is the general form of the estimator used in this study (Pedroni, 2001):

$$\hat{B}_{FPW} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \tilde{X}_{it}^{*} \tilde{X}_{it}^{*,} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (\tilde{X}_{it}^{*} \tilde{y}_{it^*} - \lambda_{12i^*\prime}) \qquad (2)$$

Where weighted variables are created as follows:

$$\tilde{X}_{it}^{*} = \hat{\Omega}_{22i}^{-\frac{1}{2}} * \tilde{X}_{it} \qquad (3)$$

$$\tilde{y}_{it}^{*} = \hat{\omega}_{22i}^{-\frac{1}{2}} * \tilde{y}_{it}^{++} \qquad (4)$$

$$\lambda_{12i^*} = \widehat{\omega}_{12i}^{-\frac{1}{2}} * \lambda_{12i}^{+} * \widehat{\omega}_{22i}^{-\frac{1}{2}} \tag{5}$$

In the last phase of the investigation, the testing of causality was conducted utilising the panel data test designed by Juodis, Karavias, and Sarafidis (2021). This test considers cross-sectional dependence and cross-sectional heteroskedasticity in the errors, resulting in more resilient results compared to typical Granger causality tests. Eviews and Stata software, along with the xtgranger package, were used for the computations.

Results

Table 2 presents the fundamental characteristics of the study variables, including the mean, median, standard deviation, maximum, minimum, kurtosis, and skewness measures. The majority of examined variables demonstrate a skewness value close to zero, indicating normality. The kurtosis values, an except lnAGDP are below 3, suggesting the normality of variables. In the case of the variable in question, data distribution that is more pointed (sharper) than a normal distribution.

Table 2. Descriptive statistics

Parameter	lnACO2	lnAEC	lnAGDP	lnALS	lnF
Mean	-3.979	-1.350	5.782	3.931	4.742
Median	-3.873	-1.269	5.863	3.927	4.716
Maximum	-2.908	-0.37	6.355	4.234	5.280
Minimum	-5.356	-2.441	4.509	3.666	4.058
Std. Dev.	0.613	0.512	0.386	0.165	0.289
Skewness	-0.168	-0.306	-1.489	0.116	0.126
Kurtosis	2.082	2.351	5.037	2.020	2.111
Observations	104	104	104	104	104

Source: author's calculation.

Table 3 displays the findings of the panel unit root tests. The results demonstrate that all variables are stationary at the first difference. With the exception of the lnAGDP variables, the study variables are non-stationary in I(0). The results from the stationarity test suggest that the FMOLS and DOLS estimator can be applied.

Table 3. Panel unit root test (IPS)

Variables	Level	1st difference
lnACO2	0.753	-4.619***
lnAEC	-0.680	-4.946***
lnAGDP	-1.315*	-6.675***
lnALS	0.836	-3.828***
lnF	1.664	-5.601***

Note: ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Source: author's calculation.

After confirming that the variables were not stationary, a cointegration test was performed to determine the link between CO$_2$ emissions in agriculture and the consumption of fertiliser, energy, value added through agriculture, and the area of agricultural land. The Pedroni cointegration test results are presented in Table 4. Since most of the tests were statistically significant, the null hypothesis of no cointegration was rejected.

Table 4. Pedroni residual cointegration test

Test Statistic	Statistic	Prob.	Weighted Statistic	Prob.
v-Statistic panel	-0.046	0.519	0.190	0.425
rho-Statistic panel	0.392	0.652	-0.388	0.349
PP-Statistic panel	-1.335	0.091	-2.957	0.002
ADF-Statistic Panel	-1.456	0.073	-3.336	0.000
Test Statistic			Statistic	Prob.
Group rho-Statistic			0.141	0.556
Group PP-Statistic			-3.825	0.000
Group ADF-Statistic			-3.949	0.000

Note: Alternative hypothesis: common AR coefs. (within-dimension) and alternative hypothesis: individual AR coefs. (between-dimension).

Source: author's calculation.

To reinforce the reliability of the outcomes, a Kao cointegration examination was executed and shown in Table 5. The null hypothesis of no cointegration was rejected since the test statistic is significant at the 1% level. Thus, the results ratified a long-term correlation's presence among the variables investigated.

Table 5. The Result of Kao's cointegration test

Kao Residual Cointegration Test	t-Statistic	Prob.
ADF	-4.324	0,000
Residual variance		0.006
HAC variance		0.005

Source: author's calculation.

After confirming that the variables are co-integrated, a FMOLS model was estimated to investigate the relationship between the variables. The results are presented in Table 6. The choice of the optimal model parameters was based on the values of the R and R^2 parameters. All coefficients are statistically significant at the 1% level, indicating their significant impact on CO_2 emissions in Visegrad country agriculture. It is important to note that these results should be interpreted in a long-term perspective:

– a 1% increase in energy consumption in agriculture leads to an increase in CO_2 emissions of 0.73% in the long term,
– a 1% increase in added value from agricultural production leads to an increase in CO_2 emissions of 0.43% in the long term,
– a 1% increase in fertiliser use leads to a 0.29% increase in CO_2 emissions over the long term,
– an increase in the share of agricultural land of 1% leads to an increase in CO_2 of 0.95%.

Table 6. Results from the panel fully modified ordinary least square approach (FMOLS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnAEC	0.733	0.072	10.207	0.000
lnAGDP	0.426	0.066	6.435	0.000
lnALS	0.945	0.042	22.549	0.000
lnF	0.288	0.077	3.720	0.000
R-squared				0.947
Adjusted R-squared				0.943
S.E. of regression				0.147
Long run variance				0.015

Source: author's calculation.

The DOLS model was estimated to confirm the findings from the FMOLS model (Table 7). Both models yielded consistent results in terms of coefficient signs and significance, bolstering the robustness of the study's conclusions. The DOLS model provided a higher level of fitness, as evidenced by the R and R^2 values. The estimation further validates the robustness of the results.

Table 7. Results from the panel dynamic least square approach (DOLS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnAEC	0.548	0.064	8.589	0.000
lnAGDP	0.503	0.114	4.416	0.000
lnALS	1.325	0.377	3.516	0.001
lnF	0.644	0.138	4.674	0.000
R-squared				0.985
Adjusted R-squared				0.963
S.E. of regression				0.119
Long run variance				0.007

Source: author's calculation.

Causality tests

The study's final stage entailed examining the causal relations amongst CO$_2$ emissions, fertiliser consumption, agricultural energy consumption, agricultural value added per capita, and agricultural land area as a proportion of total land. The aim of this approach is to validate the long-term relationship between the time series under consideration, and to determine its direction. At this stage of the research, we employed the estimator for Granger non-causality tests for panel data, which was developed by Juodis, Karavias, and Sarafidis (JKS). Table 8 presents the z-statistic and statistical values indicating the cause-effect relationship between the variables.

Table 8. Panel Approach to Granger's causality test

Causality → effect	Z-statistics	p-value
lnAGDP → lnACO2	2.79	0.005
lnACO2 → lnAGDP	-1.47	0.141
lnAEC → lnACO2	2.57	0.010
lnACO2 → lnAEC	-0.97	0.332
lnALS → lnACO2	2.00	0.046
lnACO2 → lnALS	0.02	0.988
lnF → lnACO2	2.69	0.007
lnACO2 → lnF	5.9	0.000
Half-Panel Jackknife Wald test statistic	17.44	0.002

Note: The null hypothesis in the procedure in question is defined as "variable X does not cause causality of variable Y".

Source: author's calculation.

The BIC information criterion determined the lag length. A test statistic of 17.438 and a *p*-value of 0.002 demonstrate solid evidence of rejecting the null hypothesis of Granger non-causality. This implies that the observed results are highly probable. The z-statistic values for the individual variables indicate both unidirectional and bidirectional causality. Bidirectional causality exists between fertiliser consumption and CO_2 emissions (lnF$\leftrightarrow$lnACO2).

Increased carbon dioxide emissions from agriculture can reduce the worth added by agriculture. This occurs due to the impact on climate change, making crop growth and livestock rearing more challenging. Moreover, ascertaining reduced CO_2 emissions also impacts agricultural profitability. Increased added value in agriculture can result in higher CO_2 emissions due to the greenhouse gases released by more efficient and extensive cultivation and breeding methods. Similarly, increased fertiliser usage can lead to higher CO_2 emissions as soil amendments release more greenhouse gases into the atmosphere. Additionally, increased CO_2 emissions can result in more fertiliser usage due to the detrimental effects of climate change, such as reduced soil fertility caused by droughts.

Unidirectional causality was instead confirmed between farm area and CO_2 emissions (lnALS$\rightarrow$ lnACO2) and agricultural energy consumption and CO_2 emissions (lnEC$\rightarrow$ CO2).

Farm area emerges as the key driver of agricultural CO_2 emissions, with larger farms contributing more. That causality highlights the need for strategies that address area-related emissions in agricultural practices. In the second case, on the other hand, the result indicates that energy consumption in agriculture is also the main factor influencing CO_2 emissions from agriculture. The greater the energy consumption in agriculture, the greater the CO_2 emissions from agriculture. All relationships are illustrated in Figure 1.
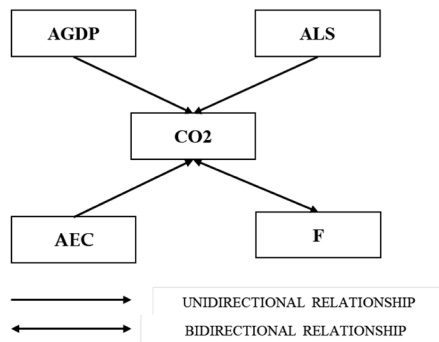
Figure 1. Relationships between study variables established by the causality test

Note: AGDP – added production by agriculture, ALS – agricultural area, F –fertiliser consumption, AEC – energy consumption by agriculture.

Source: author's calculation.

Conclusions and discussion

The results obtained from the model estimations for the Visegrad countries confirm that CO_2 emissions are influenced by an increase in the volume of production in agriculture expressed in terms of value added. These results are in line with previous studies, which indicated that there is a relationship between economic growth and agricultural output growth and CO_2 emissions from agricultural production (Adedoyin et al., 2021). However, it is worth noting that in developing countries, an increase in agricultural production has been observed to lead to a reduction in CO_2 emissions, which is in contrast to what is typically observed in developed countries (Doğan, 2018; Huan et al., 2022).

Another observation obtained, indicating that increasing the area of agricultural land increases CO_2 emissions, corresponds with these results. Such results were previously confirmed by Zhang *et al.* (2018) and Yerli *et al.* (2019). Therefore, it should be noted that a rise in agricultural production volume has an adverse effect on the environment, as it leads to higher consumption and utilisation of natural resources.

The results also indicate that increasing energy consumption by agriculture increases CO_2. Previously, similar relationships were indicated by Appiah *et al.* (2018) and Flammini *et al.* (2021). However, it is important to note that an increase in energy consumption in agriculture does not always have a negative impact on the environment. Numerous studies show that increasing the use of renewable energy has a positive impact on the environment by reducing CO_2 emissions from agriculture (Ben Jebli, Youssef, 2017). Studies have shown that it has a one-way causal impact on both agriculture and emissions, highlighting its potential for positive environmental impact (Appiah et al., 2018). Furthermore, the use of renewable energy has been shown to significantly reduce CO_2 emissions, especially in countries with lower incomes (Naseem, Guang Ji, 2021).

Also, the results of the study indicate negative environmental impacts of fertilisers used by the agricultural sector in the V4 countries, which corresponds to the findings of Zwane *et al.* (2023). The results confirm that CO_2 emissions in the Visegrad countries are increased by agricultural production, energy and fertiliser consumption, and the area of cultivated land.

Summary and implications

The study analysed the correlation between agricultural growth, fertiliser consumption, energy consumption, agricultural land expansion and agricultural carbon dioxide emissions in the Visegrad countries from 1995 to 2020. Cointegration was used to establish long-term associations between variables and both FMOLS

and DOLS models were estimated. Finally, to establish the links between variables and to highlight potential future research avenues, a cointegration analysis was conducted using the seminal JKS estimator.

The results suggest that the agricultural sector is positively related to CO_2 emissions from agricultural activities in the V4 countries. As a result, policies aimed at reducing these emissions should centre on lowering energy consumption in agriculture and enhancing the agricultural production efficiency with limited resources. Additionally, the results indicate that reducing CO_2 emissions should involve decreasing the amount of land devoted to agriculture and lowering fertiliser usage. However, such activities of the Fit for 55 package and the "From Farm to Fork" strategy for the accessible have access to users who use external resources and may impact productivity. Farmers must require support from the Member State to ensure emissions levels with reduced greenhouse licensing. Without applying the procedure that followed, the agriculture of the V4 countries will suffer due to the issuance of the Green Deal.

It is therefore worthwhile for the right measures to be implemented at the time of the energy transition. Firstly, it should focus on promoting new, greener agricultural practices. Over the past decade, the share of EU agricultural land under organic farming has increased by more than 50%, with an annual growth rate of 5.7%. Small-scale ecological farming can lead to equity and efficiency gains, while land redistribution toward smaller farms can promote economic growth. In V4 countries, ecological farming has share of on average 15% of farmland (Wrzaszcz, 2023). However, it should be borne in mind that due to the lower efficiency of organic crops, small farms will not be able to replace the reduction in production resulting from the implementation of climate goals (Chiarella et al., 2023). Secondly, it is required to improve energy efficiency in agriculture by investing in new technologies and machinery, low and zero carbon. The implementation of individual RES on farms may also be a solution.

Thirdly, increasing the added value from agricultural production should be done by promoting smaller farms and organic production methods, while at the same time using more efficient farming methods. Fourthly, with alternative methods such as composting and biopesticides, V4 countries should aim to reduce the use of fertilisers. Furthermore, it will be necessary to decrease the amount of agricultural land by reclaiming it and repurposing it for other uses, such as forests and parks.

In contemplating the future, the integration of renewable energy sources emerges as a pivotal consideration for agriculture. Embracing energy derived from renewables such as solar, wind, and biomass offers farmers the prospect of diminishing reliance on conventional, frequently pollutant-laden, energy outlets. This not only fosters the advancement of sustainable practices but also yields positive ramifications for the environment by mitigating the greenhouse gas emissions linked to traditional

energy sources. Future-oriented initiatives might encompass the implementation of photovoltaic panels, the adoption of wind turbines, or the extraction of biogas from agricultural waste. Envisioned in this manner, agriculture charts a course toward heightened environmental sustainability, concurrently playing a substantive role in advancing global objectives for reducing CO$_2$ emissions.

Implementation of the proposed solutions will also require a significant investment in research and development (R&D), as well as in agricultural subsidies. Increased investment in R&D directed towards sustainable agricultural practices, precision farming technologies, and climate-resilient crop varieties can lead to innovative solutions that enhance productivity while minimising environmental impact. By fostering advancements in agroecology, water management, and energy-efficient farming techniques, R&D contributes to a more sustainable and low-carbon agricultural sector.

Simultaneously, agricultural subsidies can be strategically employed to incentivise practices that reduce CO$_2$ emissions. Redirecting subsidies towards eco-friendly practices, such as organic farming, agroforestry, or the adoption of renewable energy in agriculture, can stimulate a transition to more sustainable and environmentally conscious approaches. This financial support serves as a lever for steering agricultural activities towards practices that align with climate mitigation goals. It will also require the organisation of educational and awareness-raising initiatives on the matter.

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Summary

The primary aspiration of this paper is to learn about the effects of agricultural energy consumption, agriculture value added, agricultural land and fertiliser consumption on environmental pollution in Visegrad countries. The research employs panel data from long-run models FMOLS and DOLS, covering the period from 1995 to 2020. The study suggests that there is a positive and statistically significant correlation between CO_2 emissions from agriculture in Central and Eastern European countries, and factors such as higher energy consumption, increased value from agricultural production, greater fertiliser consumption, and larger arable land areas. The FMOLS and DOLS models' long-term coefficients suggest that energy consumption in agriculture and crop area are the main factors contributing to the increase in CO_2 emissions from agriculture in the studied countries. The study recommends a sustainable energy transformation of agriculture by limiting the use of fossil fuels in agricultural production and reducing share of arable land.

Keywords: agriculture, CO_2 emissions, Visegrad Group, panel methods, energy.

Wpływ rolnictwa krajów Grupy Wyszehradzkiej na emisję CO_2. Dowody z badania empirycznego danych panelowych przy wykorzystaniu metody FMOLS i DOLS

Streszczenie

Głównym celem artykułu jest poznanie wpływu zużycia energii w rolnictwie, wartości dodanej w rolnictwie, zużycia gruntów rolnych i nawozów na zanieczyszczenie środowiska w krajach Grupy Wyszehradzkiej. W badaniu wykorzystano długookresowe modele danych panelowych FMOLS i DOLS, obejmujące okres od 1995 do 2020 roku. Wyniki badania wskazują, że istnieje pozytywna i statystycznie istotna korelacja między emisją CO_2 z rolnictwa w krajach Europy Środkowej i Wschodniej a czynnikami takimi jak wyższe zużycie energii, zwiększona wartość produkcji rolnej, większe zużycie nawozów i większe obszary gruntów ornych. Długoterminowe współczynniki modelu FMOLS potwierdzają, że zużycie energii w rolnictwie i powierzchnia upraw są głównymi czynnikami wzrostu emisji CO_2 z rolnictwa w badanych krajach. W oparciu o wyniki badania zaleca się zrównoważoną transformację energetyczną rolnictwa poprzez ograniczenie wykorzystania paliw kopalnych w produkcji rolnej i rekultywację części gruntów.

Słowa kluczowe: rolnictwo, emisja CO_2, Grupa Wyszehradzka, metody panelowe, energia.

dr Elżbieta Pohulak-Żołędowska[1] ⓘ
Department of Economics and Economic Policy
Faculty of Economics and Finance
Wroclaw University of Economics and Business

dr Agnieszka Wójcik-Czerniawska[2] ⓘ
Collegium of Management and Finance
Department of Local Government Economics and Finance
SGH – Warsaw School of Economics

Impact of regulation on investment crowdfunding[3]

Introduction

　　The regulation of the financial market, which ensures its clarity of operation and the efficiency of its mechanisms, is undoubtedly a tool that has a strong impact on the competitiveness and innovation of this market and on the position of the financial services players within it. The development of digital technologies has led to the emergence of a whole group of new financial services, generally referred to as FinTech, which have become widespread. The presence of financial innovation in economies improves the position of market participants in terms of access to capital and can therefore lead to improved livelihoods, increased innovation in the economy in general and improved economic conditions. As examples from developed countries show, this is possible. Financial innovations (such as investment crowdfunding) democratise investment, reduce barriers to accessing capital and support the development of innovative businesses. They can therefore contribute to the creation of a dynamic, innovative society, and thus, to economic growth.

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[1] Correspondence address: Department of Economics and Economic Policy, Faculty of Economics and Finance, Branch in Jelenia Góra, ul. Nowowiejska 3, 58-500 Jelenia Góra; e-mail: elzbieta.pohulak-zoledowska@ue.wroc.pl. ORCID: 0000-0002-8267-3705.

[2] Correspondence address: Department of Local Government Economy and Financing, SGH Warsaw School of Economics, ul. Madalińskiego 6/8, budynek M, 02-513 Warszawa; e-mail: awojci5@sgh.waw.pl. ORCID: 0000-0002-9612-1952.

The capital market has undergone significant changes in recent years, driven by increasing digitalisation and the widespread use of innovative solutions. One of the most notable changes is the dynamic development of alternative financing methods, such as crowdfunding. Crowdfunding has recently attracted the interest of a large number of investors and entrepreneurs. The potential of crowdfunding has been recognised by both charity fundraisers and businesses seeking investors (as well as by investors themselves). The investment nature of the tool is mainly used in equity and loan crowdfunding. The question of the need for and extent of regulation of markets is a constant concern for legislators. The European crowdfunding market, hitherto heterogeneous in terms of regulation, already has common regulations. However, the level of development of the various national markets differs, as they have developed autonomously so far, based on national guidelines. The US, China and the UK all have different levels of crowdfunding market development – and the common denominator for these differences is regulation. National regulations are designed to ensure the safety and transparency of the market and to build trust. Some countries have taken a very liberal approach to equity crowdfunding, while others are very protectionist.

The purpose of this article is to analyse the existing regulatory environment in developed market economies such as the UK and the US, which are leaders in the alternative finance market, and to try to assess whether the pan-European equity crowdfunding regulations that are being introduced have the potential to create a European equity crowdfunding market.

Regulating innovation in financial services – a literature review

Innovation, by definition, changes the existing order of things. They are a source of both profit and uncertainty. The emergence of innovations in financial markets heralds growing prosperity on the one hand, but frequent abuse on the other. A spontaneous new order develops freely only at the beginning of its existence. In contrast, a new, evolving, and informal phenomenon always gives rise to moral hazards. Effective financial market regulation is crucial for its innovation and the future position of the sector's companies in the financial services industry. It ensures transparency, clarity and efficiency, leading to prosperity for the economy.

References to the creation of regulation in financial markets in the context of social welfare can be found in the literature. E. Hippel (2005) speaks of an increase in social welfare only when both users and producers innovate. J. Y. Campbell *et al.* (2011) analyse financial market regulation from the perspective of consumer safety and financial protection. They understand regulation through the lens of neoclassical market failures. The list of market failures refers to traditional failures – externalities, information asymmetries, market power and coordination failures

such as those that arise in public goods. In their analysis, these authors support the theory that regulation is needed when a lack of trust disqualifies a financial product with positive opinions and characteristics in the eyes of consumers.

E. Avgouleas (2015), on the other hand, points out that while there are huge welfare benefits associated with the introduction of financial innovations, there is also a dangerous side to their use, the most significant of which is fraud. This means that financial innovation has always been both a tool for increasing wealth and a driver of major financial crises. He argues that in recent years, regulatory reforms in response to financial innovation have sought to bring standardisation and uniformity, making little distinction between good and bad innovations.

Michalopoulos *et al.* (2009), on the other hand, show that there is a positive relationship between financial innovation and economic growth, concluding that when forms of inhibition of financial innovation are introduced, for example through legislation or regulation, this will slow down technological change and economic growth.

Supranational institutions also recognise the role of regulation in the development of financial services. The OECD published a guide in 2010 entitled *A policy framework for effective and efficient financial regulation* (OECD, 2010). For the OECD, financial regulation must be seen in the current context of financial services, the policy objectives envisaged as desirable for the well-being of financial systems and the policy instruments available.

Research methodology

Due to the subject matter of the study, which is the regulation of equity crowdfunding as well as equity crowdfunding itself, the methodology of the study consists primarily of research of source data available online. An analysis of primary data – the European Commission's Regulation 2020/1503 – was conducted, as well as secondary data from academic articles, reports, industry websites, and government websites. A literature review on the regulation of innovation in financial services was conducted. This includes the identification and review of academic articles, research reports, books, industry publications, and other authoritative sources. The literature review aims to gather comprehensive knowledge related to the regulation of equity crowdfunding, covering various dimensions such as weaknesses, best practices, regulatory frameworks and best practice case studies. By analysing existing research and insights, this step aims to establish a contextual understanding of the topic. Once relevant literature and sources have been identified, the next step involves gathering and synthesising data and information from these sources. This includes extracting key findings, statistics, trends and expert opinions related to the issues of equity crowdfunding

regulation. This synthesis of information helps to define an appropriate benchmark for the regulation of European crowdfunding, identifying patterns and challenges for effective, and pro-development regulation.

<div align="center">ALTERNATIVE FINANCE – CASE OF EQUITY CROWDFUNDING</div>

Crowdfunding is an innovation in the financing of early-stage companies. It enables start-ups and growing companies to effectively conduct a 'mini-IPOs', offering shares to the general public under a limited disclosure regime. Instead of issuing a full prospectus, they provide a simplified document that sets out the financial health of the company for potential investors.

A broad definition of crowdfunding encompasses the process of financing various ideas, initiatives or plans via online platforms by individuals and companies. It is one of the alternative methods of funding start-ups and SMEs, which has seen its rapid growth especially in the years just after the 2008 financial crisis. The market defines four basic types of crowdfunding: debt-based, equity-based, reward-based, and donation-based models. The first two models are also known as investment types of crowdfunding, while the latter two do not offer any form of financial return. As the crowdfunding market develops, the terminology becomes clearer. The literature cites a taxonomy developed by the Cambridge Centre of Alternative Finance (CCAF). According to the CCAF report (CCAF, 2020), 14 different alternative finance models have been adopted, which are grouped into three main categories: debt models, equity models and non-investment models.

The breakdown of alternative funding sources, according to the CCAF taxonomy, is as follows (Ziegler et al., 2020):
1. Debt models
a. P2P – loans
   – consumer loans
   – business loans
   – loans against property
b. balance sheet loans
   – consumer loans
   – business loans
   – loans against property
c. invoice trading
d. collateral (securities)
   – debt-based
   – mini bonds
2. Capital models
   – capital-based

    – property-based
    – profit-sharing
3. Non-investment models
    – reward-based
    – donation

This classification system helps to distinguish between types of alternative financing models as forms of capital raising. According to this taxonomy, equity crowdfunding models are typically associated with investing in unlisted shares or securities of SMEs (Deloitte, 2021).

In 2020, the largest regional alternative market was the United States and Canada (USD 73.93 billion) with the US being the largest national market with USD 73.62 billion, which accounted for 65% of global online alternative finance market volume. This is followed by the UK (USD 12.64 billion), Europe excluding the UK (USD 10.12 billion), the Asia Pacific excluding China (USD 8.90 billion), Latin America and Caribbean (USD 5.27 billion), Sub-Saharan Africa (USD 1.22 billion), China (USD 1.16 billion) and Middle East and North Africa (USD 0.59 billion) (Ziegler et al., 2020).

Equity crowdfunding is categorised as an alternative fundraising instrument and, like other alternative funding instruments, is characterised by the following features (Klimontowicz, Harasim, 2015, pp. 228–229):
– the way and place of trading, which are various types of trading platforms,
– simple and transparent financial transaction procedures,
– the absence of regulatory constraints specific to the financial sector, particularly the banking sector,
– lack of protection for the participants in a sale and purchase transaction.

Both investors and borrowers in equity crowdfunding are exposed to quite a few risks present in the crowdfunding ecosystem. The risks are broadly divided into two groups: direct and indirect. Direct risks for backers include project failure, platform closure, fraud and lack of exit options. Risks related to uneducated investors and money laundering are also highlighted. Indirect risks, on the other hand, include cyber-attack, theft of personal data and lack of transparency (Deloitte, 2021).

Alternative funding sources are increasing their importance in the corporate finance ecosystem. The global crowdfunding market was valued at USD 1.9 bn in 2021 and is projected to reach USD 6.8 bn in 2031, growing at a 14.3% CAGR over 2022–2031 (WWW1, http). Also, the share of capital crowdfunding (equity and loan crowdfunding) is projected to grow over the assumed time horizon.

Governments can actively support the development of alternative forms of business finance using a number of tools: by implementing supportive policies and regulations, and through tax incentives for individuals and organisations that invest in crowdfunding projects. Governments also create legal frameworks for

crowdfunding. Such regulations help to ensure that crowdfunding investments are legal and investors' funds are protected (WWW1, http).

Regulatory framework for alternative funding sources

The approach of regulators to the issue of regulating equity crowdfunding varies from country to country. This has different implications for the development of each national financial ecosystem. Some countries have taken a very liberal approach to equity crowdfunding, while others are very protectionist. The more protectionist regulators have significantly stifled the development of their equity crowdfunding markets, while the more liberal regimes have proven to be more effective through self-control driven by competitive pressures coming from the platforms.

In 2019, the Cambridge Centre for Alternative Finance, together with the World Bank, conducted a study entitled: *Regulating Alternative Finance* (World Bank, 2019). The study sought to understand the global regulatory landscape for alternative finance by collating empirical data from regulators. Focusing on peer-to-peer (P2P) lending, equity crowdfunding and initial coin offerings (ICOs), the study aimed to provide a comprehensive and comparative analysis of how regulators in both developing and developed economies regulate alternative finance. The survey covered 111 jurisdictions from around the world, with 40 per cent of respondents from high-income countries and 30 per cent each from middle- and low-income countries, respectively (World Bank, 2019).

The survey findings clearly show that economies of all income groups are positive about the potential of alternative finance to improve SME and consumer access to finance (79% of respondents from high-income countries, 65% from middle-income countries, 65% from low-income countries), as well as to stimulate competition in financial markets (68%). These expectations are in line with the new priorities of regulators, including financial inclusion or support for competition (World Bank, 2019, p.8). Alternative finance is generally not formally regulated. Only 22% of jurisdictions surveyed formally regulate P2P lending, 39% of jurisdictions regulate equity crowdfunding and 22% regulate ICOs. Where regulation does exist – in some cases, this means that a pre-existing regulatory framework is in place (e.g. for securities), while more often alternative finance is subject to a specific regulatory framework dedicated to it (12% of P2P countries, 22% of ECFs, 12% of ICOs). These regulations are new or adapted from other countries.

Although there is no legislative compulsion, in order to ensure transparency of the market, clarity of its rules and mitigation of risk for investors, entrepreneurs and platforms, most of the countries surveyed have introduced regulations for

equity crowdfunding in 2021/22. A very important driver of global regulatory change is regulatory benchmarking. It is used by more than 90 per cent of regulators when reviewing regulations for alternative finance, and lessons from analysing regulations present in other countries' regulations, have driven regulatory change more often than any other factor. There are global leaders that form the backbone of existing regulation; they serve as the core for benchmarking. These are: the UK, the US and Singapore among the high-income countries, constituting the top three, while representatives of emerging markets such Malaysia, the UAE or Mexico are also in the top 10 leaders.

The regulation of the rules of alternative funding sources has several objectives. These are primarily:
– ensuring large-scale security of the sector,
– the adaptation of the sector to the mass market, including both individual inve-stors, and small and medium-sized enterprises;
– AML (Anti-money Laundering) and KYC (Know your Customer)
– protection against misleading promotions or misuse of customers' money.

The regulation of equity crowdfunding and P2P is prescriptive in nature, with the new regulations imposing more obligations on entities than is the case of pre-existing regulations. The bespoke framework tends to prioritise investor exposure controls, rigorous due diligence on fundraisers, protection of client money and appropriate online marketing standards.

European leader – crowdfunding in the UK

Reflecting its leadership in the financial technology or 'fintech' space, the UK has the world's most developed equity crowdfunding industry (ECUK, 2015). The UK equity crowdfunding industry has witnessed increased competition over the past decade. The number of active platforms has increased from four in 2010 to 13 in 2017 (Estrin, Gozman, Khavul, 2018) and 16 in 2022. Regulations were also introduced by the Financial Conduct Authority (FCA) in March 2014 to protect consumers without preventing effective competition. Equity crowdfunding investors are divided into: (i) 'restricted' – retail investors who do not invest more than 10% of their net assets in unquoted equity or debt securities; (ii) 'advised' – investors who receive investment advice from independent financial advisers; (iii) 'sophisticated' – such as professionals and business angels; and (iv) 'wealthy' – investors with an annual income of £100,000 or more or net assets of £250,000 or more (WWW2, http).

The United Kingdom remained the main contributor to the European alternative finance volume, though accounting for a smaller market share over time. In isolation, the UK market accounts for the third largest market in 2019

and the second in 2020. The UK online alternative finance market has reported consistent annual growth in market volume over the past five years, growing from USD 4.9 billion in 2015 to USD 12.6 billion in 2020 and, despite disruptions such as the COVID-19 pandemic and Brexit, the UK alternative finance market grew from USD 11 billion in 2019 to USD 12.6 billion in 2020 (Ziegler et al., 2020).

In 2020, there were 433 ECF campaigns in the UK, raising over £332m from more than 283,000 investors; the highest number of successful campaigns and the second highest amount of capital raised in a single year (Report, 2020). As the UK recovers from the COVID-19 pandemic, while facing the challenges of Brexit, SMEs' reliance on crowdfunding success will grow (Vu et al., 2023).

The UK's Financial Conduct Authority has taken a fairly relaxed approach to the oversight of crowdfunding. However, despite the UK's lax regulations, crowdfunding platforms continue to closely monitor companies that are looking to partner with them to run a crowdfunding campaign. Platforms believe that it is in their own interest to build a reputation for quality in order to build trust with their investor base. It is these commercial realities, rather than strict regulation, that are the secret to the UK's success (WWW3, http).

The progress of the UK market has also been boosted by the very attractive tax incentives offered under the Seed Enterprise Investment Scheme for early-stage seed companies and the Enterprise Investment Scheme (EIS) for slightly more mature start-ups. These tax breaks for investors allow those contributing to a qualifying crowdfunded company to offset their investment against their existing tax liability.

Global crowdfunding leader – the US

In 2020, the US became the largest alternative finance market in the world with 65% of the global market share. The total US volume reached USD 73.62 billion in 2020, growing 43% year-on-year from USD 51.52 billion in 2019. Currently, the primary piece of legislation governing the raising of equity capital on online platforms is a package of laws designed to support micro-entrepreneurship, called The Jumpstart Our Business Startups Act (JOBS) approved in April 2012. (WWW4, http). JOBS required the US Securities and Exchange Commission to set out the rules and regulations necessary to implement the intent of the act. Regulations relevant to the development of crowdfunding are contained in Part Two (Title II Access to the Capital for Jobs Creation) and Part Three (Title III Crowdfunding) – these parts of the JOBS are considered the most relevant to the raising of funding by start-ups and to the development of crowdfunding. Among the most important legal changes related to the enactment and implementation of JOBS are the regulations for crowdfunding and the facilitation of the IPO process for growth companies (Kordela, 2016).

US-based companies can use crowdfunding portals to raise up to USD 1.07 million – an amount that increases annually with inflation – in any 12-month period. The relatively low amount of capital allowed under Title III crowdfunding limits the use of equity crowdfunding to very early-stage companies.

Notably, investment companies and special purpose financial vehicles cannot use the US Title III regime – as opposed to the UK approach. This means that Title III crowdfunding only applies to direct corporate investments and not to managed funds, such as those that would manage several companies in a single investment vehicle.

Alternatives to Title III crowdfunding are also available, such as Reg A+ and Reg D offerings, which are more akin to raising capital in the form of a "light public offering" rather than the limited disclosure offering documents for which equity crowdfunding is best known.

The regulation of crowdfunding applies to the issuer who sells the securities; the intermediary who operates the platform through which those securities are sold; and the investors who buy the securities (Cumming, Hornuf, 2018). It can be seen that this regulation imposes significant obligations on issuers, intermediaries, and investors. While the incentive to protect investors is worthwhile, the costs of regulation may be too high for many small business offerings. Thus, it should be noted that US crowdfunding regulation focuses on capital formation rather than investor protection.

Crowdfunding regulations in EU

The EU crowdfunding regulation was proposed in 2018 as part of the FinTech Action Plan, part of the European Commission's strategy to make financial markets more relevant through the use of cutting-edge technologies such as blockchain and artificial intelligence (European Commission, 2018). To date, crowdfunding in individual countries has developed within the framework of national regulations.

The introduction of uniform regulations for the entire European Union crowdfunding market (EU, 2020) was linked to the identification of significant differences in the development of the European crowdfunding market compared to crowdfunding operating in other developed countries of the world (such as the US, China or Singapore). The main problem of European crowdfunding was the weak cross-border activity caused primarily by the lack of common laws and regulations, resulting in high compliance costs that hindered the wider expansion of crowdfunding platforms in Europe (Rau, 2020). Cross-border crowdfunding activity in the EU amounted to 0.73% of the total amount raised through crowdfunding in 2013–2014.

The EU's crowdfunding regulation 2020/1503 entered into force on 10 November 2020 and is effective from 10 November 2021 with an additional

transition period of 12 to a maximum of 24 months for crowdfunding providers to obtain authorisation to provide crowdfunding services based on loans and (equity) investments (Article 48). Crowdfunding providers are required to act as neutral intermediaries (Article 8), handle customer complaints (Article 7) and appoint effective and prudent management to conduct credit risk assessments of crowdfunding projects, including a minimum level of due diligence on project owners (Articles 4–5). They are subject to various prudential requirements (Article 11).

To ensure investor protection, the maximum amount that can be raised in a single crowdfunding project is €5 million (Article 49). The regulation distinguishes between sophisticated and unsophisticated investors by means of an initial knowledge test and a simulation of the capacity to bear losses (Article 21), with additional protection clauses such as explicit risk warnings, and a four-day pre-contractual reflection period during which a potential unsophisticated investor can cancel the investment offer (Article 22). Potential investors must be provided with a maximum 6-page key investment information sheet, including detailed project features and a potential financial risk warning, drafted by the project owner and reviewed by crowdfunding providers (Article 23).

Crowdfunding platform service providers cannot accept deposits (Article 10) and cannot act as trading venues. Instead, they may operate a bulletin board that allows their customers to advertise their interest in buying and selling loans, marketable securities or permitted instruments for crowdfunding purposes that were originally offered on their crowdfunding platforms (Article 25) (Bajakić et al., 2021).

The regulation introduced affects all three parties in the crowdfunding process: the CF funding providers (platforms), investors, and project owners. A summary of the impact of regulation on crowdfunding participants is provided in Table 1.

Table 1. Impact of crowdfunding regulation 2020/1503 on crowdfunding participants

Requirements for crowdfunding platforms
1. All European crowdfunding providers must undergo a licensing process and submit to supervision by their local financial regulator. This will give a locally-issued crowdfunding licence the hallmark of a European licence – enabling aspiring crowdfunding platforms to rapidly develop and provide services across all EU member states. There will be a transitional period until November 2023 for current crowdfunding providers to allow them to become regulated.
2. Crowdfunding providers are required to implement a wide range of well-documented business processes, including customer complaint handling procedures, due diligence procedures and risk assessment and management procedures
3. All crowdfunding providers are required to ensure that their services are suitable for non-advanced investors by implementing investor knowledge tests.

4. All crowdfunding providers operating with customer accounts and wallets are required to obtain an additional European Payment Institution licence or outsource all their payment services to external payment institutions.
Requirements for project owners:
1. An impeccable business history, no criminal record and no violations of commercial, insolvency, anti-money laundering and financial regulations.
2. Provide its potential investors with a highly standardised information sheet, the Key Investment Information Sheet.
Requirements for investors:
1. All investors who are not advanced must pass a knowledge test to ensure they understand the specifics of crowdfunding. Investors are required to pass the test at least once every two years.
2. Advanced investors do not need to pass the test, assuming they are aware of the risks involved in investing in crowdfunded projects.

Source: (Crowdfunding…, http).

Conclusions

Institutions play a crucial role in fostering crowdfunding by providing a supportive environment, building trust, and facilitating the growth of crowdfunding platforms. One of the most important institutions is regulation and compliance. Government regulatory bodies, play a vital role in establishing and enforcing regulations for crowdfunding platforms. Clear regulatory frameworks help build trust among investors and fundraisers, ensuring a fair and secure crowdfunding environment.

There is no doubt that crowdfunding has now established itself firmly on the international stage. Equity crowdfunding, on the other hand, has been recognised as an important form of funding for start-ups and young SMEs. It is the share of future profits that is the primary motivation for investors in this form of crowdfunding. The intensive development of this form of financial services market must be supported by effective regulation. A lack of rules, or too much liberalism in setting rules, can result in market failures – for the financial services market, the greatest danger is fraud, embezzlement, and financial pyramids. For financial services markets of the digital age – cyber-attacks. Conversely, 'over-regulation' or overly restrictive regulation – results in the market not developing according to its potential. So, what should the regulation be?

This article presents the UK and the US regulations as a reference for effective crowdfunding regulation in the EU. These are solutions that are proven in mature markets with a well-established and large role for alternative finance in corporate financing and can serve as a benchmark for European solutions.

To sum up – institutions contribute to the success of crowdfunding by providing a regulatory framework, protecting investors, offering financial infrastructure, promoting education, supporting research, fostering collaboration, and creating awareness. Their involvement helps establish a reliable and trustworthy environment for crowdfunding to thrive.

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Summary

This article focuses on the regulation of investment crowdfunding as a key criterion for the dynamic but safe development of this form of business financing. The aim of this article is to analyse the existing regulatory framework in developed market economies, such as the UK and

the US, which are the leaders in the alternative finance market, and to try to assess whether the pan-European equity crowdfunding regulations that are being introduced have a chance of enabling the European equity crowdfunding market to emerge. Crowdfunding, and in particular investment crowdfunding, is a relatively new form of alternative financing for business activities, which can and – in its mature form – does provide an important source of funding that 'fills the gap' in early-stage financing for start-ups, innovative projects and is also a source of financing for SMEs. The intensive, uncontrolled development of innovation in financial markets generally leads to irregularities (fraud, abuse, and crises). In turn, excessive and restrictive regulation can act as a brake on the development of financial innovation. Until 2023, crowdfunding in EU countries will be regulated only by national laws, most of which are not specific to this form of financing. The fragmentation of the European market and the inconsistency of regulations have led to a slowdown in the development of this form of financing, resulting in a loss of development potential for companies and entire economies. The authors present the equity crowdfunding regulations of the US and the UK – the world's number 1 and 2 crowdfunding markets – as a benchmark for the proposed pan-European regulations. The features of the common European rules seem to meet the requirements. And the increase of the funding amount to EUR 5 million opens up completely new possibilities for equity crowdfunding.

Keywords: equity crowdfunding, alternative finance, regulation, financial innovation.

Wpływ regulacji na crowdfunding inwestycyjny

Streszczenie

Artykuł porusza tematykę regulacji crowdfundingu inwestycyjnego jako kluczowego kryterium dynamicznego, lecz bezpiecznego rozwoju tej formy finansowania działalności przedsiębiorstw. Celem artykułu jest analiza istniejących uwarunkowań regulacyjnych stosowanych w rozwiniętych gospodarkach rynkowych, jak Wielka Brytania i USA, które są liderami rynku finansowania alternatywnego, i próba oceny, czy wprowadzane paneuropejskie regulacje crowdfundingu udziałowego mają szansę sprawić, że powstanie europejski rynek crowdfundingu udziałowego. Crowdfunding, a w szczególności crowdfunding inwestycyjny to stosunkowo nowa forma alternatywnego finansowania działalności przedsiębiorstw, która może stanowić, i w dojrzałych swoich formach stanowi, istotne źródło środków finansowych, które „zapełniają" lukę wczesnego finansowania start-upów, innowacyjnych projektów, a także MSP. Intensywny niekontrolowany rozwój innowacji na rynkach finansowych z reguły prowadzi do powstania nieprawidłowości (oszustw, nadużyć, kryzysów). Z kolei nadmierna i restrykcyjna regulacja może działać hamująco na rozwój innowacji finansowej. Crowdfunding w krajach Unii Europejskiej do 2023 roku był regulowany jedynie na mocy krajowego ustawodawstwa, przeważnie niededykowanego dla tej formy finansowania. Fragmentacja europejskiego rynku i niespójność przepisów spowodowały zapóźnienie rozwoju tej formy finansowania, a przez to utratę potencjału rozwojowego przez przedsiębiorstwa i całe gospodarki. Autorki przedstawiają regulacje crowdfundingu udziałowego stosowane w USA i Wielkiej Brytanii – kraje te są numerami 1 i 2 światowego crowdfundingu, jako benchmark dla projektowanych regulacji paneuropejskich. Wspólne europejskie regulacje wydają się realizować stawiane wobec nich wymagania, zaś zwiększenie kwoty finansowania do 5 mln EUR otwiera przed crowdfundingiem udziałowym zupełnie nowe możliwości.

Słowa kluczowe: crowdfunding udziałowy, finanse alternatywne, regulacje, innowacje finansowe.

dr Rafał Pitera[1]

Department of Finance and Accounting
Institute of Economics and Finance
University of Rzeszów

dr Alig Baghirov[2]

Research Center for Monetary Economics
Azerbaijan State University of Economics (UNEC)
Baku, Azerbaijan
PhD Candidate at Istanbul University
Economics Department
Turkey

Investigation of the efficiency of the Azerbaijan banking system with Data Envelopment Analysis (2015–2019)

INTRODUCTION

In the banking efficiency literature, two main approaches are prominent for selecting inputs and outputs for a bank. The first is the production approach, also known as the service delivery or value-added approach, which treats banks as organisations that provide services to customers. This approach offers a framework for evaluating the scope, quality and efficiency of the services provided by banks. The second is the intermediation approach, also known as the asset approach, which assesses banks based on their ability to manage assets and resources effectively. This approach focuses on measuring the financial intermediation functions of banks and the efficiency of these functions. While both approaches apply traditional microeconomic theory to the measurement

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[1] Correspondence address: ul. Ćwiklińskiej 2, 35-601 Rzeszów; e-mail: rpitera@ur.edu.pl. ORCID: 0000-0001-9598-1240.

[2] Correspondence address: Research Center for Monetary Economics, Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan; e-mail: aliq.bagirov@unec.edu.az. ORCID: 0000-0003-3016-165X.

of banking system efficiency, they differ in how they address the characteristics of banking activities (Humphrey, 1985; Hjalmarsson et al., 2000). For instance, the production approach developed by Benston views banks primarily as service providers. It emphasises analysing the scope, quality and efficiency of the services offered by banks, thereby measuring bank performance through the effectiveness and quality of these services (Benston, 1965). According to this approach, output is understood as the scope of services provided to customers and can be most accurately measured by the number and variety of transactions, the volume of documents processed or specialised services provided in a given period. This method provides a comprehensive understanding of both service efficiency and customer loyalty. However, in the absence of detailed process flow data, a measurement based solely on the number of deposit and loan accounts may lead to erroneous results. By focusing on the number of accounts, this approach may ignore important aspects of customer satisfaction and operational efficiency, rather than accurately reflecting the quality or level of service provided. In this approach, inputs include physical variables (such as labour, materials, space or information systems) and their associated costs, focusing solely on operating costs while completely ignoring interest expenses (Kumar, Gulati, 2008).

The brokerage approach proposed by Sealey and Lindley views banks as financial intermediaries that facilitate the transfer of funds between depositors and creditors. In this approach, banks provide brokerage services by collecting deposits and other liabilities and allocating them to interest-bearing assets such as loans, securities and other investments. Unlike the production approach, this method includes deposits as inputs, taking into account both operating costs and interest expenses (Sealey, Lindley, 1977).

Berger and Humphrey argue that no single approach fully captures the dual function of banks, namely their role as both transaction/document processing service providers and financial intermediaries. However, they contend that the intermediation approach is better suited for analysing bank-level efficiency, while the production approach is more appropriate for measuring branch-level efficiency. The reason for this distinction is that bank management aims to reduce not only non-interest expenses, but also total costs – whereas at the branch level, there are numerous customer service activities, and branches generally do not have direct control over the bank's financing and investment decisions (Berger, Humphrey, 1997).

In this context, this study investigates the relative efficiency of banks in Azerbaijan using an intermediation approach with data from 2015 to 2019. The analysis includes 25 banks operating in Azerbaijan for which data is available. The primary objective is to evaluate how the efficiency of Azerbaijan's banking sector has developed over this period and to identify which banks are efficient and which are not. Additionally, the study recommends that inefficient banks adopt best practices from more efficient banks and optimise their input-output strategies to enhance

overall performance. In this study, two different models were used to assess the efficiency of banks: the Charnes, Cooper and Rhodes (CCR) model, with constant returns to scale, and the Banker, Charnes and Cooper (BCC) model, with variable returns to scale. The CCR model operates under the assumption of constant returns to scale, while the BCC model assumes variable returns to scale. These two models provide a comprehensive evaluation of banks' performance. Additionally, the Super Efficiency scores of active banks were calculated in the study. These scores help to analyse the efficiency of banks in more detail compared to other banks. The input variables for the efficiency analysis include interest expenses, personnel expenses, general/special expenses and deposits, while the output variables are loans, interest income and non-interest income. All data is presented in Azerbaijani Manats (AZN), which is important for accurately reflecting local economic conditions and the financial situation of the banking sector. This approach allows for a thorough examination of both the internal and external efficiency performance of banks.

This study provides a comprehensive examination of efficiency analysis. Initially, a literature review was conducted to gather fundamental information about the efficiency of the banking sector based on existing studies. In the second section, the theoretical background of the methods used to analyse banking sector efficiency is explained in detail. This section establishes the theoretical framework necessary for the study by presenting the background of the methodologies employed in the analysis. The third section introduces the banks included in the study and the input and output variables used in the efficiency analysis. This section clarifies the structure of the data set and the criteria used in the analysis. In the fourth section, the results of the efficiency analysis are presented and discussed in detail. The findings include an analytical review of the data obtained to evaluate the performance of the banks, as well as various graphs and tables, to illustrate the implications of the results. Finally, the fifth section includes the discussion and conclusions. This section offers a general evaluation based on the findings, discusses the implications of the results for the banking sector, as well as relevant policies, and presents the limitations of the study along with suggestions for future research.

Literature review

There are many efficiency analyses in the literature to examine the banking sector. Most of these studies focused on the selection of the model and variables to be applied in the research.

In the study conducted by Drake, Hall and Simper (2009), the efficiency of the Japanese banking system was investigated with Data Envelopment Analysis by using total deposits, total operating expenses, total provisions, total non-interest expenses, total other operating expenses as inputs and total loans, total other earning

assets, net commission, fee and trading income, other operating income and net interest income as outputs.

In the study published by Küçükaksoy and Selcan (2013), the balance sheet and income statement data for the years 2004 and 2011 of 10 private capital deposit banks and five foreign capital deposit banks operating in the Turkish banking sector between 2004–2011 were analysed using the Data Envelopment Analysis model. Three input variables (total deposit, interest expenses and personnel expenses) and two output variables (total loan and interest income) were used. As a result of the study, it was determined that seven banks in 2004, 2005, 2008, 2010 and 2011, six banks in 2006, eight banks in 2007 and five banks in 2009 were technically efficient under the assumption of variable returns to scale.

Yuksel, Mukhtarov and Mammadov (2016) measure and compare, using Data Envelopment Analysis, the efficiency of the 10 largest banks operating in Turkey and Azerbaijan between 2010–2014. In their study, five inputs (total assets, total equity, total deposits, number of personnel, interest expenses and number of branches) and three outputs (net income, interest income and non-interest income) were used. As a result of the study, it was determined that Turkish banks are more efficient than Azerbaijani banks. Turkish banks were efficient, except for Turkey Ekonomi Bank in 2011; four Azerbaijani banks were efficient throughout the years, and the other six banks were found to be inefficient for some years.

In the study of Beridze and Anbar (2019), the efficiency of 15 commercial banks operating in the banking sector between 2013–2017 was examined using Data Envelopment Analysis. The variables of total deposits, total capital and total expenses were used as input, while total loans, total income and net profit were used as output variables. As a result, it was determined that the efficiency levels of banks were generally high, with five banks being fully efficient in each year of the analysis period. It was observed that efficiency in the banking sector of Georgia tended to increase in 2013–2015 and decline in 2016–2017.

Dutta, Jain and Gupta (2020) analysed the performance of non-banking financial companies (NBFCs) in the Indian context by using data envelopment analysis. In the first stage, panel data for the years 2014–2018 were taken to calculate super efficiencies, and in the second stage, in order to find exogenous factors significantly affecting the model, Tobit regression analysis was used. As a result of the study, where total assets and employee cost are considered as input, interest income, non-interest income and operating profit as output, according to traditional models, the total number of efficient decision-making units is eight out of 43, and considering the Super Efficiency algorithm, 15 units were found. Malmquist Indices, productivity indices of NBFCs over five years, were found to have a maximum productivity increase of 8.53%.

Hammami *et al.* (2022) applied Data Envelopment Analysis and Euclidean common set of weights (ECSW) ranking to the banking sector in the Euro Area

from 2014 to 2018. A data set for 59 of 67 banks traded in 17 countries was obtained. In the study, deposits, number of employees and operating costs are used as input variables, while operating income and total assets are used as output variables. As a result of the ECSW approach, it was observed to perform better than other common weight approaches in terms of ranking consistent with banks' credit ratings, as well as in both numerical and real-life examples.

Tsionas (2020) measured the efficiency of 285 banks in the USA by using the DEA method. In the study, consumer loans, property loans, commercial and industrial loans and securities are considered as input variables, and the labour force (number of full-time equivalent employees), physical capital, funds purchased, interest-bearing transaction accounts and non-transaction accounts are considered as output variables.

Čiković, Keček and Cvetkoska (2023) investigated the impact of the COVID-19 pandemic on the performance of banking systems in Western Balkan countries using Data Envelopment Analysis (DEA) based on the data of commercial banks in six developing Western Balkan countries (North Macedonia, Serbia, Montenegro, Bosnia and Herzegovina, Kosovo and Albania) for the period 2016–2020. The output-oriented DEA model was implemented using interest expenses and non-interest expenses as inputs, and interest income and non-interest income as outputs. According to the results of the analysis, the average efficiency of the banks in the six Western Balkan countries included in the analysis has varied across these years, with Kosovo banks exhibiting the highest performance and Bosnia and Herzegovina banks the lowest. The COVID-19 pandemic had a negative impact on the banking sector in the six Western Balkan countries, except Kosovo (Čiković et al., 2023).

In the study conducted by Li *et al*. (2020), the efficiency of 32 banks operating in China between 2014–2018 was analysed by using three inputs – number of employees, fixed assets and operational cost(s), and two outputs – interest income and non-interest income.

Balci and Ayvaz (2020) measured the efficiency of 15 deposit banks operating in the Turkish banking sector between 2014–2018 using Data Envelopment Analysis on three public, six private and six foreign deposit banks, along with the Malmquist index. As inputs, personnel expenses/total assets (%), total loans/total assets (%), equity/total assets (%) and total deposits/total assets (%) were used, and as outputs, earning power of assets (net profit/total assets) and earning power of equity (net profit/equity) (%) were used to analyse the efficiency of banks. As a result of the study, four banks were found to be efficient under the assumption of constant returns to scale, and eight banks were found to be efficient under the assumption of variable returns to scale between 2014–2018.

S. Yagubov and U. Yagubov (2020) investigated the efficiency of 10 commercial banks with the highest total number of assets in Azerbaijan in 2016,

using the Data Envelopment Analysis method for the period 2011–2016. Three inputs (total assets, total equity and interest expenses) and two output variables (interest income and net profit) were used in the study, employing the CCR (Charnes, Cooper and Rhodes) model. As a result of the study, it was determined that only Turan Bank was efficient in the period before the devaluation that took place in 2015, while the banks in the post-devaluation period were generally efficient, with Pasha Bank achieving the highest efficiency.

The reviewed literature provides an overview of CCR, BCC and Super Efficiency models used in banking sector efficiency analysis. It highlights that variations in efficiency levels among banks are influenced by economic conditions, regulatory changes and internal management practices. The current research emphasises the importance of selecting appropriate models and variables in context and aims to develop a deeper understanding of banking efficiency dynamics and contribute to the existing literature.

Research methodology

The subject of the study is to evaluate the efficiency of 25 banks operating in Azerbaijan between 2015–2019 and to determine the efficiency of these banks. In addition, based on the results of the analysis, the aim is to identify efficient and inefficient banks and to assess whether the Azerbaijani banking system operated efficiently and effectively during these years. Therefore, in this study, three Data Envelopment Analysis (DEA) models – the CCR model, BBC model and Super Efficiency model – were used to measure the efficiency of the banks.

CCR Model

The CCR model used in the analysis was the first tool that provided the development of the DEA approach by Charnes, Cooper and Rhodes in 1978. In this method, the variable weight method is used, and the weights are created directly from the data obtained as a result of multiple assumptions, with fixed weights being avoided (Kutlar, Salamov, 2016, pp. 5–6). In determining these weights with three constraints through linear programming:
1. All data and weights included in the analysis must be positive;
2. The ratio of weighted outputs to weighted inputs should take a value between zero and one;
3. Weights must be used for all DMUs included in the model (Cooper et al., 2011, p. 13).

In the literature, these weight values are called *virtual input-output* or *virtual weights*. The weights are determined in order to maximise the efficiency rate through linear programming. The mathematical representation of the model is shown below (Cooper et al., 2011, p. 13):

$$Weights = \frac{\text{virtual output}}{\text{virtual input}} = \frac{u_1 y_{1o} + u_2 y_{2o} + \ldots + u_s y_{so}}{v_1 x_{1o} + v_2 x_{2o} + \ldots + v_m x_{mo}} \tag{1}$$

Any DMU that is efficient in the analysis made with the input-oriented CCR model is definitely efficient in the output-oriented analysis. This model is divided into two as input-oriented CCR model and output-oriented CCR model according to the control of inputs and outputs. In this analysis, the input-oriented CCR model will be discussed. The input-oriented CCR model is a model solution aimed at minimising the input level by determining the most appropriate input set to bring a certain output set to the most efficient rate (Torun, 2020, p. 47). The purpose of the CCR model is the ratio of a single virtual output to virtual input for a DMU by maximising the ratio of output and input. It provides the efficiency measure which is a function of the factors. If j is the efficiency of the decision unit h_j, the goal should be to maximise this value.

In this case, the input-oriented function can be expressed in the formula below (Charnes et al., 1978, p. 430):

$$\text{Max} h_j = \frac{\sum_{s=1}^{n} u_s y_s}{\sum_{i=1}^{m} v_i x_i} \tag{2}$$

The following constraint was imposed so that the efficiency rate of DMU does not exceed 1 (Charnes et al., 1978, p. 430):

$$\frac{\sum_{s=1}^{n} u_s y_s}{\sum_{i=1}^{m} v_i x_i} \leq 1 \tag{3}$$

The following constraint was introduced so that the weights of the inputs and outputs to be used are not negative:

$u_r \geq 0; v_i \geq 0;$

where:
j: DMU number, $j = 1,2.., r$;
s: output number, $s = 1,2\ldots n$;
i: input number, $i = 1,2\ldots m$;
y_s: j'th, the value of the s'th output produced by the DMU;

x_r : j'th the value of the r'th input produced by the DMU;

u_r : weight given to r'th output;

v_i : weight given to the i'th input (Yeşilyurt, Salamov, 2017, p.130).

　　If the efficiency scores are 1, the KVB included in the analysis is efficient; if it is less than 1, it indicates that it is not efficient (Kutlar, Babacan, 2008, p. 150).

BCC Model

　　In 1984, Banker, Charnes and Cooper conducted studies based on the assumption of returns to scale and called the BCC formulation. This model was developed on the basis of the CCR model, which is based on the assumption of constant returns to scale, and a model based on the assumption of variable returns to scale was created (Cooper et al., 2007, p. 87). The BCC method measures efficiency by considering only technical efficiency. The BCC model's efficiency score limits will always be less than or equal to the CCR efficiency score limits. As in the CCR model, the BCC model also uses two methods: input-oriented and output-oriented (Banker et al., 1984, p. 1079). In this study, the input-oriented BCC model will be used. The input-oriented BCC model was created to provide the intended output and determine the best amount of input.

　　The function of input-oriented BCC model is as follows (Banker et al., 1984, p. 1079):

$$MaxZ = \sum_{r=1}^{s} u_r y_{r0} - \mu_0$$

　　According to the following conditions: (4)

$$\sum_{i=1}^{m} v_i x_{i0} = 1 \, ; \, j = 1, \dots , n: \quad \sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} - \mu_0 \leq 0 \, ; \, r = 1, \dots , p; \, i = 1, ..., m;$$

$$u_r \geq \varepsilon \, ; \, v_i \geq \varepsilon , \qquad \mu_0 : \text{unrestricted}$$

where:

u_r : the weight given to the *r*'th output by DMU;

v_i : the weight given to the *i*'th input by DMU;

y_{r0}: *i*'th input used by DMU;

y_{rj}: *r*'th output produced by the *j*'th DMU;

x_{ij}: *i*'th input used by the *j*'th DMU;

ε : a small enough positive number;

μ_0: the return to the scale is defined as variable.

　　The efficiency value of the efficient DMUs in the Input Oriented BCC model is equal to 1. In the case of efficiency, it is impossible to make any changes to the

input and output vectors. The efficiency value of inefficient DMUs is less than 1
(Cooper et al., 2007, p. 89).

Super Efficiency

In DEA model analysis, Super Efficiency (SE) is a model that is measured in
cases where a DMU gets a value higher than 1, as not every company allows it to
be used as an equal. With the assumption of n number of DMU, each DMU_j ($j = 1$,
2, ..., n) consumes X_j input to produce Y_j output. The input-oriented Super Efficiency
DEA model, created on the basis of the basic DEA models predicted by Seiford and
Thrall (1990), can be expressed as follows (Seiford, Thrall, 1990, p. 9):

Max ρ
Restrictions

$$\sum_{\substack{j=1 \\ j \neq 0}}^{n} \lambda_j x_j \leq \rho x_0; \qquad \sum_{\substack{j=1 \\ j \neq 0}}^{n} \lambda_j y_j \geq y_0; \qquad \rho, \lambda_j \geq 0, \qquad j \neq 0; \qquad (5)$$

With this linear programming, no plug-ins are needed when Super Efficiency
is used for the CCR model, but when BCC is used for model, $\sum_{\substack{j=1 \\ j \neq 0}}^{n} \lambda_j = 1$ is added
to the model.

Here, x_0 and y_0 represent DMU_0. The model was created for the firm "j", which
is the linear programmatic-input-oriented fixed-scale return DEA expressed by
the above formula. In order to calculate the Super Efficiency scores of the "j"
company, the data of the "j" DMU is extracted from the X (N*I) and Y (M*I)
matrices. As a result, the matrices take the form of Nx (I-1) and Mx (I-1). In this
case, when linear programming is run, it cannot be part of the j-th firm's reference
boundary and, therefore, if it is a DMU that is at full efficiency limit in the original
standard DEA model, now its efficiency score is expected to be more than one.
This linear programming is calculated for each firm in the sample, and each linear
programming contains a reference set of (I-1) DMU (Coelli et al., 1998).

Determination of Decision Units and Variables

In order to meet the minimum conditions of the analysis and to reach a clear
conclusion, all banks operating in the Republic of Azerbaijan were included in the
analysis and accepted as a Decision-Making Unit (DMU). The input and output data
used in this study was collected on the basis of the banks' year-end independent audit
reports. In the analysis, efficiency scores of DMUs were calculated without making
any distinction between banks. In the study, input-oriented Data Envelopment

Analysis (DEA) was conducted for 25 banks in Azerbaijan using data from 2015–2019. One of the main objectives of this study is to analyse the banks operating in Azerbaijan as a whole. With this approach, in order to include all banks in the analysis, data from some banks after 2019 could not be accessed. In other words, the lack of post-2019 data from some banks constitutes a limitation in this analysis.

The input-oriented analysis method is to calculate how much the inputs are minimised to produce the current outputs of DMUs. Fixed-return-to-scale Charnes, Cooper and Rhodes (CCR) and variable-return-to-scale Banker, Charnes and Cooper (BCC) models were used in the analysis, and as a result of these models, the Super Efficiency scores of the efficient banks were obtained. The names of the banks included in the study are shown in the table.

Table 1. List of banks included in the analysis

No.	Bank Names	No.	Bank Names	No.	Bank Names
1	Capital Bank	10	Pasha Bank	19	Bank of Baku
2	AccessBank	11	Premium Bank	20	Bank Respublika
3	AFB Bank	12	Bank Melli Iran	21	Bank VTB
4	Azer-Turk Bank	13	TuranBank	22	RabiteBank
5	Bank BTB	14	UniBank	23	Azerbaycan Industry Bank
6	ExpressBank	15	Xalq Bank	24	International Bank
7	Bank Avrasiya	16	Yapi Kredi Bank	25	National Bank of Pakistan
8	Gunay Bank	17	Yelo Bank		
9	MughanBank	18	Ziraat Bank		

Source: own study.

Due to the lack of data on personnel expenditures and general and disciplinary expenditures, which are among the input variables of Rabitabank for 2015 and 2016, these were not included in the analyses for those years.

Table 2. Input and output variables

Input				Output		
Interest Expenditures	Personnel Expenditures	General and Retained Expenditures	Deposits	Loans	Interest Income	Non-Interest Income Income

Source: own study.

As in most of the empirical literature, the input and output variables shown in Table 2 were used to analyse the efficiency of banks operating in the Azerbaijani banking sector. In the study, four inputs (interest expenditures, personnel expenditures, general and private expenditures and deposits) and three outputs (loans, interest income and non-interest income) were used for efficiency analysis.

All the data included in the analysis is given on the basis of the Azerbaijani national currency (manat) and analysed with the DEA-Solver program.

Research findings

CCR Model

Efficiency scores and averages for 24 banks in 2015–2016 and 25 banks in other years with a fixed return CCR model of input-oriented DEA to scale are shown in Table 3. The ranking is based on the annual performance averages of the banks.

Table 3 shows that three banks: Gunay Bank, Bank VTB and Bank Melli Iran were fully efficient, and except for 2015, AFB Bank, Halk Bank and Bank Eurasia, and except for 2016, National Bank of Pakistan achieved a fully efficient score between 2015–2019. The efficiency score of most of the banks included in the analysis was above 50%. The banks with an efficiency rate of less than 50% in 2015 were Bank Respublika (46%), Yapı Kredi Bank (45%) and Azer-Turk Bank (33%). According to Table 3, the number of fully efficient banks increased from seven banks to 18 banks in 2019 compared to 2015; that is, seven banks in 2015, nine banks in 2016, 12 banks in 2017, 13 banks in 2018 and 16 banks in 2019 were efficient.

The banks that got the closest to the full efficiency score in 2015 were Premium Bank (0.93), AccessBank (0.92) in 2016, Unibank and Muğanbank (0.96) in 2017, TuranBank (0.95) in 2018 and Unibank (0,98). The efficiency score average of the 25 banks included in the analysis between 2015 and 2019 is shown in Figure 1.
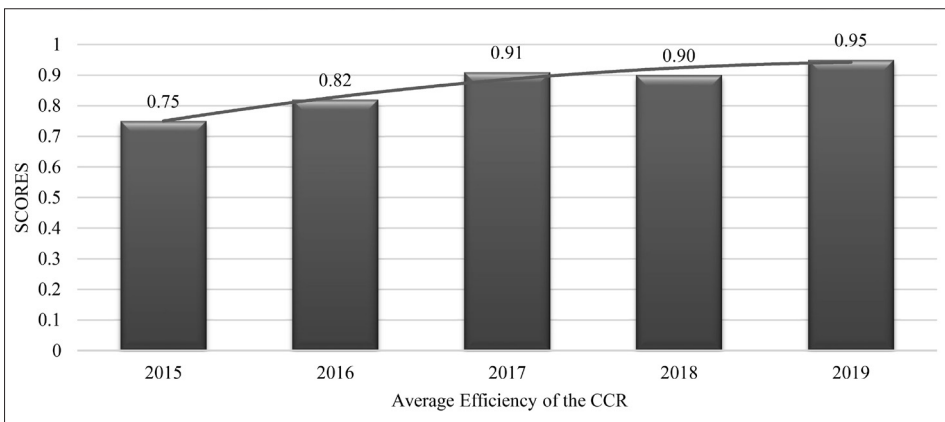
Figure 1. Average efficiency of the CCR model of banks by year (%)

Source: own study.

Table 3. CCR Efficiency Scores between 2015–2019

Bank Names	2015	2016	2017	2018	2019	Average
Gunay Bank	1	1	1	1	1	**1**
Bank VTB	1	1	1	1	1	**1**
Bank Melli Iran	1	1	1	1	1	**1**
Bank Avrasiya	0.85	1	1	1	1	**0.97**
Bank of Baku	1	1	0.83	0.88	1	**0.94**
Premium Bank	0.93	0.76	1	1	1	**0.94**
AFB Bank	0.67	1	1	1	1	**0.93**
AccessBank	1	0.92	1	0.91	0.77	**0.92**
National Bank of Pakistan	1	0.59	1	1	1	**0.92**
Xalq Bank	0.57	1	1	1	1	**0.91**
Yelo Bank	0.67	1	1	1	0.86	**0.91**
Azerbaycan Industry Bank	1	0.57	0.81	1	1	**0.88**
Unibank	0.78	1	0.96	0.65	0.98	**0.87**
MughanBank	0.74	0.83	0.96	0.92	0.89	**0.87**
Ziraat Bank	0.80	0.84	0.80	0.89	1	**0.87**
Uluslararası Bank	0.57	0.76	1	1	1	**0.87**
Yapi Kredi Bank	0.45	0.61	1	1	1	**0.81**
Expressbank	0.77	0.89	0.81	0.71	0.88	**0.81**
TuranBank	0.50	0.69	0.90	0.95	1	**0.81**
Kapital Bank	0.51	0.60	0.92	1	1	**0.81**
Pasha Bank	0.72	0.75	0.88	0.83	0.78	**0.79**
Rabitebank	-	-	0.82	0.71	0.73	**0.75**
Bank BTB	0.64	0.54	0.75	0.88	0.84	**0.73**
Bank Respublika	0.46	0.51	0.74	0.63	1	**0.67**
Azer-Turk Bank	0.33	0.76	0.66	0.56	0.95	**0.65**
Average score	**0.75**	**0.82**	**0.91**	**0.90**	**0.95**	

Source: own study.

Between 2015 and 2019, a linear progression in the average efficiency scores of banks was observed. The efficiency score increased from 75% in 2015 to 95% in 2019, reflecting a 27% improvement in average efficiency over this period. This trend suggests a significant enhancement in operational efficiency among banks in Azerbaijan, indicating progressive optimisation of their performance.

BCC Model

For 24 banks in 2015–2016 and 25 banks in other years, the variable return BCC model of input-oriented DEA is used to scale the efficiency score, and the averages are shown in Table 4. The ranking is based on the annual performance average of the banks.

Table 4. BCC Efficiency Score between 2015–2019

Banks Names	2015		2016		2017		2018		2019		Ave-rage
	Score	Scale	Score	Scale	Score	Scale	Score	Scale	Score	Scale	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
AccessBank	1	C	1	D	1	C	1	D	1	D	1
AFB Bank	1	D	1	C	1	C	1	C	1	C	1
International Bank	1	D	1	D	1	C	1	C	1	C	1
Bank Melli Iran	1	C	1	C	1	C	1	C	1	C	1
Bank Avrasiya	1	D	1	C	1	C	1	C	1	C	1
Bank VTB	1	C	1	C	1	C	1	C	1	C	1
Gunay Bank	1	C	1	C	1	C	1	C	1	C	1
National Bank of Pakistan	1	I	1	I	1	C	1	C	1	C	1
Pasha Bank	1	D	1	D	1	D	1	D	1	D	1
Premium Bank	1	D	1	D	1	C	1	C	1	C	1
Unibank	1	D	1	C	1	D	1	D	1	D	1
Xalq Bank	1	D	1	C	1	C	1	C	1	C	1
Expressbank	1	D	1	D	1	D	0.93	D	1	D	0.99
Yelo Bank	0.97	D	1	C	1	C	1	C	0.92	D	0.98
Kapital Bank	0.76	D	1	D	1	D	1	C	1	C	0.95
Mughanbank	0.85	D	0.89	D	1	D	1	D	1	D	0.95
Bank of Baku	1	C	1	C	0.83	D	0.90	C	1	C	0.95
Ziraat Bank	1	D	0.87	D	0.81	I	0.92	I	1	C	0.92

| 1	2	3	4	5	6	7	8	9	10	11	12
Industry Bank	1	C	0.65	C	0.86	I	1	C	1	C	0.90
TuranBank	0.72	D	0.85	D	0.93	D	1	D	1	C	0.90
Yapı Kredi Bank	0.63	D	0.74	D	1	C	1	C	1	C	0.87
Rabitebank	-	-	-	-	0.86	I	0.72	I	0.76	D	0.78
Bank BTB	0.72	D	0.57	D	0.75	I	0.89	D	0.91	D	0.77
Bank Respublika	0.65	D	0.59	D	0.74	I	0.77	D	1	C	0.75
Azer-Turk Bank	0.57	D	0.85	D	0.66	I	0.57	D	0.95	I	0.72
Average efficiency	0.91		0.92		0.94		0.95		0.98		

"C" – Constant Return to Scale Feature; "I" – Increasing Return to Scale Feature; "D" – Increasing Return to Scale Feature

Source: own study.

In Table 4, according to the results of the analysis made with the variable return to scale BCC model, 12 banks: National Bank of Pakistan, International Bank, Bank VTB, Xalq Bank, Bank Melli Iran, Premium Bank, Paşa Bank, Gunay Bank, Bank Avrasiya, AFB Bank, AccessBank and Unibank were seen to be efficient between 2015–2019. Eight banks: Expressbank, Yelo Bank, Kapital Bank, Muğanbank, Bank of Baku, Ziraat Bank, Azerbaycan Industry Bank and TuranBank had efficiency scores between 90% and 99%, Yapı Kredi Bank Azerbaijan 87%, while the other six banks received efficiency scores between 72% and 78%. Express Bank (except 2018) and Kapital Bank (except 2015) were efficient in other years. Yelo Bank, Muğanbank, Bank of Baku, Azerbaijan Industry Bank and Yapı Kredi Bank were efficient in three different years. According to Table 4, in 2019, compared to 2015, the number of efficient banks increased from 16 to 20. The efficiency scores of all banks included in the analysis achieved above 50%. The four banks with the lowest average scores were Rabitabank (78%), Bank BTB (77%), Bank Respublika (75%) and Azer-Turk Bank (72%).

The efficiency analysis shows that Azer-Turk Bank (2015, 2017 and 2018), the Bank BTB (2016) and Rabitabank (2019) received the lowest efficiency scores. As a result of the analysis conducted with the CCR and BCC method in Table 4, the characteristics of banks' returns to scale are also presented. The number of banks with constant returns to scale and without scale inefficiency was six banks in 2015, 10 banks in 2016, 12 banks in 2017, 14 banks in 2018 (Bank of Baku) and 16 banks in 2019. In both CCR and BCC analyses, it can be said that most of the banks with constant returns to scale are efficient and there is no need to change the

input and output variables. In the analysis performed by the Industry Bank in 2016 and the Bank of Baku in 2018 with the CCR and BCC method, it was determined that although they were not efficient, their scales did not change. The number of banks with increasing returns to scale was one in 2015, 2016 and 2019, six in 2017 and two in 2018. The banks with increasing returns to scale show that they produce less output while they should produce more output with current inputs. As the cause of this situation, the economic structure of the country, political decisions taken, the country being at war, as well as the geographical situation and climate, can be shown as external factors. In the analysis conducted with the CCR method, it is seen that most of the inefficient banks in all years have the feature of decreasing returns to scale. The average efficiency score of 25 banks included in the analysis between 2015 and 2019 is shown in Figure 2.
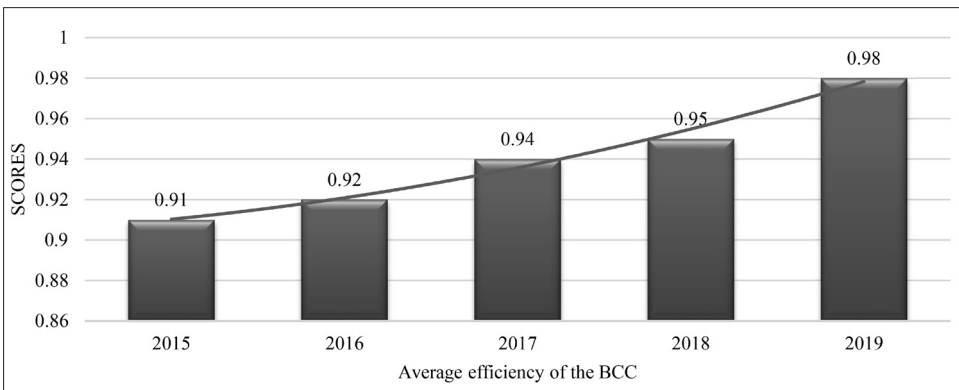
Figure 2. Average efficiency of the BCC model of banks by year (%)

Source: own study.

According to Figure 2, between 2015 and 2019, there was a linear increase in the average efficiency scores of banks. Specifically, the average efficiency score rose from 91% in 2015 to 98% in 2019. This represents an approximate 8% improvement in average efficiency over this period. These results indicate that banks operating in Azerbaijan are progressively enhancing their performance and operating with greater efficiency.

CCR Super Efficiency

In the efficiency analysis conducted with the CCR method, in order to determine which of the efficient banks is the most efficient, the results of the Super Efficiency analysis are presented in Table 5 below by year.

Table 5. Super Efficiency Analysis Predictions (CCR)

N	2015 Bank Names	Score	2016 Bank Names	Score	2017 Bank Names	Score	2018 Bank Names	Score	2019 Bank Names	Score
1	Industry Bank	227.89	Bank Melli Iran	11.70	National Bank of Pakistan	17.64	National Bank of Pakistan	21.01	National Bank of Pakistan	96.25
2	Bank Melli Iran	11.82	Unibank	4.63	International Bank	3.59	Bank VTB	2.31	Premium Bank	2.64
3	Gunay Bank	4.68	Gunay Bank	3.70	Bank VTB	3.30	Premium Bank	2.05	Xalq Bank	2.13
4	National Bank of Pakistan	1.53	Bank VTB	2.03	Premium Bank	2.09	Gunay Bank	1.96	Bank VTB	2.05
5	Bank VTB	1.13	AFB Bank	1.40	AFB Bank	1.87	Xalq Bank	1.95	Industry Bank	1.78
6	AccessBank	1.08	Bank of Baku	1.40	Bank Melli Iran	1.76	Bank Melli Iran	1.58	Bank Melli Iran	1.73
7	Bank of Baku	1.02	Yelo Bank	1.37	Xalq Bank	1.76	Industry Bank	1.54	AFB Bank	1.34
8			Bank Avrasiya	1.07	Gunay Bank	1.70	AFB Bank	1.50	Bank Avrasiya	1.31
9			Xalq Bank	1.01	Bank Avrasiya	1.36	Yelo Bank	1.27	International Bank	1.27
10					Yelo Bank	1.19	International Bank	1.26	Gunay Bank	1.21
11					Yapi Kredi Bank	1.12	Bank Avrasiya	1.18	Bank of Baku	1.13
12					AccessBank	1.04	Kapital Bank	1.16	Kapital Bank	1.12
13							Yapi Kredi Bank	1.05	Yapi Kredi Bank	1.11
14									Bank Respublika	1.06
15									Ziraat Bank	1.03
16									TuranBank	1.03

Source: own study.

Banks with the highest Super Efficiency scores obtained by the CCR method were Industry Bank in 2015 (227.89), Bank Melli Iran in 2016 (11.70) and National Bank of Pakistan in 2017–2019 (17.64, 21.01, 96.25). Banks with the least Super Efficiency scores by years were Bank of Baku (1.02), Halk Bank (1.01), AccessBank (1.04), Yapi Kredi Bank (1.05), Ziraat Bank (1.03) and TuranBank (1.03), respectively.

BCC Super Efficiency

The results of the Super Efficiency analysis conducted to determine which of the banks that are efficient in the efficiency analysis conducted with the BCC method is more efficient are presented in Table 6.

In Table 6, according to the results of the Super Efficiency analysis conducted using the variable return to scale BCC method, Bank Melli Iran achieved the highest scores (16.29 and 33.76) in 2015 and 2016, and the National Bank of Pakistan achieved scores of 27.00, 56.00 and 100.99 in 2017–2019. International Bank in all years, Industry Bank in 2015, Kapital Bank in 2018 and Pasha Bank in 2019 received the lowest Super Efficiency score (1.00). Furthermore, five banks in 2015 and 2018, nine banks in 2016, seven banks in 2017 and six banks in 2019 obtained a score of 2 or more.

The banks that were a reference for those that are not efficient in the input-oriented, constant returns efficiency analyses conducted for the years 2015–2019 of banks operating in Azerbaijan are presented in Table 7.

Table 7 illustrates that Bank Melli Iran, Bank VTB and Gunay Bank during the period were fully efficient and were shown as references for the inefficient banks. Although National Bank of Pakistan in 2015, Access Bank in 2017 and in 2018, AFB Bank, Bank Respublika, Premium Bank, TuranBank & Ziraat Bank in 2019 were efficient, these banks have not been referenced.

According to Table 7, Bank Avrasiya, Bank VTB, Gunay Bank and Xalq Bank were efficient during the years and are shown as a reference to the inefficient banks. Although AccessBank, Bank Melli Iran and Industry Bank in 2018 and 2019, AFB Bank and Ziraat Bank in 2015 and 2019, Bank Respublika in 2019, Expressbank and Muğanbank in 2017 and 2019, Kapital Bank in 2016 and 2017, Pash Bank in 2016–2019, Premium Bank, Turan Bank and Yapı Kredi Bank in 2018, International Bank in 2016, 2018 and 2019, and Unibank in 2017 were efficient, these banks have not been referenced.

As a result of the input-oriented analyses conducted with both CCR and BCC methods, it is observed that inefficient banks use existing outputs and input variables more efficiently than reference banks. It can be said that in order for inefficient banks to become efficient, they should use each variable efficiently and the variables should be reduced at approximately the same rate.

Table 6. Super Efficiency Analysis Predictions (BCC)

No.	2015 Bank Names	Score	2016 Bank Names	Score	2017 Bank Names	Score	2018 Bank Names	Score	2019 Bank Names	Score
1	Bank Melli Iran	16.29	Bank Melli Iran	33.76	National Bank of Pakistan	27.00	National Bank of Pakistan	56.00	National Bank of Pakistan	100.99
2	National Bank of Pakistan	7.46	Unibank	15.16	Bank Melli Iran	7.22	Premium Bank	3.11	Premium Bank	5.18
3	Gunay Bank	5.81	Gunay Bank	4.30	Bank VTB	3.34	Bank VTB	2.74	Bank VTB	2.56
4	AccessBank	2.50	National Bank of Pakistan	3.54	Xalq Bank	2.71	Xalq Bank	2.02	Xalq Bank	2.52
5	Xalq Bank	1.71	Bank VTB	2.64	Pasha Bank	2.56	Gunay Bank	1.97	Bank Melli Iran	2.00
6	Bank VTB	1.62	Bank of Baku	2.44	Premium Bank	2.09	Yelo Bank	1.93	Industry Bank	1.80
7	Premium Bank	1.61	Xalq Bank	2.25	AFB Bank	1.95	Bank Melli Iran	1.89	Bank Respublika	1.77
8	Pasha Bank	1.53	AFB Bank	2.20	Yelo Bank	1.77	AFB Bank	1.74	Kapital Bank	1.60
9	Bank of Baku	1.42	AccessBank	1.86	Gunay Bank	1.71	Industry bank	1.58	Gunay Bank	1.42
10	Expressbank	1.29	Yelo Bank	1.62	AccessBank	1.56	AccessBank	1.41	Expressbank	1.42
11	AFB Bank	1.11	Premium Bank	1.50	Bank Avrasiya	1.37	Pasha Bank	1.40	Unibank	1.38
12	Ziraat Bank	1.07	Pasha Bank	1.45	Yapi Kredi Bank	1.35	Bank Avrasiya	1.25	AFB Bank	1.35
13	Bank Avrasiya	1.06	Expressbank	1.16	Unibank	1.19	Muganbank	1.23	Bank Avrasiya	1.32
14	Industry Bank	1	Kapital Bank	1.13	Kapital Bank	1.16	Yapi Kredi Bank	1.15	AccessBank	1.30
15	International Bank	1	Bank Avrasiya	1.12	Expressbank	1.12	Unibank	1.11	Yapi Kredi Bank	1.29
16			International Bank	1	Muganbank	1.05	TuranBank	1.01	Muganbank	1.24
17					International Bank	1	Kapital Bank	1	Bank of Baku	1.15
18							International Bank	1	TuranBank	1.14
19									Ziraat Bank	1.07
20									Paşha Bank	1
21									International Bank	1

Source: own study.

Table 7. Reference Numbers of Efficient Banks (CCR and BCC)

Bank Names	CCR					BCC				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
AccessBank	3	-	0	0	-	2	1	1	0	0
AFB Bank	-	6	4	3	0	0	5	3	2	0
Bank Melli Iran	1	-	-	-	1	2	5	2	0	0
Bank of Baku	-	-	5	-	1	7	6	-	-	4
Bank Respublika	16	12	8	2	3	-	-	-	-	0
Bank Avrasiya	5	7	-	-	6	1	1	6	3	3
Bank VTB	-	-	-	-	0	3	3	2	3	2
Expressbank	-	5	9	5	6	4	3	0	-	0
Gunay Bank	6	5	4	5	1	5	3	7	7	2
Halk Bank	17	12	11	11	3	4	7	3	3	2
Kapital Bank	-	-	-	3	3	-	0	0	2	2
Muğanbank	0	-	3	3	6	-	-	0	1	0
National Bank of Pakistan	-	-	2	2	0	0	0	1	3	1
Pasha Bank	-	-	-	-	0	3	0	0	0	0
Premium Bank	-	4	-	-	-	5	0	5	3	2
Industry Bank	-	2	4	5	4	5	-	-	0	0
TuranBank	-	-	-	-	1	-	-	-	0	1
International Bank	-	2	2	5	-	4	0	3	0	0
Unibank	-	-	-	-	0	-	0	1	1	3
Yapı Kredi Bank						-	-	2	0	1
Yelo Bank						-	2	2	5	-
Ziraat Bank						0	-	-	-	0

"-" banks that are not efficient in the current year.

Source: own study.

Conclusion

The importance of the banking sector is increasing day by day in the globalising world. In this study, the comparison of selected decision-making units with the CCR, BCC and Super Efficiency model measurements of input-oriented DEA for the period 2015–2019 was analysed. In the input-oriented DEA model, the aim is to minimise the level of inputs in order to produce the available outputs. In the selection of decision-making units, inputs and outputs that meet the

minimum conditions for the analysis were investigated, and all 25 banks operating in Azerbaijan were selected as decision-making units. To analyse the efficiency of banks, 24 banks in 2015–2016 and 25 banks in 2017–2019 were included in the study. In other words, Rabitabank was not included in the analysis in 2015 and 2016. The limitation of the study is the unavailability of Rabitabank's data for the years 2015–2016 from the Statistical Institute of the Republic of Azerbaijan and the annual reports of the bank. The study uses four variables as inputs – interest expenditures, personnel expenditures, general/special expenditures and deposits – and three variables as outputs – loans, interest income and non-interest income in thousands (manat). Super Efficiency analyses were conducted to determine which year was more efficient in CCR and BCC models, and improvement suggestions were developed for inefficient years.

According to the analysis results of the input-oriented CCR and BCC models, Azerbaijan's banking system exhibited expected improvements from 2015 to 2019. This enhancement is likely due to amendments made by the Central Bank of Azerbaijan to the banking regulations, which aimed to promote bank development. Furthermore, the analysis of input-oriented CCR and BCC Super Efficiency models indicates that the efficiency scores of banks in Azerbaijan increased from 2005 to 2019. These findings suggest that the development of banks in Azerbaijan was positively influenced by the reforms implemented by the Central Bank of Azerbaijan.

According to the results of the four model analyses, the average efficiency scores of banks increased from 2015 to 2019, indicating that banks are operating more efficiently. As a result of the analysis, it is recommended that inefficient banks learn the transaction systems of efficient banks and adjust the inputs and outputs of their banks in accordance with their capacities.

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Summary

The primary objective of this research was to assess the efficiency of banks within the Azerbaijani banking system, identifying and comparing both efficient and inefficient banks. To this end, the efficiency of 25 banks operating in Azerbaijan from 2015 to 2019 was analysed using input-oriented CCR, BCC and Super Efficiency models. The results provide insights into the efficiency levels of the banks and highlight the distinctions between efficient and inefficient institutions. Furthermore, recommendations for improving inefficient banks were developed, with the expectation that these suggestions could enhance the effective use of resources within the banking system. The study estimates a significant increase in banking system efficiency over the years, and this improvement is believed to reflect the positive impact of reform and enhancement efforts.

Keywords: DEA, BCC model, CCR model, super efficiency, Azerbaijan banking system.

**Badanie efektywności systemu bankowego Azerbejdżanu za pomocą analizy DEA
(2015–2019)**

Streszczenie

Głównym celem niniejszego badania jest ocena efektywności banków w systemie bankowym Azerbejdżanu, zidentyfikowanie i porównanie banków efektywnych i nieefektywnych. W tym celu, efektywność 25 banków działających w Azerbejdżanie w latach 2015–2019 została przeanalizo-

wana przy użyciu modeli CCR, BCC oraz modelu superefektywności opartego na danych wejściowych. Wyniki analizy dostarczyły informacji na temat poziomów efektywności banków i uwypukliły różnice między bankami efektywnymi a nieefektywnymi. Ponadto opracowano rekomendacje dotyczące poprawy efektywności banków nieefektywnych, z nadzieją, że sugestie te przyczynią się do bardziej efektywnego wykorzystania zasobów w systemie bankowym. Badanie szacuje, że w ciągu lat efektywność systemu bankowego znacznie wzrosła, a ten wzrost uważa się za odzwierciedlenie pozytywnego wpływu reform i działań usprawniających.

Słowa kluczowe: DEA, model BCC, model CCR, super efektywność, system bankowy Azerbejdżanu.

JEL: D61, D70, E42, E50, G24.

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